SCHOLARSHIPS FUNDED THROUGH EUREKA 2020 PROJECT, reserved for graduates and unemployed/non-employed residents of or domiciled in the Marche Region at the time of the application for the scholarship and in possession of the degree and income requirements set forth in Art. 3 and Art. 8 of this Call	For additional information postlaurea@unicam.it

Research fields
Manufacturing, Wood-furniture industry, Industry 4.0, Tourism, Construction and Renewable Energies, Mechanical and Mechatronic industries, Innovative Materials, Agri-food industry, Blue Economy and Personal Services

5 SCHOLARSHIPS FUNDED THROUGH THE INNOVATIVE DOCTORAL PROGRAM, reserved for graduates and unemployed/non-employed residents of or domiciled in the Marche Region at the time of the application for the scholarship and in possession of the degree and income requirements set forth in Art. 3 and Art. 8 of this Call	For additional information postlaurea@unicam.it

Research fields
Applications can be submitted in the 12 areas of specialized research (aerospace, agrifood, blue growth, green chemistry, design, creativity and made in Italy, energy, intelligent factory, sustainable mobility and health), along with the area of "Disaster Risk Reduction" promoted by the United Nations (Sendai Framework 2015-2030) which has become central to the agenda of the Marche Region after the seismic events of 2016. The Marche Region, with DGR n. 1511/2016, has identified four cross sectoral areas: Domotics, Mechatronics, Sustainable Manufacturing, Health and Wellness, in addition to ICT and Advanced Business Services as transversal enabling areas. Considering the innovative regional policies for the promotion of the economic development of the territory, special attention will be given to the following areas of intervention, identified by DGR n. 400 of 30/3/2020: sustainable manufacturing, agri-food industry, with a view toward enhancing the territory and the landscape for tourism; mechanical and mechaormazione, 35/S Ingegneria informatica, LM-32 Ingegneria informatica). e synthesis, nature-inspired, of organic molecules as functional additives for new materials always with a view to the circu

3 scholarships within the framework of the "**Polo dei Materiali Compositi**", for research activities related to environmental sustainability, design, modelling and chemical development of products in the composite materials sector	**For additional information postlaurea@unicam.it**	

3 SCHOLARSHIPS for the Doctoral course in Architecture, Design, Planning within the AGREEMENT with the CNR, for the application of Urban Intelligence and the Digital Twins model to the government of the territory.	Architecture, Design, Planning - Sustainable Urban Planning and Inland Areas Development Strategies	**For additional information postlaurea@unicam.it**

Tematica di ricerca e obiettivi generali delle tre borse di dottorato

Un processo di agglomerazione sempre più intenso, fenomeni climatici estremi e una fragilità degli insediamenti destinata ad accentuarsi per effetto della pandemia sono all'origine di una crescente domanda di strumenti intelligenti di gestione degli eco-sistemi urbani e delle reti di servizi che ne consentono il funzionamento. La complessità di politiche pubbliche da adottare in condizioni di crescente incertezza sollecita la predisposizione di un sistema scientifico e tecnologico integrato di supporto alle decisioni, tale da consentire da un lato la messa a punto di scenari previsionali, e dall'altro la elaborazione di politiche di prevenzione dei rischi e di messa in sicurezza delle strutture territoriali e urbane.

Attraverso il ricorso a competenze disciplinari che spaziano dalla pianificazione urbanistica all'informatica e alla matematica applicata, il programma coordinato di ricerca di dottorato punta al trasferimento del modello dei Gemelli Digitali dall'ingegneria al governo del territorio, e alla soluzione dei problemi concettuali, metodologici e applicativi derivanti dalla necessità di applicarlo a problemi ben più complessi per il numero dei dati da raccogliere e analizzare, e per la molteplicità delle variabili e delle soluzioni alternative da prendere in considerazione.

