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## UNIVERSITA' DEGLI STUDI DEL MOLISE Area Innovazione e Sviluppo

PhD IN B	BIOLOGY AND APPLIED SCIENCES (DOT197K79Z)
	Coordinator: prof. Giovanni FABBROCINO
Duration of course	1st November 2019 – 31st October 2022
Educational targets	<ul> <li>The PhD Program in 'Biology and Applied Sciences' of the University of Molise aims at train advanced scientific and technological skills able to carry out autonomous and interdisciplinary research in the field of biology and safety of infrastructure and information, developing and integrating advanced tools for analysis and processing of data. Particular attention is paid to the education of the student to develop strategies of analysis and solution of complex problems to be applied both in research and in industrial contexts. The course is divided into two curricula: <ul> <li>Biology: aims at training highly qualified professionals with an interdisciplinary preparation able of designing and autonomously carrying out basic and applied research in the context of the various biological systems.</li> <li>The research topics concern in particular microbial, animal and plant organisms and include their study at cellular, molecular and morphofunctional level.</li> <li>Applied Sciences: aims at training professionals able to autonomously design and carry out research in scientific fields characterized by high levels of interdisciplinarity by using quantitative methods. The latter are established in the field of information sciences, mathematics and physics, structural and environmental monitoring technologies by exploiting the integration of numerical analysis techniques, optimization methods, data and knowledge management, software engineering and IT security.</li> </ul></li></ul>
Admission requirements	Degree taken after a Graduate Program (Two-year higher course) already declared equipollent by competent Italian authorities or deemed equivalent for the sole purposes of the competition to a Second Level Italian specialist/master degree belonging to the following classes: <i>LMG/01 Law</i> <i>LM-4 Architecture and Architectural engineering</i> <i>LM-6 Biology</i> <i>LM-7 Agrarian Biotechnologies</i> <i>LM-8 Industrial Biotechnologies</i> <i>LM-9 Pharmaceutical, Veterinary and Medical biotechnologies.</i> <i>LM-10 Conservation of environmental and architectural heritage</i> <i>LM-11 Conservation and restoration of the cultural heritage</i> <i>LM-13 Pharmacy and industrial pharmacy</i> <i>LM-17 Physics</i> <i>LM-18 Computer science</i> <i>LM-21 Biomedical engineering</i> <i>LM-22 Chemical engineering</i> <i>LM-23 Civil engineering</i>

	LM-26 Safety engineering
	LM-31 Management engineering
	LM-32 Computer systems engineering
	LM-33 Mechanical engineering
	LM-35 Environmental engineering
	LM-40 Mathematics
	LM-41 Medicine
	LM-42 Veterinary Medicine
	LM-43 Information technology methods for the humanities
	LM-44 Mathematical modelling for engineering
	LM-53 Material engineering
	LM-54 Chemistry
	LM-60 Natural sciences
	LM-61 Nutrition
	LM-66 Computer systems safety
	LM-69 Agricolture
	LM-71 Industrial chemistry
	LM-82 Statistics
	LM-91 Methods and techniques for the information society
	4/S (Architecture and construction engineering)
	0/3 (Blology) 7/5 (Agrigultural histochuglogica)
	//S (Agricultural biotechnologies)
	0/S (Industrial Difference) and modical biotechnologies
	10/S (Conservation of architectural haritage and environment)
	12/S (Conservation of dremeetaria neritage and environment)
	20/S (Physics)
	20/5 (1 mystes) 22/S (1 mw)
	23/S (Computer Science)
	24/S (Computer Science for humanities)
	27/S (Chemical engineering)
	28/S (Civil engineering)
	35/S (Computer engineering)
	36/S (Mechanical engineering)
	38/S (Environmental engineering)
	61/S (Materials science and engineering)
	62/S (Chemistry)
	77/S (Agriculture)
	81/S (Industrial chemistry and related technologies)
	82/S (Environmental and land sciences and technology)
Total available positions	Total available positions 9:
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	- n. 5 positions with scholarship
	- n. 1 position reserved to students graduated in a foreign University
	- n. 2 positions without scholarship
	- n. 1 position with scholarship cofinanced by CNR – Topics
	Development of volvest methodologies for a horse or with
	Development of robust methodologies for cybersecurity
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	<u>Curriculum Biology</u>
	- n. 3 positions with scholarship;
	- n 1 position without scholarship
	Curriculum Applied Sciences
	n 2 positions with scholarshing:
	- II. 2 positions with scholarships,
	- n. I position without scholarship.
	- n. 1 position with scholarship cofinanced by CNR – Topics Development
	of robust methodologies for cybersecurity
	of robust memouologies for cyber security

