



UNIVERSITY OF L'AQUILA



**Profile of**

***2<sup>nd</sup> Cycle Degree in  
MEDICAL BIOTECHNOLOGIES***

**Laurea Magistrale in  
BIOTECNOLOGIE MEDICHE**

**DEGREE PROFILE OF**  
**Laurea Magistrale in BIOTECNOLOGIE MEDICHE**  
**Second Cycle Degree in MEDICAL BIOTECHNOLOGIES**

TYPE OF DEGREE & LENGTH	Single Degree (120 ECTS-credits)
INSTITUTION(S)	Università degli Studi dell'Aquila - <i>University of L'Aquila</i> , ITALY
ACCREDITATION ORGANISATION(S)	Italian Ministry of Education and Research Albo dei Biologi /Associazione Nazionale biotecnologi ( <a href="http://www.bbbb.eu">www.bbbb.eu</a> ),
PERIOD OF REFERENCE	Programme validated for 3 years for cohorts starting in October 2012
CYCLE /LEVEL	QF for EHEA: Second Cycle; EQF level: 7; NQF for Italy: Laurea Magistrale

<b>A</b>	<b>PURPOSE</b>
	<p>The 2<sup>nd</sup> Cycle Degree Program in <i>Medical Biotechnologies</i> aims to prepare students for advanced careers in molecular biotechnology-oriented clinical, industrial and research laboratories, high level broad spectrum specialists distinguished by creative and critical thinking, with fundamental low-based knowledge and faculties necessary for various biology-related scientific, technical and productive development of biotechnologies applied to the human health field, and who can therefore work in positions of high responsibility. The program, in accordance with the Italian <i>Ministry Decree n.270/2004</i>, concentrates on biological processes, technologies and skill sets used in the research and development of drugs, vaccines and devices for the medical industry and in the diagnosis of diseases. The Master degree in <i>Medical Biotechnologies</i> provides the students the knowledge and skills to enable them to analyze molecular diversity, structure, composition, to characterize biological systems, their functioning and interaction, to better understand principles of immune and other systems, to comprehend the pathogenesis of diseases and to improve their diagnosis and therapy and to work according principles of good laboratory practice, rules of bioethics. The programme meets the requirements of European and National laws and Directives.</p>

<b>B</b>	<b>CHARACTERISTICS</b>	
1	DISCIPLINE(S) / SUBJECT AREA(S)	Strong theoretical basis on Biology and Medicine, Laboratory Practice (20:30:50)
2	GENERAL / SPECIALIST FOCUS	Specialist on molecular knowledge of diseases to improve diagnosis and therapy
3	ORIENTATION	It is an academic research based degree with a professional orientation applied to the theory and practice of Biotechnologist professional profile, according to International and National Directives on Alliees Health Professions.
4	DISTINCTIVE FEATURES	This degree has a strong component of interdisciplinary learning with other biomedical professionals and is developed in a stimulating research environment. Students have a 3/6-months placement in biomedical departments in Italy and/or abroad for on-field working experiences and research activities.

<b>C</b>	<b>EMPLOYABILITY &amp; FURTHER EDUCATION</b>
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1	EMPLOYABILITY	<p>Upon successful completion of the Programme, graduates are eligible to work as Medical Biotechnologists and join National Associations of Italian Biotechnologist (ANBI) (<a href="http://www.biotechnologi.org">www.biotechnologi.org</a>). Graduates having passed the state examination can be enrolled in the professional Register of Biologists, who have fulfilled the requirements of European Directive ("Professional Qualifications Directive" 2005/36/EC) on the Recognition of Professional Qualifications.</p> <p>Graduates carry out their professional activities in health care facilities, public or private, either as employees or freelance workers, in Companies related to molecular biology, biotechnology, biopharmaceutics and food industry.</p>
2	FURTHER STUDIES	<p>The Master Degree in <b>Medical Biotechnologies</b> normally gives direct access to a wide range of PhD degree programs in the fields encompassed on Allied Healthcare Professionals as well as Biology, Molecular Biology and Biotechnology, Biochemistry, and other PhD programs related to biotechnological and biomedical sciences. Furthermore they can carry out research and teaching activities at university.</p>

D EDUCATION STYLE		
1	LEARNING & TEACHING APPROACHES	Lectures, group-work, individual study and autonomous learning, inter professional learning, self directed study, work placement.
2	ASSESSMENT METHODS	<p><b>Formative assessment</b> is a fundamental part of the teaching and learning activities. Throughout the Programme students are encouraged to become independent and self-motivated learners, thriving on challenge and opportunities to think for themselves. At the start of the degree each student is assigned a Tutor who, throughout the studies, provides help in three important areas: supporting academic progress, developing transferable skills and dealing with any welfare issues. Small-group or individual tutorials, run alongside the lecture course and addressing any individual problems, allow the students to consolidate lecture material, as well as test understanding through problem-solving exercises.</p> <p><b>Summative assessment</b> is performed in several ways, according to the characteristics of each Module. Written exams, oral exams, laboratory and project reports, oral presentations, continuing assessments, course work evaluation, final comprehensive exam. Particular emphasis is given to team work, with a variety of assessment methods of results obtained in either a group or individually (by splitting tasks and assignments), by written reports or a presentation. The aim is to develop a research-orientated approach to a problem and to acquire essential skills that are highly valued by employers.</p> <p>During the second year the student must work in the laboratories and carry out experiments focused on specific research themes that will be the topics of their Thesis under the guidance of a tutor/supervisor. The results will be reported in a written text that must possess the characters of originality, exhaustive documentation and scientific investigation, and the final exam, consisting of the presentation of the outcomes to a committee of university professors and experts, aims to evaluate the acquired knowledge, skills and competences as well as the capacity to be independent in making judgments, updating knowledge and to communicate clearly complex concepts.</p> <p>Students are informed of the assessment procedure before the courses start and are also provided with previous examples.</p> <p><b>Re-assessment</b> procedures follow the principles decided at institutional level.</p> <p>Degree holders obtain the credentials for National Certification as "<b>Medical Biotechnologist</b>"</p>