Descrizione delle tre linee specifiche di ricerca e dei profili richiesti

n.1 - "Planning"

Relativamente a questa posizione la selezione dei candidati verrà effettuata tenendo conto che il vincitore dovrà condurre ricerche metodologiche e applicative nell'ambito dell'Urban Intelligence. In particolare si richiederà al dottorando di indirizzare la sua ricerca alla scomposizione dell'organismo urbano preso in esame in termini di modularità, scalabilità e adattabilità, con l'obiettivo di favorire l'impiego del modello dei Gemelli Digitali rispettivamente nella raccolta e nell'analisi dei dati, nel monitoraggio delle dinamiche (demografiche, socio-economiche, urbanistiche) attinenti singole parti di città, nei processi di aiuto alle decisioni e di attivazione delle pratiche partecipative concernenti la pianificazione urbanistica generale e di dettaglio.

n.2 - “Modelli Semantici 3D di Ambienti Urbani” Il programma di studi e ricerca ha l’obiettivo di studiare approcci e metodi per la rappresentazione 3D di ambienti urbani (es., morfologia, costruito, struttura urbana). Partendo da un’analisi delle soluzioni allo stato dell’arte che permettono di costruire rappresentazioni 3D a partire da diversi tipi di acquisizione dati (es, DTM, LiDAR, fotogrammetria) si studieranno diversi approcci all’organizzazione con cui possono essere definitivi modelli digitali 3D delle strutture urbane, concentrandosi su modelli 3D semanticamente strutturati, ovvero strutturati rispetto alle esigenze di pianificazione urbanistica da una parte e di costruzione di digital twin dall’altra. Ogni digital twin può aver necessità di accedere ad informazioni del contesto urbano a livelli di dettaglio semantico, per cui il modello 3D del contesto urbano dovrà essere organizzato in modo da essere interrogabile in modo efficiente da diversi DT. Sono utili per questo studio competenze di base in informatica e conoscenza di sistemi GIS e/o metodi di rappresentazione/visualizzazione 3D.
n.3 – “Modelli digitali a sostegno della simulazione, gestione e trasformazione di sistemi urbani” Relativamente a questa posizione la selezione dei candidati verrà effettuata tenendo conto che il vincitore dovrà maturare le specifiche funzionali di una piattaforma ICT per la gestione di un sistema complesso, in grado di supportare la gestione dei diversi sotto-sistemi di cui si compone un organismo urbano, la predizione delle sue dinamiche future, la definizione di futuri scenari, l’orientamento delle politiche di prevenzione dei rischi per una gestione “sicura” della città, le decisioni legate all’incremento della resilienza urbana, alla implementazione di programmi complessi di trasformazione e rigenerazione, o agli investimenti pubblico/privati. Il candidato avrà il profilo di informatico/sviluppatore di sistemi con le lauree richieste come prerequisito (23/S Informatica, LM-18 Sicurezza informatica, 100/S Tecniche e metodi per la società dell’informazione, LM-91 Tecniche e metodi per la società dell’Informazione, 35/S Ingegneria informatica, LM-32 Ingegneria informatica).

	2 SCHOLARSHIPS within the REDI CONSORTIUM (Reducing risks of natural Disasters)	**For additional information postlaurea@unicam.it**
	Research topics	
1	The post COVID 19: re-organization of human living environments in small-medium cities in inland areas	
2	Citizen science and RRI to prepare communities for the transition and restart phase	

	3 SCHOLARSHIPS in the framework of the Agreement with the INGV to carry out research activities at the Camerino seat of the INGV	**For additional information postlaurea@unicam.it**
	Research topics	
1	Broadband, high-sensitivity devices for environmental monitoring;	
2	Shock features in major and accessory minerals due to impact vs. tectonic processes;	
3	Fault interaction and the evolution of seismicity: the case study of the Central Apennines Fault System (CAFS)	

Up to a maximum of 5 SCHOLARSHIPS reserved for Chineses citizens who have graduated from Liaocheng University within the framework of the AGREEMENT BETWEEN UNICAM AND LIAOCHENG UNIVERSITY (CHINA)	For additional information postlaurea@unicam.it

Research fields
Priority will be given to applications in the field of **Physics, Chemistry, Mathematics, Biology and Veterinary Medicine**

Up to a maximum of 6 SCHOLARSHIPS reserved for Chineses citizens who have graduated from Zhengzhou University within the framework of the AGREEMENT BETWEEN UNICAM AND ZHENGZHOU UNIVERSITY (CHINA)	For additional information postlaurea@unicam.it

Research fields
Priority will be given to applications in the field of **Food Sciences, Chemistry, Biology and Design**

Up to a maximum of 6 SCHOLARSHIPS reserved for Chineses citizens within the framework of the AGREEMENT BETWEEN UNICAM AND SUZHOU CHIEN SHIUNG INSTITUTE OF TECHNOLOGY (CHINA)	For additional information postlaurea@unicam.it