	The positions reserved to students graduated in a foreign University are associated to the curriculum once the evaluation and ranking of the candidates is accomplished.
Exams – Selection procedures	Italian candidates         • Evaluation of qualifications and research project attached to the application;         • Interview in Italian or English language         • English language proficiency         Italian candidates residing abroad         • Evaluation of qualifications and research project attached to the application:
	<ul> <li>Possible interview in videoconference, in this case a Skype is required</li> <li>English language proficiency</li> </ul> Foreign candidates <ul> <li>Evaluation of qualifications and project proposal annexed to the application</li> <li>Interview in English language</li> <li>English language proficiency</li> </ul>
	<ul> <li>Foreign candidates residing abroad</li> <li>Evaluation of qualifications and research project proposal annexed to the application</li> <li>Possible interview in videoconference; in this case a Skype is required;</li> <li>English language proficiency;</li> </ul>
Interview	<ul> <li><u>Place</u>: Università degli Studi del Molise, Dipartimento di Bioscienze e Territorio, Pesche (IS)</li> <li><u>Date</u>: starting from 25 September 2019 at 10.00 according to the agenda established by the Selection Committee depending on the number of the candidates admitted to the interview.</li> </ul>
Other assessable qualifications	<ul> <li>Qualifications evaluated up to 20/80 points:</li> <li>Final degree mark; as an alternative in the case of missing degree at the time of the application, average grade of the passed exams;</li> <li>Scientific publications on peer-reviewed journals (max. 3), participation to national and international congresses with oral presentations and posters;</li> <li>Other qualifications considered evaluable (study grants, awards, courses attended, Masters, Erasmus or study programs abroad, work experiences, etc)</li> </ul>
Criteria for evaluating the exams	Evaluation of qualifications is preparatory in order to be admitted to the tests. All candidates having scored at least 15/80 and 15/80 for the project proposal annexed to the application will be considered suitable for the interview.

	The ranking of the candidates after the first stage of evaluation will be
	published, as soon as available, before the interview, on the PhD program
	web page http://dipbioter.unimol.it/dottoratobiosap/
	Scored at most 20/80 for the titles
	scored at most 60/80 for the project presentation:
	- 20/80 for the research project;
	- 40/80 for the oral presentation and discussion of the research
	project
Examination themes	Candidates are required to prepare a research project proposal to be
	submitted along with the application form. The maximum length of the
	research project is 10.000 characters (excluding references). The
	project proposal must be on one of the following themes selected
	among those of interest to the two curricula:
	<u>a. Biology</u> :
	• recovery, conservation, monitoring and characterization of
	biodiversity;
	<ul> <li>study of the mechanisms of interaction between plant organisms and the environment;</li> </ul>
	• use of plants and microorganisms in environmental recovery and restoration:
	• analysis of microbial communities and study of the interaction
	between microorganisms and between microorganisms and
	higher organisms:
	• study of the cellular mechanisms that underlie certain human
	pathologies;
	• analysis of the response of healthy or pathological human cell
	models to treatment with molecules of natural and / or synthetic
	origin;
	• regulation of metabolic pathways in cell proliferation, survival and differentiation processes:
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	b. Applied Sciences:
	• Design and development of complex and secure software systems;
	• Design of decision support systems based on machine learning
	techniques and both exact and meta-heuristic optimization
	methods;
	• Analysis and design of mathematical models for image analysis
	and for modeling and numerical solution of complex equation
	systems;
	• Advanced diagnostics and monitoring of people, environment,
	built heritage and cultural heritage;
	• Security of IT and technological infrastructures, both from a
	software and physical point of view (buildings, networks,
	lifelines);
	Analysis, refurbishment and preservation of the relevant
	environmental, urban, historical and architectural heritage;

• Structural and geotechnical safety of structures subjected to natural and anthropic hazards and emerging technologies for risk mitigation.
For the oral presentation and discussion of the project candidates are allowed to use information technology supports.