

Title of the Ph.D. course	BIOTECHNOLOGIES
Cycle	XXXVI
Scientific area	INTERDISCIPLINARY
Duration	3 years
Department	Department of Biomedical and Biotechnological Sciences
Department website	http://biometec.unict.it/
Ph.D. Course Coordinator	Prof. Vito De Pinto
Partner Institution(s)	None
Research themes	<p>The interdisciplinary Ph.D. course in Biotechnologies of the University of Catania encompasses the biotechnological competences of the University thanks to the presence of academic disciplines for Italian Universities in biomedical, agricultural and pharmaceutical fields and an additional provision as regard to Bio informatics and System Biology. Three Departments of the University, whose research and didactics have a focus on biotechnologies, contribute to this Ph.D. course. The Ph.D. course is organised in four curricula defined as follows: Molecular biotechnologies, biomedical and preclinical biotechnologies, agri-food biotechnologies and pharmaceutical biotechnologies. The common domain is life technology regarding to which the molecular application of genetic engineering is prevalent. This application introduces to the use of living cells and organisms to obtain goods and services. Research fields are: the acquisition of genetic, transcriptomic and proteomic knowledge and its application to animal and plant field; the identification and characterization of innovative molecules potentially exploitable in industrial or health field; the implementation of innovative, analytical systems of biological and natural molecules; genetic and food improvement in the agri-food sector, the use of biotechnologies for the production of renewable energies. Here follow, to be illustrative but not limiting, some of the research themes carried out in the laboratories, to whose projects doctoral students might be included</p> <p><u>Molecular Biotechnologies</u></p> <ol style="list-style-type: none"> 1) Novel mechanisms of cell-to-cell communication: extracellular vesicles in CNS health and disease; 2) Identification and modulation of DNA-protein molecular interaction: principles of biological recognition for therapeutic approach; 3) Structural and proteomic analysis of membrane proteins and their post-translational modifications; 4) Role of metal-chaperone and research of new targets in neovascular disorders; 5) Biomedical engineering: artificial intelligence and machine learning for medicine; 6) Synthetic Biology: design of integrated biological systems capable of autonomously performing useful tasks, elucidate the design principles underlying complex phenotypes; 7) Systems Biology: programming and analysis of selected cells and organelles (e.g., <i>E. coli</i>, <i>S. cervisiae</i>, mitochondrion). <p><u>Biomedical and preclinical biotechnologies</u></p> <ol style="list-style-type: none"> 1) Innovative Cell Strategies with Stem/neuroprogenitors and Astrocytes to Boost Neurorepair/Regeneration in Neurodegenerative Diseases; 2) Electrophysiological study of endogenous neurotransmitters and neuromodulators on membrane ionic currents, neuronal excitability, transmission of nerve impulses and synaptic plasticity of the central nervous system; 3) Preclinical studies of molecular basis of neurodegenerative processes and therapeutical interventions; 4) Biomarkers in disorders associated to autism; 5) Biotechnological approaches and preclinical imaging in animal modelling of neurodegenerative diseases. 6) Muscoloskeletal disorders and tissue engineering, mechanobiology, health sports technology and movement analysis. <p><u>Agri-food biotechnologies</u></p> <ol style="list-style-type: none"> 1) New breeding techniques for the genetic improvement of cultivated plants; 2) Study of the diversity of cultivated plants through genome sequencing, indentification of markers associated to loci of interest and application to genetic improvement; 3) -omic sciences and analysis of host-pathogen interaction for the purpose of resistance; 4) Bio-synthesis of carotenoid and anthocyanin pigments and plasticity in the process of DNA methylation in blood orange during the ripening of the fruit and in abiotic