Research fields
Priority will be given to applications in the field of **Chemistry, Biosciences, Pharmaceutical Sciences, Architecture and Computer Sciences**

1 SCHOLARSHIP FUNDED THROUGH THE PARTNERSHIP AGREEMENT BETWEEN UNICAM and the JILING AGRICULTURAL UNIVERSITY (CHINA)

1 SCHOLARSHIP FUNDED THROUGH THE PARTNERSHIP AGREEMENT BETWEEN UNICAM and the UNIVERSITY of ANTWERPEN		
Research field	**Area of Research and PhD Curriculum**	**Contact person**
Physics of matter	Physics, Earth and Materials Sciences - Physics	andrea.perali@unicam.it

	RESEARCH TOPICS LIST: ARCHITECTURE, DESIGN, PLANNING		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1A	**Teorie e progetto dell'architettura contemporanea**	Architecture, Design, Planning - Architecture, Theories and Design	postlaurea@unicam.it
2A	**Storia e valorizzazione del patrimonio architettonico**	Architecture, Design, Planning - Architecture, Theories and Design	postlaurea@unicam.it
3A	**Rappresentazione grafica e multimediale dell'architettura**	Architecture, Design, Planning - Architecture, Theories and Design	postlaurea@unicam.it
4A	**Design di oggetti, sistemi e ambienti innovativi ed intelligenti**	Architecture, Design, Planning - Innovation Design	postlaurea@unicam.it
5A	**Design per la sostenibilità ambientale e per l'innovazione di processo e di prodotto**	Architecture, Design, Planning - Innovation Design	postlaurea@unicam.it
6A	**Design della comunicazione, nuove tecnologie e patrimonio culturale**	Architecture, Design, Planning - Innovation Design	postlaurea@unicam.it
7A	**Sviluppo sostenibile del territorio, contenimento del consumo di suolo e strategie di adattamento al *climate change***	Architecture, Design, Planning - Sustainable Urban Planning and Inland Areas Development Strategies	postlaurea@unicam.it
8A	**Gestione del rischio e superamento delle situazioni di crisi**	Architecture, Design, Planning - Sustainable Urban Planning and Inland Areas Development Strategies	postlaurea@unicam.it
9A	**Politiche per l'innovazione, valorizzazione territoriale e sviluppo delle aree interne**	Architecture, Design, Planning - Sustainable Urban Planning and Inland Areas Development Strategies	postlaurea@unicam.it
10A	**Attivazione di processi di rigenerazione urbana**	Architecture, Design, Planning - Sustainable Urban Planning and Inland Areas Development Strategies	postlaurea@unicam.it

	RESEARCH TOPICS LIST: CHEMICAL AND PHARMACEUTICAL SCIENCES AND BIOTECHNOLOGY		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1 CH	**Research topic in analytical, environmental and physical chemistry**. - Lithium and Sodium batteries: development of active materials and green electrodes, electrochemical/spectroscopic characterizations, recycling processes; - Functional nanomaterials for environmental applications: Dye sensitized Solar Cells, Adsorption and Photocatalysis to remove pollutants - Characterization of gas hydrate in CH4-CO2 replacement. - Analysis for the speciation of particular pollutants and analytes in different environmental matrices. - Characterization, conservation and restoration of cultural heritage - Immobilization techniques of dangerous wastes in inorganic polymeric matrices - Chemometric data sets elaboration	Chemical and Pharmaceutical Sciences and Biotechnology - Chemical Sciences	postlaurea@unicam.it
2 CH	**Research topic in food chemistry.** The primary field of ***food chemistry*** research is the assessment of food quality by means of development and application of new methods to identify and quantify both new and classical chemical markers and investigating reactions and compositional changes occurring in food during cooking, processing and storage.	Chemical and Pharmaceutical Sciences and Biotechnology - Chemical Sciences	postlaurea@unicam.it
3 CH	**Research topic in inorganic chemistry.** The research in ***inorganic chemistry*** covers several important areas of chemistry such as coordination chemistry, organometallic chemistry, metal-based drugs, metals in medicine and in biological processes, catalysis, porous coordination polymers, MOFs, and functionalized nano-materials. The main topics focus on: a) design and synthesis of new ligands characterized by the presence of C-, N-, O-, P- and S-donor groups; b) evaluation of their coordination capabilities with main group and late transition metal ions; c) applications in medicinal inorganic chemistry, in the field of composite materials, in catalysis and as materials for optoelectronics.	Chemical and Pharmaceutical Sciences and Biotechnology - Chemical Sciences	postlaurea@unicam.it

