SCHOLARSHIPS FUNDED THROUGH THE EUREKA PROGRAM

Research topic description
Manufacturing, Wood mobile, Industry 4.0, Turism, Environmental Energy Innovation Building, Mechanical and Mechatronics Engineering, Innovative Materials, Agribusiness, Blue Economy, Personal Service

SCHOLARSHIPS REGARDING THE INTERDISICPLINARY TOPIC OF "DATA SCIENCE"

Research topic description
Development and enhancement of technologies for the retention, analysis and interpretation of “Big Data” : • Science and Technology: Innovative methods for Big Data analysis; • Life and Health Sciences: Data-driven modeling in environmental and bio-medical sciences; • Legal and Social Sciences: Data mining for taming the quick evolution of a legal system; • Chemical and Pharmaceutical Sciences and Biotechnology: Data-driven modeling in (nano- and bio) material- and bio-medical sciences; • Architecture, Design, Planning: Big Data analysis for societal, urban and landscape planning

SCHOLARSHIPS REGARDING THE INTERDISICPLINARY TOPIC OF "DISASTER RISK REDUCTION"

Research topic description
Understanding the risks to strengthen governance in emergency situations, but, above all, to invest in technological and regulatory logistics for the prevention and reduction of risk. Some topics will aim to develop competencies for specific categories of risk: • Science and Technology: Self-adaptive systems-data-driven modeling; • Life and Health Sciences: Prevention and mitigation of health risks; • Legal and Social Sciences: Emergency rules and regulation in a global society; • Chemical and Pharmaceutical Sciences and Biotechnology: a) Development of novel materials for infrastructure rehabilitation and reconstruction; b) Prevention and mitigation of health risks; • Architecture, Design, Planning: Urban and landscape planning, regeneration and resilience

SCHOLARSHIP FUNDED THROUGH PRIN 2015

Research topic description	Area of Research and PhD Curriculum	Supervisor
SOFTWIND-Smart Optimized fault Tolerant WIND Turbines	Science and Technology - Mathematics	Letizia Corradini

SCHOLARSHIP FUNDED THROUGH THE PARTNERSHIP AGREEMENT BETWEEN AIX MARSEILLE AND CAMERINO

Research topic description	Area of Research and PhD Curriculum	Supervisor
Multiscale Modelling of T-All Cancer Disease Characterizing Oncogenic Networks and Therapeutic Targets, with joint dissertation direction in conjunction with Aix Marseille Université Centre de Physique Theorique and Centre Immunology, Luminy	Science and Technology - Computer science	Emanuela Merelli

SCHOLARSHIP IN MEMORY OF MARIO TROISI

Research topic description	Area of Research and PhD Curriculum	Supervisor
Cooperative enterprise and innovation between public procurement and market. Investigating innovation in cooperative economy, new features of cooperative enterprises; implications of cooperative enterprises with public procurement law; labour law reforms related to cooperative enterprises; de-intermediation and producer-labour cooperatives; social cooperatives and non profit organizations	Legal and social sciences - Civil law and constitutional legality	Francesco Casale

SCHOLARSHIP FUNDED THROUGH THE PARTNERSHIP AGREEMENT BETWEEN ANTWERPEN AND CAMERINO

	Research topic description	Area of Research and PhD Curriculum	Supervisor
1	**Multiband superfluidity and strongly correlated ground states in novel ultrathin materials.** The electrons in graphene promise new opportunities to access strong many-body electronic correlations. High quality two-dimensional electron layers and quasi-one-dimensional nanoribbons should exhibit new many-body phenomena in the range of parameters where the average Coulomb repulsions between electrons dominate over their Fermi energies. In graphene nanoribbons of few nanometres width, quantum size effects and van Hove singularities enhance electron correlations. For graphene multilayers or nanoribbons in a double unit electron-hole geometry, many-body electron-hole correlations can be made strong enough to stabilise high-temperature electron-hole superfluidity.	Science and Technology - Theoretical and experimental Physics	Perali, Peeters

SCHOLARSHIP FUNDED THROUGH THE AGREEMENT BETWEEN UNIVERSITE EVANGELIQUE DU CAMEROUN AND CAMERINO - set aside for candidates from Cameroon