E PROGRAMME COMPETENCES		
1	GENERIC	
The degree program meets the competences and quality assurance procedures required by <i>Italian Association of Biotechnologists</i> and by the National Higher Education Quality Assurance Agency (AVA) requirements for degree courses		

	<p>at second level. This includes the Generic Competences expected for the second cycle graduated, as follows:</p> <ul style="list-style-type: none"> <li>— <b>Analysis and synthesis:</b> Knowledge and understanding of the subject area and understanding of the profession and ability to be critical and self-critical and to make autonomous judgments;</li> <li>— <b>Flexible mind:</b> Ability to make autonomous reasoned decisions and to interact with others in a constructive manner, even when dealing with difficult issues;</li> <li>— <b>Leadership, Management and Team-working:</b> Ability to work in a team and to interact constructively with others regardless of background and culture and respecting diversity;</li> <li>— <b>Communication skills:</b> Ability to communicate both orally and through the written word in first language and in another European language;</li> <li>— <b>Field culture:</b> Ability to apply knowledge in practical situations and to act on the basis of ethical reasoning</li> <li>— <b>Learning ability:</b> Capacity to learn and stay up-to-date with learning</li> <li>— <b>Problem solving:</b> Ability to identify, pose and resolve problems in new or unfamiliar environments within broader and multidisciplinary contexts in providing, organizing and optimizing health diagnostic services;</li> <li>— <b>Other skills:</b> Ability to plan and manage time and to evaluate and maintain the quality of work produced</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:</p> <p><b>Deep knowledge and understanding:</b></p> <ul style="list-style-type: none"> <li>- of the morphology and functions of the cell, systems and full human body;</li> <li>- of cellular and molecular etiopathogenesis of the most important human pathologies;</li> <li>- of congenital or acquired pathological conditions in which it is possible to intervene using a biotechnological approach;</li> <li>- of the main diagnostic and clinical procedures for the main human pathologies, including applied technologies.</li> </ul> <p><b>Comprehension/understanding:</b></p> <ul style="list-style-type: none"> <li>- ability to recognize the interaction between foreign micro-organisms and the human body (also through specific diagnostic investigations);</li> <li>- ability to recognize the elements of innovation in innovative medicine development projects;</li> <li>- ability to recognize and assess the main ethical problems involved in clinical experimentation protocols;</li> <li>- ability to formulate detailed autonomous judgments and opinions in order to solve specific problems linked to their professional activities;</li> </ul> <p><b>Analysis:</b></p> <ul style="list-style-type: none"> <li>- Ability to analyze, assess and evaluate biomedical and biotechnological tests in collaboration with other health care professionals as well as to take actions for the achievement of personnel ethic, social and moral behavioral attitude;</li> </ul> <p><b>Application:</b></p> <ul style="list-style-type: none"> <li>- ability to use the main methodologies and instruments which are featured in biotechnology for the purposes of the prevention, diagnosis and treatment of human disease;</li> <li>- in cooperation with medical graduates, ability to design and apply biotechnology-based preventive, diagnostic and therapeutic strategies in the field of human pathologies;</li> <li>- ability to apply European regulations relative to the experimentation of medicines, in particular medicines for advanced treatments and tissue engineering products;</li> <li>- ability to use computer, biocomputing and statistical methodologies;</li> </ul> <p><b>Synthesis:</b></p> <ul style="list-style-type: none"> <li>- ability to recognize the interaction between foreign micro-organisms and the human body (also through specific diagnostic investigations);</li> <li>- ability to recognize the elements of innovation in innovative medicine development projects;</li> <li>- ability to recognize and assess the main ethical problems involved in clinical experimentation protocols;</li> <li>- ability to formulate detailed autonomous judgments and opinions in order to solve specific problems linked to their professional activities.;</li> <li>- Capacity to provide reasons for, analyze, interpret and document the chosen actions and solutions on the basis of reasoning, decision-making, documentation and evaluation processes;</li> </ul> <p><b>Creativity:</b></p> <ul style="list-style-type: none"> <li>- Ability to plan and adapt instruction, guidance and advice as regards problems with time and equipment management;</li> <li>- ability to plan and enhance the actions aiming to increase human, technological, information and financial resources of the health structures where they work;</li> </ul> <p><b>Evaluation and learning skills:</b></p> <ul style="list-style-type: none"> <li>- ability to organize and plan laboratory activities and to study experimental techniques in detail;</li> <li>- ability to keep abreast of the regulations, methods, techniques and tools applied in the sector also through the consultation and study of bibliographic sources, which is indispensable in a continuously evolving field;</li> <li>- development of a study method and ability to work by objectives, both in groups and autonomously;</li> <li>- ability to select and interpret data and information.</li> <li>- acquisition of the learning skills required to continue studies with a high level of autonomy;</li> </ul>