4CH	**Research topic in organic chemistry.** Graduate students in organic chemistry have opportunities to take a wide array of experiences with the aim of providing new solutions to the great power to create/design new molecules and reactions. Central to the research program of organic chemistry is the discovery of organic transformations using new sustainable and low energy consumption processes by the use of unconventional methods for preparing highly functionalized organic molecules which allow progress to be made in the allied fields of chemical biology, material science, and medicine. Particular emphasis is placed on identification and analysis of new natural products to allow the organic chemists to have the advantage of designing and creating new small analogous molecules of biologically active natural products. The discovery and development of novel transformation together with synthetic efforts provide material for detailed biological mode-of-action studies. This need for the PhD students in organic chemistry to explore biomolecular mechanisms of action is also the basis for the synthesis, nature-inspired, of organic molecules as functional additives for new materials always with a view to the circular economy. The focus is mainly on the preparation of innovative materials with controllable properties, especially towards an ever increasing antibacterial and antiviral activities.	Chemical and Pharmaceutical Sciences and Biotechnology - Chemical Sciences	postlaurea@unicam.it
1 PS	The main goal of this PhD program is to involve PhD students in stimulating research activities in the fields of **drug design, rationale synthesis, in vitro and in vivo pharmacological studies, drugs and cosmetics formulation and delivery, food quality and safety, food supplements and nutraceuticals, analytical and biological studies on plant extracts**. During the three years PhD Course the students will have personal mentors who educate them to follow research topics, with the goal to allow the students to become able to formulate a scientific problem independently, propose hypotheses and procedures leading to its solving on an experimental or theoretical level in the above different fields. The general concept behind all the research activities listed above is related to human health and well-being. Research activities will be related to: **computer assisted drug design and optimization; synthesis of potential drugs with different synthetic approaches and instrumental characterization; isolated macromolecules, cell tissues and animal pharmacological studies; novel strategies for drug delivery systems; new formulations, mainly based on natural ingredients, for cosmetics; in deep quali-quantitative analytical studies of foods; development of functional food and food supplements, mainly based on nutraceutics; analytical studies and biological properties of essential oils and solvent extracts from plants.**	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it

2 PS	**CIRCULAR ECONOMY IN FOOD TOURISM How to apply circular economy principles to sustainable food tourism development.** Food tourism is the exploration of food as the purpose of tourism. It is now considered a vital component of the tourism experience. Dining out is common among tourists and "food is believed to rank alongside climate, accommodation, and scenery" in importance to tourists. Culinary tourism became prominent at the beginning of this century. The World Food Travel Association estimates that food and beverage expenses account for 15 to 35% of all tourism spending, depending on the affordability of the destination. The WFTA lists possible food tourism benefits as including more visitors, more sales, more media attention, increased tax revenue, and greater community pride. The Project aims to foster innovative solutions for sustainable food tourism development and management of tourism enterprises, through transnational cooperation and knowledge transfer, in particular toward SMEs focused on local supply chains and developing industrial symbiosis to develop circular business models. An important part of the project will focus on the development of - new products, services, skills and new business models, especially working on industrial symbiosis/communities of practice, and - more circular and sustainable supply chains at local level, with particular attention on Food Waste Recovering and reuse, and Plastic-free solutions, also rethinking packaging	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it
3 PS	**Scale-up and optimization of isolation procedures of phytocannabinoids from hemp by-products.** The increase of cultivation of industrial hemp (Cannabis sativa L.) all over the world offers new opportunities for the industry to manufacture innovative products from this multipurpose crop. The availability of hemp biomass produced during manufacturing and processing of fibre and seeds represents a valuable resource to exploit and valorize on an industrial level. The main goal of this project is to develop and scale-up sustainable extraction and isolation procedures of cannabidiol (CBD) and minor non-psychotropic phytocannabinoids (e.g., CBG, CBC, THCV) from hemp by-products. procedures of phytocannabinoids from hemp by-products	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it
4 PS	**Targeting the extracellular NADome (eNADome) in inflammation** Intracellular Nicotinamide Adenine Dinucleotide (NAD) and its related metabolites (NADome) are important endogenous components that play crucial roles in cellular metabolism, inflammation, oxidative stress, cancer, neurodegeneration, and aging in mammals. While the intracellular NADome (iNADome) has received considerable attention and drugs targeting it are being developed in the field of cancer and inflammation, the extracellular NADome (eNADome) has been partly neglected and is not fully understood, although it can be a valuable source of plausible targets for several disorders, including inflammatory bowel diseases (IBD). In this context, the eNADome is an exciting new field of research and strongly urge further investigation. Additionally, the enzyme nicotinic acid phosphoribosyl transferase (NAPRT) has been recently found extracellularly, and its levels are significantly increased in inflammatory states. Based on these findings, the main goal of the project is to develop new small chemical entities acting as potential NAPRT inhibitors.	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it