	Research topic description	Area of Research and PhD Curriculum	Supervisors
1	**Immune response modulatory effects of plants traditionally used for the treatment of malaria in Cameroon** Over 1200 plant species are used world wide as remedies for the treatment of malaria and many of them have been extensively studied, antimalarial activity validated and molecules acting against the *Plasmodium* parasite identified. However, the perceived efficacy of the plants may in part be due to antipyretic properties, and as it emerges from a large bulk of literature, plants most likely harbor a variety of molecules able to interfere at different stages with the pathophysiology of fever, with the anti-inflammatory response and with the regulation of humoral and cell mediated immunity. This research, conducted in collaboration with the "Université Evangélique du Cameroun", aims at: 1) identification and selection of anti-malarial plants with perceived effects on the clinical signs of malaria (first 18 months, ethnobotanical study in Cameroon); 2) chemical and biological characterization of 2 – 4 selected plants to explore immune response modulatory properties of the plant extracts and isolated molecules *in vitro* and in the rodent malaria model (second 18 months at the University of Camerino in Italy).	Life and Health Sciences - One Health	Annette Habluetzel, Martin Sozbe

SCHOLARSHIP FUNDED THROUGH THE AGREEMENT BETWEEN THE UNIVERSITY OF CAMERINO AND THE SETTORE URBANISTICA OF THE MARCHES REGION

	Research topic description	Area of Research and PhD Curriculum	Supervisor
	The Landscape as an indicator of resilient cities	Architecture, Design, Planning - Sustainable Urban Planning	Massimo Sargolini

TWO POSITIONS reserved for the people working with or within FHNW for carrying on researches on BUSINESS INFORMATION SYSTEMS in the context of the AGREEMENT between UNIVERSITY OF CAMERINO and UNIVERSITY OF APPLIED SCIENCES AND ARTS, Nortwestern Switzerland, FHNW School of Business .

	Research topic description	Area of Research and PhD Curriculum	Supervisor
1	**Digitalisation in distribution grids operation.** Energy grid operators are exposed simultaneously to a decentralization of supply and an increased pressure on decarbonization targets and on costs, while having to maintain a significant level of security of supply. Considering possible synergies in multi-carriers and multiservice city distribution companies, further digitalization contributes to these targets by enhancing the modelling accuracy of the interdependency between security of supply and sizing of storage infrastructure, and thus reaching a better use of their demand response potential.	Science and Technology - Computer science	Wache Holger
2	**Digital Transformation Journey.** In the digitalization era IT technologies are used as enablers/drivers to foster innovative business models. Companies are faced with the challenge to realize the opportunities of these technologies and to start their own digital transformation in order to not be left behind. A scientific-based method to guide businesses through their digital transformation journey, specifically regarding on how to define a starting point for their digital transformation, is crucial	Science and Technology - Computer science	Stella Gatziu, Knut Hinkelman
2	**Distributed Ledger Technology towards Digital Innovation.** The research request focus on digital innovations and how "distributed ledger technology" (DLT) can contribute to digital transformation initiatives. The objective is to evaluate how DLT (e.g. Blockchain / BitCoin, Ethereum, IPFS, Swarm) can influence enterprises' business models, structures, or processes. DLT is a young technology, which demands a high technical understanding, but it has economic disruption potential. Research in this field promises theoretical and application-oriented new perspectives into how this technology works and how it influences companies in the future.	Science and Technology - Computer science	Petra Asprion, Knut Hinkelman

RESEARCH TOPICS LIST

	Research topic description	Area of Research and PhD Curriculum	Supervisor
1	**Systematic and taxonomic studies on the vascular flora of the Central Apennines**	Life and Health Sciences - Ecosystem and Biodiversity management	Fabio Conti
2	**Biodiversity of plant communities in the Apennines: structural and functional insights.** Ecosystems provide a number of ecosystem services, which are supported by multiple plant traits. This responds to spatio-temporal biotic and abiotic heterogeneity and variations (incl. climate changes) and to management. To this respect, Mediterranean mountainous area (grasslands and forests) are still poorly understood at both landscape and stand scale. Based on common databases and field surveys, the response of plant traits to environmental gradients and\ or constraint (multiple drivers) will be investigated. The quantification of ecosystems services by modeling, in comparison with other areas, as well as the study of the relation between plant diversity and traits, are also of interest**.**	Life and Health Sciences - Ecosystem and Biodiversity management	Roberto Canullo, Andrea Catorci

