

**ANNEX A****PhD Course Biological, Informatics and Computational systems (DOT197K79Z)**

Coordinator	Prof.ssa Dalila Trupiano e-mail: dalila.trupiano@unimol.it	
Short description	The PhD programme in "Biological, Informatics and Computational Systems" is an advanced, interdisciplinary, and international training programme aimed at preparing highly qualified researchers in the fields of biosciences, informatics and computational sciences. Within this framework, the programme promotes both specialized disciplinary research pathways and interdisciplinary research approaches that integrate expertise from different scientific domains and apply advanced methodologies for the analysis and management of complex data. With a strong application-oriented focus, the programme also includes a mandatory international mobility period of at least six months, to be carried out at companies, research institutions, or universities abroad. In addition, it encourages study and research experiences at other qualified Italian institutions.	
Web Site	Information on the structure of PhD activities is available on the webpage of the Doctoral School site: https://www3.unimol.it/ricerca/scuola-di-dottorato/generiche/24	
Duration of the Programme	01/11/2026 – 31/10/2029	
Total Number of Available Positions	Position with ordinary scholarship	1
	Position funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027)	1
	Position funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027) and with mandatory six-months research period in the company. Research topic: <i>Isolation and characterization of microorganisms for biotechnological applications.</i>	1
	Position co-funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027) and company. A mandatory six-months research period in the company is required. Research topic: <i>Three-dimensional density reconstruction from cosmic muon data using artificial intelligence algorithms.</i>	1
	Position co-funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027) and company. A mandatory six-months research period in the company is required. Research topic: <i>Identification of molecular targets and development of novel therapeutic strategies for neurodegenerative diseases.</i>	1
	TOTAL positions with scholarship	5
Admission requirements	All specialized or master's degrees or degrees in the system before the introduction of the D.M. 509/1999. In the case of candidates who have obtained their qualifications abroad, they must have the same characteristics as those listed above.	



Assessable Qualifications and Corresponding Scores	List of assessable qualifications (point awarded up to a maximum of 25/100): - <i>curriculum vitae et studiorum</i>; - graduation mark; in the case of participation in the selection before graduation, the weighted average marks of the passed exams; - other educational qualifications that can be deduced from the <i>curriculum vitae et studiorum</i>: specialization diplomas; attendance of post-graduate specialization courses; documented research activity at universities and research centers; prizes and awards obtained during the study; participation in Erasmus programs; internship and abroad activities; work experiences, internships and training in companies; I and II level masters; research grants - a maximum of three peer-reviewed scientific publications and a maximum of five participations in national and international conferences with written contributions, oral presentations, or posters. Titles will also be assessed for their relevance to the topics covered within the PhD in Biological, Informatics and Computational sciences. The reference topics include, but are not limited to: - Plant and Microbial Biodiversity Conservation, analysis, monitoring, and enhancement of plant and microbial biodiversity; study of organism–environment interactions; isolation and characterization of microorganisms for biotechnological applications; phytoremediation, bioremediation, and sustainable management of natural and human-modified ecosystems. - Health Biology, Physiology, and Biomedical Research Investigation of the cellular and molecular mechanisms involved in physiological and pathological processes; analysis of signaling pathways, metabolism, and cellular responses; development of experimental models and innovative strategies for biomedical and therapeutic applications. - Chemistry for Health, Environment, and Sustainability Design, characterization, and study of natural and synthetic bioactive molecules; applications in therapeutic, diagnostic, environmental, and industrial fields; development of innovative chemical methodologies aimed at sustainability and environmental protection. - Computer Science, Software Systems, and Artificial Intelligence Design, development, and evaluation of advanced algorithms, software systems, and digital infrastructures; research in artificial intelligence, machine learning, data science, computer vision, biometrics, virtual and augmented reality, communication networks, cybersecurity, software quality, and decision-support systems. - Computational Modeling and Analysis of Complex Systems Development and application of mathematical and computational models for the analysis, simulation, and prediction of complex phenomena; use of machine learning and deep learning techniques for pattern identification, classification, prediction, and knowledge extraction from heterogeneous and high-dimensional data.
Examination Topics and Interview <i>Please note that the research proposal described in the report (Annex 5).</i>	Research proposal (awarded up to a maximum of 25/100). Applicants are required to demonstrate active engagement with the research themes of the PhD Programme by submitting a research proposal, which forms an integral part of the application. The proposal must be dated, signed by the applicant, and prepared in accordance with Annex 5.

submitted for the purposes of the competition, does not necessarily correspond to the research project that will ultimately be carried out during the PhD Programme. Should the candidate be admitted, the actual research project will be subsequently defined and approved by the PhD Committee Board

This project, consistent with the candidate's second level degree, should be focused on one of the research topics of the Doctorate, briefly listed below:

- **Plant and Microbial Biodiversity**

Conservation, analysis, monitoring, and enhancement of plant and microbial biodiversity; study of organism–environment interactions; isolation and characterization of microorganisms for biotechnological applications; phytoremediation, bioremediation, and sustainable management of natural and human-modified ecosystems.