5 PS	**Development of biodegradable nanoparticles for antitumoral immunotherapy**. The topic belongs to the European Project: “Active Monitoring of Cancer As an Alternative to Surgery” CAST Project code ID 857894. Program: H2020- MSCA-ITN-ETN-2019. Candidate will use FDA-approved PLGA nanoparticles to encapsulate anti-CTLA-4 and a PD-1-blocking antibody for injecting locally at the tumour site. The expected results of the project are: to overcome a systemic administration route so that a) the tumour microenvironment is breached, and the stroma becomes less of a barrier, b) systemic, autoimmune and inflammatory side effects are reduced, c) lymphoid tissue downstream is also targeted because of lymphatic drainage from the site of injection and d) slow and local release at the tumour site.	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it
6 PS	**Nanomaterials and PFC contrast reagents for 19F MRI**. The topic belongs to the European Project: “Novel application in 19F magnetic Resonance Imaging” NOVA-MRI Project code ID 859908. Program: H2020- MSCA-ITN-ETN-2019. Candidate will synthesized biodegradable and biocompatible polymers for the preparation and characterization of decorated nanoparticles for the encapsulation of 19F MRI for tumour diagnosis and treatment. The expected result is the optimization of biodegradable and biocompatible nanoparticles decorated on the surface with molecules able to recognize specific target in order to selectively target cells, tissues, and organs by an active drug targeting mechanism. The nanoparticles must be able to release the payloads in the target compartment with a controlled delivery and with a specific kinetic. All the system will be tested in vitro and in vivo for magnetic resonance imaging	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it
7 PS	**Development of formulation of biomolecules and biosimilars exploiting innovative systems of delivery**. The candidate will develop innovative formulations such as nanoparticles, hydrogels, complexes to protect and deliver biomolecules and biosimilars to specific body compartments, in a fashionable design [Industrial Doctorate in collaboration with Recusol srl] Financially supported by “Programma Operativo Regionale del Fondo Europeo di Sviluppo Regionale POR MARCHE FESR 2014/2020 – Asse 1 – OS 2 – Azione 2.1 – Sostegno allo sviluppo di una piattaforma di ricerca collaborativa negli ambiti della specializzazione intelligente. Area tematica: medicina personalizzata, farmaci e nuovi approcci terapeutici”.	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences	postlaurea@unicam.it

8 PD	**Research Topics in Neuroscience** Few PhD positions are available in the field of neuroscience. Selected applicants will have the opportunity to work in the following research topic: 1) The functions of sleep in health and disease; 2) The neurobiology and psychopathology of substance use and eating disorders ; 3) Microbiota modulation as preventative and therapeutic approach in neurodegenerative diseases; 4) Neuromorphological and neurobiogical correlates in animal model of nervous system disorders The doctoral candidate will receive training in the techniques most commonly used in basic neuroscience, including brain activity recording, imaging, electrophysiology, proteomics, behavioural testing, molecular biology, histology and data analysis. Pharmacological, chemogenetic and optogenetic approaches will be also experienced. Candidates with different training backgrounds in life sciences, physics, mathematics will be considered for these positions. This area of research focuses on three main topics: • mapping the biological mechanisms regulating sleep in physiological conditions; • elucidating the long-term effects of sleep disruption at cellular and system level across the life course; • studying the therapeutic potential of sleep enhancement The doctoral candidates will receive training in the techniques most commonly used in basic neuroscience, including brain activity recording, imaging, behavioural testing, molecular biology, histology and data analysis.	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences OR Life and Health Sciences - Molecular Biology and cellular Biotechnology	Contact persons for topic 1) michele.bellesi@bristol.ac.uk; luisa.devivo@bristol.ac.uk; Contact person for topic 2) roberto.ciccocioppo@unicam.it; Contact person for topics 3) annamaria.eleuteri@unicam.it; Contact person for topics 4) khosrow.tayebati@unicam.it