3	**Impact of nutraceutical products on neurodegeneration: metabolic and proteomic aspects**	Life and Health Sciences - Molecular Biology and Cellular Biotechnology	Valeria Polzonetti, Stefania Pucciarelli, Silvia Vincenzetti
4	**Development of digital systems to ensure high quality medical assistance in remote and rural zones**	Life and Health Sciences - One Health	Francesco Amenta
5	**Enhanced bioavailability choline-containing phospholipids in the prevention and treatment of cognitive deficits of cerebrovascular origin**	Life and Health Sciences - One Health	Seyed Khosrow Tayebati
6	**Animal husbandry and farmers' livelihoods: assessment of vulnerability, resilience and strategies for disaster risk reduction in the Apennine Mountains context** Agriculture and animal husbandry is particularly vulnerable to disasters caused by natural hazards such as floods, frost, pests and diseases but also to earthquakes as demonstrated recently by the seismic events in Central Italy (August - November 2016). This doctoral thesis will assess vulnerability and resilience characteristics of livestock farms and farmers' livelihoods in the communities of the Apennine Mountains stricken by the earthquake. Adopting a farmer and community participatory approach, the situation before and after the earthquake will be analyzed and integrated strategies for disaster risk reduction and sustainable socio-economic development elaborated. Key issues comprise the choice and promotion of locally adapted sheep, cattle and swine breeds, improved husbandry practices, appropriate animal shelters and infrastructures and diversification of livelihoods integrated in a systemic, territorial "building back better" program.	Life and Health Sciences - One Health INTERDISICPLINARY TOPIC OF "DISASTER RISK REDUCTION"	Annette Habluetzel, Carlo Renieri
7	**Design, modeling and optimization of structures under impact made of innovative composite materials.** The aim of this project is to design, model and optimize specific structures under impact conditions made of innovative materials. Recently the use of new materials, such as composites with natural fibers and thermoplastic resins, is spreading on the modeling of structures for eolic and automotive applications. Moreover it is necessary to use metamodels in order to optimize the structures for lightness and recyclability target.	Science and Technology - Mathematics	Simonetta Boria
8	**Design, development and applications of HCI (Human Computer Interaction) devices through hand gesture recognition.** The aim of this project is to develop a wearable device containing sensors for detecting and recognizing hand movements. Once collected, the data will have to be processed to identify the different movements and gestures, allowing to interact with home automation devices for remote home control. The project is especially aimed at people with certain types of motor disability.	Science and Technology - Mathematics	Andrea Cristofaro
9	**Operations Research in Disaster Management.** In the last years, approaches based on Operations Research in Natural Disasters Management (NDM) and Humanitarian Logistics (HL) have received great attention. Scientific literature identifies four stages of disaster management in relation to the logistics function: • strategic planning, • preparedness, • pre-event response, • post-event response. In all these stages the tools of OR such as supply chain management strategies, stochastic optimization, decision analysis, scheduling and optimization can be effectively used. The aim of the proposed research is to study the use of OR and Machine Learning techniques in NDM/HL also applied to the areas of Central Italy after the August/October 2016 earthquake.	Science and Technology - Mathematics	Renato De Leone

10	**Operations Research Models for Bike Sharing Problems.** Sustainable transport systems and sustainable mobility attracted great attention in the latest years (see https://www.crui.it/rus-rete-delle-universita-per-la-sostenibilita.htm). In this context, car and (electric) bike sharing systems have received major interest. The use of such systems requires the solution of various optimization and decision problems such as fleet dimensioning, bike/car rebalancing and repositioning, ensuring a satisfactory level of service, cost definition. Stochastic optimization is a key tool in this context as well as Machine Learning and simulation. The aim of this research is to study novel optimization models for the bike/car sharing problem with applications to the city of Camerino and to the mobility of students inside the city.	Science and Technology - Mathematics	Renato De Leone
11	**Machine Learning for Energy Finance and for Green Energy Management.** Time series data from electricity production, especially from renewable production, can be studied and optimally used by means of machine deep-learning econometrics and advanced data analytics. These techniques will be studied, developed and applied to financial market, solar and wind data.	Science and Technology - Mathematics	Carlo Lucheroni
12	**Multiagent Approach to Economic and Financial Equilibrium Learning.** Decision-making in communities of mutually interacting and networking heterogeneous deciders, be they financial traders, citizens of a smart city, or economic entities in a world which is increasingly warming up, is a difficult problem that is becoming intensely studied in a multidisciplinary way using sophisticated mathematics. This multiagent theoretical frame will be studied, researched and applied to real economic and financial cases.	Science and Technology - Mathematics	Carlo Lucheroni
13	**Logic and Machine Learning in Finance.** Before Machine Learning, knowledge bases and related inferences, useful for data analysis and complex decision making, were studied in the frame of classic Artificial Intelligence (AI), which is based on Mathematical Logic. In the last years most of research focus and resources in the field of AI for data analysis moved to Machine Learning, considered as a new form of AI. Currently, interdisciplinary approaches try to hybridize and merge Machine Learning with Mathematical Logic. The proposed research will start from hybrid logic-machine learning systems like Markov Logic and Fuzzy Inference Systems, develop them, and apply them to Finance and market problems.	Science and Technology - Mathematics	Carlo Lucheroni
14	**CO2 Emissions, Blue Economy and Portfolio Theory.** Risk assessment and management are themes not related to Finance and Portfolio Theory only. On the contrary, they can be seen as a part of a wider theoretical framework that uses a well established probabilistic approach derived from Finance, but which is applied to more general topics as well, like for example CO2 emission control. A zero-emission Blue Economy, more extreme and advanced than a Green Economy, strongly needs such analytical techniques to control emission and global warming risk, in order to assist policy makers to optimal decision making. The research will start from a paper by Lucheroni and Mari (Applied Energy, 2017), which applies Portfolio Theory and financial risk management techniques to CO2 emission control from the perspective of an electricity producer, and will expand it to the much broader perspective of a policy maker interested in a transition towards a Blue Economy.	Science and Technology - Mathematics	Carlo Lucheroni