	<p>stress;</p> <p>5) Influence of agro-climatic conditions on the gene expression in vine for the production of red wine;</p> <p>6) Energy crops and biotechnology for the production of sustainable energy;</p> <p>7) Genomics, transcriptomics and proteomics of animal production;</p> <p>8) Zootechnical biodiversity e mechanisms of adaptation to hot climate;</p> <p>9) Agricultural, food and environmental microbiology: biotechnological and functional implications of yeasts and lactic bacteria for the implementation of functional foodstuff;</p> <p>10) Microbiome and health of the plants, selection of microorganisms for the bio-control and analysis of action mechanisms.</p> <p><u>Pharmaceutical Biotechnologies</u></p> <p>1) Preparation and characterization of colloidal for cosmetic, oftalmic and cerebral use;</p> <p>2) Design, synthesis and in vitro pharmacological of sigma ligands for treatment of neurodegenerative diseases and anticancer;</p> <p>3) Study of the interaction and absorption of drugs from bio-membrane models and their release of different carriers (SLN, micelles, cyclodextrins);</p> <p>4) Development of inhibitors and inductors in the enzim Heme Oxygenasis – 1 (HO-1);</p> <p>5) Rational design through computational methods, synthesis and biologic evaluation of ligands for treatment of cancer and pain;</p> <p>6) Development and production of radiopharmaceuticals or stimulants for anti-cancer treatment associated to radiotherapy.</p>
<p>Master degrees required for the admission</p>	<p>LM-6 Biologia (Biology)</p> <p>LM-7 Biotecnologie agrarie (Agricultural biotechnology)</p> <p>LM-8 Biotecnologie industriali (Industrial biotechnology)</p> <p>LM-9 Biotecnologie mediche, veterinarie e farmaceutiche (Medical, Veterinary and Pharmaceutical Biotechnology)</p> <p>LM-13 Farmacia e farmacia industriale (Pharmacy and Industrial Pharmacy)</p> <p>LM-17 Fisica (Physics)</p> <p>LM-18 Informatica (Computer Science)</p> <p>LM-21 Ingegneria biomedica (Biomedical Engineering)</p> <p>LM-41 Medicina e chirurgia (Medicine and Surgery)</p> <p>LM-42 Medicina veterinaria (Veterinary Medicine)</p> <p>LM-54 Scienze chimiche (Chemical science)</p> <p>LM-69 Scienze e tecnologie agrarie (Agricultural Science and Technology)</p> <p>LM-70 Scienze e tecnologie alimentari (Food Science and Technology)</p> <p>LM-71 Scienze e tecnologie della chimica industriale (Industrial chemical science and technology)</p> <p>LM-86 Scienze zootecniche e tecnologie animali (Zootechnical Science and Animal Technology)</p> <p>6/S (specialistiche in biologia) (Biology)</p> <p>7/S (specialistiche in biotecnologie agrarie) (Agricultural Biotechnology)</p> <p>8/S (specialistiche in biotecnologie industriali) (Industrial Biotechnology)</p> <p>9/S (specialistiche in biotecnologie mediche, veterinarie e farmaceutiche) (Medical, Veterinary and Pharmaceutical Biotechnology)</p> <p>14/S (specialistiche in farmacia e farmacia industriale) (Pharmacy and Industrial Pharmacy)</p> <p>46/S (specialistiche in medicina e chirurgia) (Medicine and Surgery)</p> <p>47/S (specialistiche in medicina veterinaria) (Veterinary Medicine)</p> <p>62/S (specialistiche in scienze chimiche) (Chemical Science)</p> <p>77/S (specialistiche in scienze e tecnologie agrarie) (Agricultural Science and Technology)</p> <p>78/S (specialistiche in scienze e tecnologie agroalimentari) (Food Science and Technology)</p> <p>79/S (specialistiche in scienze e tecnologie agrozootecniche) (Agro-Zootechnical Science and Technology)</p> <p>81/S (specialistiche in scienze e tecnologie della chimica industriale) (Industrial Chemical Science and Technology)</p>
<p>Available places</p>	<p>1) Places with scholarship financed by the University of Catania: 6</p> <p>2) Places with scholarship financed by the Italian Institute of Social Security reserved to the children and orphans of users registered with the unitary system of social security credits and the children of retirees registered with the management of public employees: 1</p> <p>3) Research theme: Innovative Doctorates “Industry 4.0”</p> <p>4) Places without scholarship: 1</p> <p>TOTAL: 8</p>

Selection procedures	1) Evaluation of qualifications (foreign candidates are required an English language certification in addition to the qualifications listed in art. 3, paragraph 4, of the call for application) 2) Oral examination Candidates living abroad can take the oral interview in the form of video conference interview
Date, place, format and language of the oral interview	Date: September 22 2020, h. 9,30 (9,30 am Italian time) Place: Torre Biologica “F. Latteri” – via Santa Sofia n. 89 – Catania Format: - Dissertation on the research project - General knowledge of the themes of the candidate’s degree and/or the themes related to the Ph.D. course Language: The interview will be in English