	RESEARCH TOPICS LIST: COMPUTER SCIENCE AND MATHEMATICS		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1 CS	**Artificial Intelligence and Intelligent Systems** • Adaptive control and optimisation • Adaptation policies • Collective and adaptive systems • Knowledge representation and autonomic reasoning	Computer Science and Mathematics	michele.loreti@unicam.it
2 CS	**Business analytics and finance** • Machine learning econometrics • Natural language processing	Computer Science and Mathematics	carlo.lucheroni@unicam.it
3 CS	**Computing and Mathematics** • Algebraic and logical aspects of computing • Algebraic languages for specific domains • Computational Models and Models of Computation • Formal languages • Model theory • Methodological aspects of science education	Computer Science and Mathematics	sonia.linnocente@unicam.it, emanuela.merelli@unicam.it
4 CS	**Cybersecurity** • Access Control and Resource Usage Policies • Distributed Ledger Technologies • Design of Resilient Systems • Intrusion Detection Systems • Network security	Computer Science and Mathematics	francesco.tiezzi@unicam.it
5 CS	**Data Science and Machine Learning** • Data driven models of complex systems with applications in biology • Discriminative and generative modelling • Data driven system verification • Bayesian and Optimization and econometric techniques • Topological data analysis	Computer Science and Mathematics	emanuela.merelli@unicam.it

6 CS	**Embedded Systems and IoT** • Communication and networking for wireless and embedded systems • Energy efficiency and harvesting • Middleware and services Wireless Sensor Networks • Specification languages for embedded systems	Computer Science and Mathematics	leonardo.mostarda@unicam.it
7 CS	**Intelligent and Adaptive Systems for Health Protection** • Telemedicine • Teleservices	Computer Science and Mathematics	francesco.amenta@unicam.it
8 CS	**Intelligent Civil Engineering** • **Collective and adaptive systems for the analysis of Risk Assessment and Vulnerability** • Predictive models for Structural Health Monitoring • Mathematical models for Earthquake Engineering	Computer Science and Mathematics	andrea.dallasta@unicam.it
9 CS	**Process Management** • Continuous improvement of Process Aware Information Systems • Collaborative and Distributed Business Process Enactment including Blockchain • Models for Process Intensive Systems • Process Mining Techniques • Simulation and Verification of Data-Aware Collaboration Models	Computer Science and Mathematics	barbara.re@unicam.it
10 CS	**Software and Information System Engineering** • Engineering of Enterprise Architecture • Applied Formal Methods and Verification Tools • Testing and Verification in distributed setting • Quantitative Analysis and Tools • Runtime Monitoring and Verification	Computer Science and Mathematics	andrea.polini@unicam.it

	RESEARCH TOPICS LIST: LEGAL AND SOCIAL SCIENCES		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1 LS	**Constitutional Rules and Civil Law Relationships.** The main aim of this research is to make private relationships functional to the values that mould the whole multi-level legal system. The Italian Constitutional legal framework introduce a new kind of legality which is addressed to fulfill also the European and International Principles. The research covers all areas of Civil Law such as contracts, torts, property, rights of persons and Family law, and Alternative Disputes Resolutions. The research will be developed through an analysis of European and International case-law. The central issue of the research is to demonstrate that the free development of the human person is superior to any concurrent economic interest. A very special interest will be in research focused on the fundamental rights (e.g. integrity of the person, respect for private and family life, Protection of personal data) in the Market Place and on the role of the enterprises, no-profit organizations, professionals to achieve the new goals proposed by the 2030 Agenda for Sustainable Development.	Legal and Social Sciences - Civil Law and Constitutional Legality	lucia.ruggeri@unicam.it
2 LS	**Legal and medico-legal reflections about individual protective devices: Approval, licensing and marketing.** The late emergency situation due to COVID-19 pressed Italian government to enact a wide range of urgent measures, even derogating from widely established general principles, while the urge to save the greatest possible number of both human lives and jobs, drove many enterprises to convert their production in order to make up for the individual protective devices' global lack. In this field has promptly been deemed as essential the implementation of appropriate measures to speed up the healthcare purchasing procedures, by introducing derogatory and wholly exceptional schemes. Even the European Commission put forward a proposal for deferring the implementation of Reg. 2017\745\UE, that deeply reforms the medical devices market, for a year after its planned enactment for 26 may 2020. In this research will be studied the exemptions provided by the law (the so called “Treats Italy” decree) for the duration of the emergency and then the ordinary regulation procedure that enterprises should enforce to continue their production.	Legal and Social Sciences - Civil Law and Constitutional Legality	giovanna.ricci@unicam.it
3 LS	**Public and private synergies on healthcare field.** This PhD research topic will study the manners, both economic and legal, of coordination between public and private health centres to achieve a better managing of primary health care's granting in a given territory. Moreover, the research program will aim to find if and how it will be possible to lead this form of cooperation between public and private resources towards the birth of new structure provided with very high scientific and medical skills that will be channelled for the purpose of the research. This second aspect of the research program should be led with special focus on the possibility to create synergy with other public healthcare structures. For these reasons the research program will focus on fundamental legal topics (health and data protection, network contracts etc.) with outlooks of advanced research in medical matters and social ones too. The course will also investigate the social and economical implications born from the specific and viable collaborations between targeted public and private healthcare structures	Legal and Social Sciences - Civil Law and Constitutional Legality	francesco.rizzo@unicam.it