15	**The teaching of non-Euclidean geometries as a tool to understand the modern axiomatic method in mathematics and improve the learning of geometry.** MIUR's guidelines suggest that our students develop «a clear vision of the characteristics of the axiomatic approach in its modern form» so as to be able to abstract from the immediacy that links Euclidean geometry to everyday life. Our idea is that the acquisition of the axiomatic method can be strengthen by the teaching of non-Euclidean geometries, whose axioms are arbitrary hypotheses and hence coherence is to be proven. In order to test our research hypothesis, we'll develop a consequent teaching method and evaluate it, through trails in schools, by checking quantitatively measurable factors such as logic capability and induced specific competence in Euclidean geometry.	Science and Technology - Mathematics	Silvia Benvenuti
16	**p-adic quantum bit** It is well known that measurements give rational numbers, whereas theoretical models traditionally use real and complex number fields. A completion of rational numbers with respect to the p-adic norms gives the fields of p-adic numbers in the same way as completion with absolute value yields reals. The metric introduced by p-adic norm is the non-Archimedean (ultrametric) one. Possible existence of such space around the Planck length is the main motivation to study p-adic quantum models. The present project aims at realizing quantum bit by means of representations of the p-adic special orthogonal group in dimension three. [Cotutele through ERC Advanced Grant IRQUAT - Information and Randomness in Quantum Theory, contract no. ERC-2010-AdG-267386, prof. Andreas Winter, Universitat Autonoma Barcelona]	Science and Technology - Theoretical and experimental physics	Stefano Mancini, Andreas Winter
17	**Beyond the standard formulation of quantum bit** It is well known that measurements give rational numbers, whereas theoretical models traditionally use real (or complex) number field. This latter is not the only possible completion of rational numbers. The present project aims at analyse a different completion and formalize there the notion of quantum bit.	Science and Technology - Theoretical and experimental physics	Stefano Mancini
18	**Multipartite entanglement characterization.** One of the most important problem in quantum information theory is to know in how many in-equivalent ways n qubits can become entangled. The aim of the project is to use algebraic methods, like Cartan decomposition of su(2n) into symmetric and anti-symmetric sub-algebras, to create all possible entanglement structures and classify them.	Science and Technology - Theoretical and experimental physics	Stefano Mancini
19	**Sedimentological and stratigraphic characterisation of sedimentary rocks and their relationship with failure modes and fracture distribution.** Reservoir quality is usually very variable due to the high degree of heterogeneities, most of which are below conventional seismic resolution but may have a major impact on fluid behaviour during production. Gaining a good knowledge of the role played by all the structural and stratigraphic key features encountered in a reservoir is therefore critical to mitigating both costs and risks. One method to more accurately interpret, and predict, the architecture of reservoir heterogeneities present in subsurface fields is through the study of appropriate outcrop analogues. This PhD project aims to explore the relationships existing between compositional, depositional, and diagenetical rock features and the physical-mechanical properties of the sedimentary rocks and, as a consequence, the different failure modes and fracture distributions in sedimentary rocks.	Science and Technology - Physical and chemical processes in Earth systems	Emanuele Tondi, Claudio Di Celma
20	**Analysis of bitcoin transactions and blockchain technologies** Bitcoin are used together for two main activity: • from one side bitcoin is the “official” money to be used for illicit traffic (from drugs to cryptolockers). Here the research has the goal to perform forensics analysis of the transaction and study methodologies for data analysis and visualition. • from the other side blockchain is an interesting distributed ledger that have tons of application to be studied from smart contracts to voting and other digital contracts.	Science and Technology - Computer science	Stefano Bistarelli