<ul style="list-style-type: none"> <li>- Ability to perform continuous quality assessment and evaluation of outcomes and results of their work;</li> </ul> <p><b>Problem managing:</b></p> <ul style="list-style-type: none"> <li>- ability to identify and prevent the problems arising in the lab work and develop suitable solutions;</li> </ul> <p><b>Communication:</b></p> <ul style="list-style-type: none"> <li>- ability to communicate both verbally and in writing scientific knowledge, both specialist and educational;</li> <li>- ability to communicate with other professional groups in multidisciplinary and multiprofessional collaboration.</li> </ul>
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<b>F</b>	<p><b>COMPLETE LIST OF PROGRAMME LEARNING OUTCOMES</b></p> <p>Upon a successful completion of the MA Program of <i>Medical Biotechnologies</i> students will gain:</p> <ul style="list-style-type: none"> <li>-Advanced knowledge in the areas of cellular and molecular biology, protein biochemistry, immunology and general pathology and physiology necessary for professional practice in the field of medical biotechnology;</li> <li>-Understanding of the use and application of relevant analytical techniques within the field of medical biotechnology;</li> <li>-Training with the planning, execution and communication skills necessary to successfully conduct research and development in medical biotechnology;</li> <li>-An understanding of basic project management and product development practices along with the regulatory structures that impact R&amp;D in biotechnology;</li> <li>-Enhanced skills in effective interpersonal and professional communication, both oral and written.</li> <li>-Increased awareness of professional, ethical and social responsibilities with relationship to medical biotechnology.</li> </ul> <p><b>The newly graduates will also be able:</b></p> <ul style="list-style-type: none"> <li>-To analyze molecular diversity, structure, composition, to characterize biological systems, their functioning and interaction: genomics, proteomics, metabolomics;</li> <li>-To understand principles of immune and other systems, their structures, integration with other vital systems of biological objects;</li> <li>-To work with living cells, organisms, animal model of diseases and populations. To evaluate processes taking place inside of the cell, work with cell cultures under laboratory conditions, to apply obtained results for modeling of biological systems, to evaluate intercellular interconnections, relations between single individuals and populations;</li> <li>-To comprehend evolution of biological objects, laws in heredity and variability, features and molecular principles of congenital diseases, and to know how to apply them for investigation of biological diversity, structure of living organisms, functioning and evolution;</li> <li>-To apply modern investigation methods, to work according principles of good laboratory practice, rules of bioethics, to collect, process, preserve and prepare research material under laboratory and field conditions;</li> <li>-To apply acquired knowledge to solve emerging problems, to recognize, analyze biological problems, to plan strategies to solve these problems, to plan and carry out various measurements, process and interpret biological data, to classify and present these data;</li> <li>-To solve qualitative and quantitative problems by using acquired mathematical and computational skills and special computer software, DNA data base;</li> <li>-To use creatively bioinformation technologies for analysis, digital description and simulation of biological objects, to use biological databases, to systematize the collected information.</li> <li>- To independently combine organizational/managing skills with understanding of the different areas of biomedical technologies;</li> <li>- To demonstrate professional interpersonal, oral, and written communications skills</li> <li>-To demonstrate professional conduct and apply legal, social, and ethical responsibilities within the laboratory environment;</li> <li>- To apply basic scientific principles in learning new techniques and procedures; demonstrate application of principles and methodologies and promote long learning activities within the structure;</li> <li>- to communicate to specialists and general public the results of their research and the great opportunities created by the scientific field.</li> </ul>
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**Comprehensive Scheme of the 2<sup>nd</sup> Cycle Degree in  
MEDICAL BIOTECHNOLOGIES**

<b>YEAR</b>	<b>CODE</b>	<b>COURSE</b>	<b>Credits (ECTS)</b>	<b>Semester</b>
<b>I</b>	B0389	Biotechnology of Central Nervous System	6	1
	B0476	Functions and Analysis of Biologic Macromolecules	8	1
	B0418	Pathologic Processes of Human Interest	12	1
	B0392	Diagnostic Microbiology and Epidemiological Methodology	11	2
	B0397	Clinical Pharmacology and Toxicology	6	2
		<i>Free choice Courses</i>		8
	<i>Other activities</i>		2	1 and 2
<b>II</b>	B0407	Conventional and advanced diagnostic strategies	18	1
	B0401	Intellectual Properties, Patents and European Legislation	3	1
	B0422	Experimental Biotechnology Models	10	2
	B0402	Reproductive Biotechnologies	6	2
		<i>Thesis</i>	30	2