4 LS	**Health and Food**	Legal and Social Sciences - Fundamental Rights in the Global Society	postlaurea@unicam.it
5 LS	**Fundamental Rights**	Legal and Social Sciences - Fundamental Rights in the Global Society	postlaurea@unicam.it

	RESEARCH TOPICS LIST: LIFE AND HEALTH SCIENCES		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1 LH	**Evolution and spreading of antibiotic-resistance genes in bacteria**	Life and Health Sciences - Molecular Biology and cellular Biotechnology	postlaurea@unicam.it
2 LH	**Regenerative therapy and tissue engineering for tissue and organ repair**	Life and Health Sciences - Molecular Biology and cellular Biotechnology	postlaurea@unicam.it
3 LH	**Analysis of the microbiota of the human digestive system in Cameroon: association between bacteria and protozoa and impact on diseases due to unbalanced nutrition and viral infections (cotutelle with Université Evangélique du Cameroun, https://www.uecam.org/).**	Life and Health Sciences - Molecular Biology and cellular Biotechnology	cristina.miceli@unicam.it
4 LH	**Nutri-epigenomics and intergenerational inheritance.** Early life represents a window of epigenetic plasticity during which occurs the programming of adult health. This research aims to characterize epigenetic biomarkers in parents and in their offspring, and to identify nutrigenomics strategies able to promote the development of a healthy epigenome	Life and Health Sciences - Molecular Biology and cellular Biotechnology	rosita.gabbianelli@unicam.it
5 LH	**Optimizing food processing for innovative applications (i.e. legumes, wheat, coffee,...) to positively impact food nutritional value and consumer's health status**	Life and Health Sciences - Nutrition, Food and Health	postlaurea@unicam.it
6 LH	**Nutrigenomics and control of inflammation.** Nutrigenomic impact of food components on gene expression and epigenetic modifications will be used to control low grade inflammation. The aim of this project is to screen bioactive compounds able to modulate inflammation in human cell lines, animal models and/or ex vivo human cells. Gene expression and epigenetic modulations (DNA methylation and histone modifications) will be analysed to identify how bioactive food components can modulate inflammatory responses.	Life and Health Sciences - Nutrition, Food and Health	rosita.gabbianelli@unicam.it
7 LH	**Studies on the microbial symbiosis in insects**	Life and Health Sciences - One Health	postlaurea@unicam.it
8 LH	**Innovative diagnostic and therapeutic approaches in veterinary medicine**	Life and Health Sciences - One Health	postlaurea@unicam.it
9 LH	**Probiotics administration in chickens in a One-Health perspective: the new potentialities of bacteriotherapy**	Life and Health Sciences - One Health	postlaurea@unicam.it
10 LH	**Plant functional ecology and assembly**	Life and Health Sciences - One Health	postlaurea@unicam.it
11 LH	**Science education: pedagogy, methodologies and digital resources to empower lifelong, lifewide and lifedeep skills**	Life and Health Sciences	postlaurea@unicam.it