21	**Argumentation theory for debate analysis** Here the goal is to look for “real-time” technologies to be applied both on the analysis of the language (sentiment analysis for instance), and on the visualization of statistics related to the debate. Also interesting is the study of properties of the semantics of Argumentation Frameworks (AFs) and tools that can be used for studying such properties	Science and Technology - Computer science	Stefano Bistarelli
22	**New scenarios of Internet of things in Industry 4.0.** The research project aim at conceiving new methodologies and tools for designing and implementing robust and energy efficient integration of industrial systems. The project will be validated in cooperation with an Italian industry where the main objective is a robust integration of systems in order to increase the degree of automation.	Science and Technology - Computer science	Leonardo Mostarda
23	**Structural elucidation of natural compounds.** Structural elucidation of natural compounds isolated from traditional medicinal plants. The structural elucidation is achieved by spectroscopic techniques, mainly 1D- and 2D-NMR spectroscopy, and MS spectrometry. In the last few years most of the activity has been devoted to the analysis of Cameroonian traditional medicinal plants.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Luciano Barboni
24	**New efficient inorganic and organometallic compounds and coordination polymers for health, energy and environment.** Synthesis and characterization of new vanadium, molybdenum, iron, ruthenium, rhodium, iridium and copper derivatives with polytopic nitrogen- and oxygen-donor ligands, and exploration of their catalytic activity in oxidation and oxygenation processes of organic substrates. Synthesis and characterization of Porous Coordination Polymers (PCPs) and MOFs and investigation of their absorption and catalytic ability toward small molecules. Design and synthesis of novel coordination and organometallic compounds with innovative biological properties of gold, titanium, tin, silver, zinc and ruthenium with chelating N- or O-donors of some families of ligands.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Claudio Pettinari, Fabio Marchetti, Riccardo Pettinari, Corrado Di Nicola
25	**Food quality and safety.** The research is focused on the study and analysis of food constituents, especially in terms of bioactive molecules, that can characterize and highlight the importance of food for the human health. The determination of volatile and non-volatile molecules is carried out through the use of sophisticated analytical techniques as HPLC and GC coupled to different detectors as mass spectrometry (MS, MS/MS), flame ionization detector (FID), diode array detector (DAD), fluorescence detector (FD) and others.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Gianni Sagratini
26	**Chemical and biological characterization of aromatic and medicinal plants.** The research of natural bioactive compounds is one of the fundamental pillars of plant biology since natural products are lead compounds for the development of new drugs. This research line concerns the phytochemical study of aromatic and medicinal plants from Italy and other countries such as Spain, France, Slovak Republic, Turkey, Iran, Algeria, Cameroon and Madagascar as sources of essential oils, iridoids, flavonoids, napthoquinones, sesquiterpenes, diterpenes, phenylpropanoids etc. Such plants have been identified on the basis of their uses in the traditional medicine or for their unexplored secondary metabolism. They will be characterized phytochemically and the main compounds will be assayed for various biological activities, namely antioxidant, antimicrobial, insecticidal, anti-parasitic and anticancer.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Filippo Maggi
27	**Nutraceuticals.** Tubers, fruits and vegetables, besides nutrients, represent an important source of constituents devoid of any toxicity to humans. Most of them deserve further phytochemical and pharmacological studies aimed at highlighting their main secondary metabolites and bioactivity. In this context, the present research line is dedicated to the search of new bioactive constituents, also known as nutraceuticals, in plant sources of food interest in order to improve their market and cultivation.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Filippo Maggi