- **Health Biology, Physiology, and Biomedical Research**

Investigation of the cellular and molecular mechanisms involved in physiological and pathological processes; analysis of signaling pathways, metabolism, and cellular responses; development of experimental models and innovative strategies for biomedical and therapeutic applications.

- **Chemistry for Health, Environment, and Sustainability**

Design, characterization, and study of natural and synthetic bioactive molecules; applications in therapeutic, diagnostic, environmental, and industrial fields; development of innovative chemical methodologies aimed at sustainability and environmental protection.

- **Computer Science, Software Systems, and Artificial Intelligence**

Design, development, and evaluation of advanced algorithms, software systems, and digital infrastructures; research in artificial intelligence, machine learning, data science, computer vision, biometrics, virtual and augmented reality, communication networks, cybersecurity, software quality, and decision-support systems.

- **Computational Modeling and Analysis of Complex Systems**

Development and application of mathematical and computational models for the analysis, simulation, and prediction of complex phenomena; use of machine learning and deep learning techniques for pattern identification, classification, prediction, and knowledge extraction from heterogeneous and high-dimensional data.

Topics related to position with ordinary scholarship and to position funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027)

- **Isolation and characterization of microorganisms for biotechnological applications**

Position funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027), with a mandatory six-month research period at the company.

- **Three-dimensional density reconstruction from cosmic muon data using artificial intelligence algorithms**

Position co-funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027) and by the company with mandatory six-month research period in the company

- **Identification of molecular targets and development of novel therapeutic strategies for neurodegenerative diseases**

Position co-funded by the Molise Region (PR Molise FESR FSE+ Regione Molise 2021/2027) and by the company with mandatory six-month research period in the company

	Interview (out of a maximum of 50/100) The oral examination and interview consists of a presentation of the research proposal and a discussion of the technical and scientific issues involved. Knowledge of English will also be assessed. Candidates may present and discuss in either Italian or English.
Criteria for the evaluation	The evaluation of the qualifications and the project proposal is a prerequisite for admission to the oral examination. The results of the first evaluation phase will be published on the University's website at https://www3.unimol.it/ricerca/scuola-di-dottorato/generiche/24 as soon as they are available. The maximum score is 100/100, divided into the following sub-scores: ● 25/100 Academic qualifications ○ Coherence of the academic background with the topics of the doctoral programme and the reference sectors related to the members of the College; ○ Relevance of professional titles and training activities to the topics of the doctoral programme and the reference sectors related to the members of the College; ○ Personal contribution of the candidate, which should be evident from the documentation submitted for evaluation or from statements made by the candidate; ○ Relevance of the educational and professional background to the topics addressed in the proposed research project. ● 25/100 Research proposal in written form ○ Consistency of the project proposal with the themes indicated; ○ Originality of the project and the contribution to knowledge in the area; ○ Clarity in the identification and description of the research objectives; ○ Project structure and feasibility; ○ Organization and synthesis. ● 50/100 Interview and knowledge of the English language. ○ Clarity and mastery of knowledge in the area of the project state-of-the-art; ○ Clarity of the candidate to expose and describe the objectives, originality, expected results, contribution to the knowledge of the area, and any practical application of the proposed research; ○ Candidate's ability to discuss the structure of the project, including methods; ○ Aptitude to the research activity. To be admitted to the oral examination, the candidate must obtain a score of at least 15/100 in the evaluation of their research proposal. The results of the two evaluation phases will be published, as soon as available on the website https://www3.unimol.it/ricerca/scuola-di-dottorato/generiche/24 in the specific sections dedicated to the relevant doctorate.
Ranking	Candidates with an overall score of at least 50/100 points will be included in the overall merit ranking.



Date of the Interview	Date: September 23, 2026 at 10:30 a.m. (GMT+2); the schedule of the interviews will be defined by the Selection Committee depending on the number of candidates admitted to the oral exam. Place: In-person: Department of Bioscience and Territory, University of Molise, Contrada Fonte Lappone, 86090 Pesche (IS), Italy. or - online: Google Meet, link: https://meet.google.com/rsb-azog-dsx
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