12 LH	**Research Topics in Neuroscience** Few PhD positions are available in the field of neuroscience. Selected applicants will have the opportunity to work in the following research topic: 1) The functions of sleep in health and disease; 2) The neurobiology and psychopathology of substance use and eating disorders ; 3) Microbiota modulation as preventative and therapeutic approach in neurodegenerative diseases; 4) Neuromorphological and neurobiogical correlates in animal model of nervous system disorders The doctoral candidate will receive training in the techniques most commonly used in basic neuroscience, including brain activity recording, imaging, electrophysiology, proteomics, behavioural testing, molecular biology, histology and data analysis. Pharmacological, chemogenetic and optogenetic approaches will be also experienced. Candidates with different training backgrounds in life sciences, physics, mathematics will be considered for these positions. This area of research focuses on three main topics: • mapping the biological mechanisms regulating sleep in physiological conditions; • elucidating the long-term effects of sleep disruption at cellular and system level across the life course; • studying the therapeutic potential of sleep enhancement The doctoral candidates will receive training in the techniques most commonly used in basic neuroscience, including brain activity recording, imaging, behavioural testing, molecular biology, histology and data analysis.	Chemical and Pharmaceutical Sciences and Biotechnology - Pharmaceutical, Nutraceutical and Food Sciences OR Life and Health Sciences - Molecular Biology and cellular Biotechnology	Contact persons for topic 1) michele.bellesi@bristol.ac.uk; luisa.devivo@bristol.ac.uk; Contact person for topic 2) roberto.ciccocioppo@unicam.it; Contact person for topics 3) annamaria.eleuteri@unicam.it; Contact person for topics 4) khosrow.tayebati@unicam.it

	RESEARCH TOPICS LIST: PHYSICS, EARTH AND MATERIALS SCIENCES		
	Research topics description	**Area of Research and PhD Curriculum**	**For additional information**
1P	**Condensed Matter Physics** • Many-body theory of ultracold matter • Superconductivity at the nanoscale: theory, simulations, and experiments • Theory of electron-hole superfluidity in graphene devices • BCS-BEC crossover in multicomponent superfluids and superconductors	Physics, Earth and Materials Sciences - Physics	postlaurea@unicam.it
2P	**Experimental Physics** • Matter under extreme conditions • Physics of surfaces, interfaces and nanosized systems • Physics, Astrophysics and Cosmology with Gravitational Waves • Soft matter, glasses, liquids and liquid solutions • Synchrotron Radiation and advanced radiation sources	Physics, Earth and Materials Sciences - Physics	postlaurea@unicam.it
3P	**Physics Education**	Physics, Earth and Materials Sciences - Physics	postlaurea@unicam.it
4P	**Theoretical and Computational Physics** • Active Matter, Brownian motion, bacterial motion • Computer simulations for molecular modelling and spectroscopy • Soft matter, clustering, non equilibrium physics, transport properties	Physics, Earth and Materials Sciences - Physics	postlaurea@unicam.it
5P	**Crustal Processes** • Earthquakes • Faults and fractures • Fluid flow • Natural Hazards and Risk reduction • Sedimentary basins • Tectonics	Physics, Earth and Materials Sciences - Physical and chemical Processes in Earth Systems	postlaurea@unicam.it
6P	**Earth Surface Processes** • Climatology • Geo-Archeology • Geomorphology • Hydrogeology • Neo-tectonics	Physics, Earth and Materials Sciences - Physical and chemical Processes in Earth Systems	postlaurea@unicam.it
7P	**High Pressure-Temperature Processes** • Crystallization kinetics • Mineral and melt structures • Volcanism and magmatic volatiles • Waste recycling	Physics, Earth and Materials Sciences - Physical and chemical Processes in Earth Systems	postlaurea@unicam.it
8P	**Geoscience Education**	Physics, Earth and Materials Sciences - Physical and chemical Processes in Earth Systems	postlaurea@unicam.it

9P	**Manufacturing and processing materials** • Materials for energy harvesting and storage • Materials science and circular economy • Materials for theranostics • Metals, alloys and superconductors	Physics, Earth and Materials Sciences - Materials Sciences	postlaurea@unicam.it
10P	**Advanced material characterization** • Fine-analysis of materials for cultural heritage • Application of synchrotron radiation techniques to advanced materials • Transport, electron and structural properties of superconductors • Materials under extreme conditions	Physics, Earth and Materials Sciences - Materials Sciences	postlaurea@unicam.it
11P	**Composites and hybrid materials** • Biomaterials and biocompatible materials • Nanomaterials • Oxides and composites for electrodes and devices	Physics, Earth and Materials Sciences - Materials Sciences	postlaurea@unicam.it