28	**Risk assessment of new and existing buildings with seismic isolation systems.** The topic concerns methods and tools for the seismic risk assessment of buildings with base isolation systems. Research program involves risk evaluation at different levels (demand, damage, loss assessment) and investigations concerning both new and existing buildings. The research program may be focused on analytical formulations of the problems, numerical methods and computational issues, applicative results and design methods. The knowledge of the structural mechanics fundamentals is required. We are seeking a highly motivated candidate, experience in in vitro electrophysiology although not required is highly appreciated.	Architecture, Design, Urban Planning - Sustainable Urban Planning	Graziano Leoni
29	**Construction risk assessment and structural design.** The topic concerns methods and tools for the structural design of constructions, with a special attention to the behaviour under extreme events involving dynamic actions, e.g. earthquakes, hurricanes and so on. Investigations may be focused on analytical formulations of the problems, numerical methods and computational issues, applicative results and design methods. The knowledge of the structural mechanics fundamentals is required.	Architecture, Design, Urban Planning - Sustainable Urban Planning	Graziano Leoni
30	**Constitutional Norms and Civil Law Relationships.** The main aim of this research is to re-read the civil code and statutes in the light of the Italian Constitution and to make private relationships functional to the values that mould the whole legal system. The Republican Constitution introduces a new kind of legality which is direct to respect also European and International Principles. The research covers all areas of Civil Law such as contracts, torts, property, family law, rights of Succession and analyses domestic, European and International test cases or doctrines. 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 human rights in the Market Place.	Legal and Social Sciences - Civil Law and Constitutional Legality	Lucia Ruggeri
31	**Freedom of Contract and Alternative Disputes Resolution.** The aim of this research is to analyse how the freedom of contract is useful to resolve a civil dispute. The UE implemented several kinds of Alternative Disputes Resolutions (ADR) in every field of Civil Law. Nowadays professionals and consumers are free to select an ADR technique and this freedom will be studied in the light of domestic, European and International rules. A specific issue of this research is to study terms and conditions used in ADR or On Line Disputes procedures.	Legal and Social Sciences - Civil Law and Constitutional Legality	Rocco Favale
32	**Sharing economy enterprises, global market and local impact.** Investigating the rise and growth of sharing economy enterprises, their role in a global market and how they can drive local development. Legal framework, consumer and stakeholders protection. Nature and features of sharing economy firms, IP rights and competition issues	Legal and Social Sciences - Civil Law and Constitutional Legality	Francesco Casale

33	**Development of methods for food quality assessment.** The project aims to provide new methods for the assessment of food quality by means of identification and quantification of new chemical markers, after development of appropriate analytical methods for their analysis. Gas chromatography coupled to mass spectrometry (GC-MS) and to flame ionization detection (GC-FID), high performance liquid chromatography coupled to mass spectrometer detectors (HPLC-MS), fluorimetric detector (HPLC-FLD) or diode array detector (HPLC-DAD) will be exploited to this purpose. Several techniques will be applied for the sample preparation, like solid-phase microextraction (SPME), solid-phase extraction (SPE) or liquid-liquid extraction.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Dennis Fiorini
34	**Photoactive Nanomaterials for Energy and Environmental Applications.** This topic propose to synthetize innovative photocatalytic semiconductor-nanomaterials, with controlled composition, morphology, electronic structure and charge-transfer properties in order to increase the performance in the photodegradation processes of environmentally relevant chemical species and in the DSSC solar cell devices. The focus will be directed to the study of nanomaterials properties, prepared at controlled experimental conditions, by studying analytically all the phases, from surface preparation, sorption of target substances, energy production and photodegradation activity in order to obtain the best quality of photocatalyst for the specific applications.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Rita Giovannetti
35	**Synthesis and characterization of advanced materials for electrochemical energy storage and conversion.** Synthesis and physicochemical characterization of advanced materials for electrochemical energy storage/conversion devices, as Li-ion batteries, Na-ion batteries and Fuel Cells, mainly targeting performance, durability and interfacial stability for mobile energy storage and electric vehicle applications. The research team includes two assistant professors and several PhD students, collaborates with several national and international partners, and is funded by national and international institutions and companies.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Francesco Nobili
36	**Synthesis and characterization of biologically active natural products.** The project is focused on the design, synthesis and characterization of biologically active molecules. In particular, the PhD candidate will synthesize these targets starting from easily accessible building blocks, both under conventional batch conditions, that even exploiting new technologies such as flow chemistry and microwaves. Moreover, the applicant will be directly involved in the chemistry of nitro compounds and heterocyclic systems, as well as in the development of new methodologies under sustainable conditions.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Alessandro Palmieri
37	**New synthetic methodologies for the preparation of heterocyclic systems with biological activity.** The growing number of biologically active compounds featured by the indole nucleus and other nitrogen containing heterocycles makes the study of their preparation and synthetic transformations particularly interesting and indispensable. The proposed research plan is aimed to provide new synthetic pathways for the preparation and functionalization of heterocyclic systems. Particularly, the reactivity of sulfonyl indoles and other azole derivatives amenable of generating indolenine intermediates, will be studied. These unprecedented procedures would complement the classical Friedel-Crafts reaction in introducing a wide array of functional groups into the heterocyclic ring.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Marino Petrini

38	**Design and syntheses of metal-based drugs for radiation-enhanced metal-based chemotherapy in the treatment of solid tumors.** Radiation-induced photoactivation (PAT) of metal-based chemotherapy drugs might improve the treatment of most solid tumors. The aims of this ground-breaking and multidisciplinary research topic are to design, synthesize, characterize and test in vitro and in vivo innovative Cu-, Au- and Ag-based antineoplastic drugs to be used in combined Synchrotron Radiation (SR) dose-enhanced therapy.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Carlo Santini, Maura Pellei
39	**Study and characterization of thermoplastic polymers from renewable sources compatible with food contact.** The importance of polymeric materials for various applications in everyday life has continuously increased over the last decades. Many technical polymers may seem to be of chemically simple composition, but polymeric materials can be complex samples containing numerous additives that are responsible for the final physical and chemical properties as well as for the long-term behavior. Thus, even if the polymeric formulations are complex materials, through analytical methodologies it will be able to get the necessary information for possible developments of dedicated additives. Particular attention will be paid to the development of materials from renewable sources that don't enter in the food chain, and which promote the transition from economic system predominantly linear in a widely circulated.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Enrico Marcantoni
40	**Preparation and characterization of new formulations of pigmented paints with high reproducibility of color.** Paints and varnishes have a wide range of applications in industries and household work. The requirements of products with reduced solvent content (low VOC's) have forced the development of new environmentally friendly products and technologies. Proper paint formulations depend upon raw materials selection and accurate calculation of the amounts of its costituents. To predict some properties of new products, it will be studied the correlation between the variable amount of components and the FT-IR, NMR spectra and thermal properties (DSC, TGA) of the formultaions. Among the various possible, water-dispersible paints will be examined fro both scientific and industrial points of view because of the excellent chemical and physical properties. Objective is to contribute to the study of the interactions between color and formulations for a color evaluation of paints.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Enrico Marcantoni
41	**New efficient sustainable methods for the formation of carbon-carbon and carbon-heteroatom bonds.** Recent advances in synthetic organic chemistry have played a major role in understanding and utilizing small molecules, and there are several benifts associated with the use of small molecules as therapeutic agents. In particular, heterocyclic compounds are an integral part of many biologically active small molecules, and numerous efforts in recent years focused in the dev3elopment of improved methods for their synthesis. Thus, this topic proposes a research finalized to optimize new sustainable methodologies for the formation of new carbon-carbon and carbon-heteroatom bonds which could operate as powerful tools in the synthesis of required heterocycles. These, generally, contain motifs that nature cannot assemble or that would be toxic to host organisms when biosynthesized at the concentrations required for a practical production process. Practical scientific principles in solving real organic synthesis problems and improving own skills in analytical techniques are developed.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Enrico Marcantoni

42	The study of polymer matrix thermoplastic composites must have the ability to convey to the consumer its "green" character of the materials used. The preparation of final products from renewable sources means to be able to have greater independence from the use of oil and its derivatives. During the study new raw material will be used that not only will not enter the food chain but will allow the development of new formulations that are compatible with food contact regulations. Analytical methods such as FT-IR, SEM, NMR, DSC, TGA, and mass spectrometry can provide the necessary information to ensure a secure relationship between the various components of the thermoplastic material and the process parameters.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Enrico Marcantoni
43	The demand for innovative finished products that can find new areas of application needs to be able to know safe relationships between the various components of the material and the process parameters. In particular, materials by their different nature alter the light that illuminates them. It is necessary to make a separate analysis of the chromatic and geometric characteristics, separating the diffused energy from matter (color) from the mirrored energy (illuminated). Practical scientific principles in solving real synthesis problems will allow to develop the best additives in order to obtain new formulations that associate end-to-end properties and ease of preparation and may find new areas of application, and improving own skills in analytical techniques such as Infrared, Mass Spectrometry and Nuclear Magnetic Resonance Spectroscopy are developed.	Chemical and Pharmaceutical Sciences - Chemical Sciences	Enrico Marcantoni
44	**Development of novel therapeutic strategies for the treatment of prostate cancer.** Prostate cancer (PC) is the third most common cancer cause in males in western societies. The common treatments are based on radiation therapy, hormonal androgen ablation and surgery, as well as various small molecule-based therapies. Unfortunately, the inevitable progression to androgen independence after treatments is responsible for the morbidity and mortality of the disease. Therefore, new and more effective treatments are needed. Based on the inter-relationship between prostate cell metabolism and regulation of the cytosolic innate immune cGAS/STING signaling pathway, aim of this project is the synthesis and biological evaluation of novel compounds that modulate STING-dependent activity.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Loredana Cappellacci
45	**To study the neurobiological, behavioral and pharmacological basis of drug addiction and chronic pain**. The candidate will be involved in studies concerning the neurobiological basis of abnormal behavioral and brain functions relevant to human psychopathology with emphasis on drug addiction and chronic pain. The research will be directed at the understanding the neurological mechanisms linking drug addiction to chronic pain and at identifying innovative pharmacological targets to aid the development of new more effective treatments. Attention is also dedicated to the study of neurocircuitry and molecular mechanisms controlling emotional and cognitive disturbances associated with protracted exposure to drugs of abuse or chronic pain. The candidate will have the opportunity to work with laboratory animals using behavioral approaches, electrophysiology, pharmacology, molecular techniques.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Roberto Ciccocioppo

46	**Advanced functional materials and nanotechnologies for medical and pharmaceutical applications.** The topic is focused on the synthesis and physicochemical characterization of advanced functional materials intended for different pharmaceutical and medical applications. SMART biopolymers are synthesized and characterized by H-NMR, HPLC, GPC and are formulated as nanogels for the in situ or systemic administration. Post-operative implant treatment aimed at prevent infection and inflammation represents the main pharmaceutical and medical objective of this topic. The research project is under the collaboration of Charité Hospital of Berlin. The project foresees a first period in Camerino for the synthesis of the biomaterial, its characterization, and the formulation as nanogel or in case other appropriate pharmaceutical forms. The nanogel will be loaded with antibiotics and other innovative products able to counteract and manage post-operative infections. The in vitro and in vivo activity will be evaluated in Berlin thank to the collaboration with the equipe of Prof. Dr. Trampuz of the Charité Hospital in Berlin.	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Piera Di Martino, Roberta Censi
47	**Agent-based modeling and simulation of smart cities scenarios.** Estimating the efficacy and efficiency of employing a range of smart mobility solutions within a urban area is one of the crucial concerns in city planning. Agent-based models and machine learning techniques will be applied with the aim to study methodologies, techniques and tools for validating smart mobility service deploy within a urban area of interest. Also interesting are the social aspects that allow to adapt mobility services from users' feedbacks.	Science and Technology - Computer science	Andrea Polini
48	**Theories and Culture of Architecture and the City**	Architecture, Design, Urban Planning - Architecture. Theories and Design	
49	**Tourism and Landscape Architecture**	Architecture, Design, Urban Planning - Architecture. Theories and Design	
50	**Temporariness as a permanent feature of the contemporary city**	Architecture, Design, Urban Planning - Architecture. Theories and Design	
51	**Design of Innovative and Smart Objects, Systems and Environments**	Architecture, Design, Urban Planning - Innovation Design	
52	**Design for Environmental Sustainability and Process and Product Innovation**	Architecture, Design, Urban Planning - Innovation Design	
53	**Design of Communication, New technologies and Cultural Heritage**	Architecture, Design, Urban Planning - Innovation Design	
54	**The collaboration between strategic guidance and urban tactics in planning process**	Architecture, Design, Urban Planning - Sustainable Urban Planning	
55	**Protection, security and energy efficiency of cultural heritage in public administration** (Co-funded ENEA)	Architecture, Desing, Urban Planning	
56	**Il palazzo ducale dei Varano a Camerino: storia costruttiva, materiali, vulnerabilità sismica**	Architecture, Desing, Urban Planning	
57	**p62 engineered Lactobacilli as biotherapeutic agents in Alzheimer's Disease.** Effects of the oral administration of Lactobacilli genetically modified with the p62 protein on the onset and progression of Alzheimer's disease will be the goal of the project. The study will be conducted using a transgenic mouse model that closely resembles human AD. The bacteria will be modified in order to express the p62 protein, a key factor in AD, involved in protein aggregates formation in the brain, in proteins degradation and inflammation.	Life and Health Sciences - Molecular Biology and Cellular Biotechnology	Anna Maria Eleuteri
58	**Regenerative Therapy in Veterinary Orthopedics**	Life and Health Sciences - One Health	Angela Palumbo Piccionello
59	**Rational design of biologically active compounds with molecular modeling tools.** The rational design of biologically active compounds through computational chemistry/molecular modeling techniques is a critical step for the development of molecules aimed at becoming drugs, pharmacological tools, or diagnostics. This research topic is focused to the use of computational tools to analyze or develop the 3D structures of proteins as biological targets of drugs (i.e. G Protein-Coupled Receptors or Ion Channels) and to design and in silico test novel compounds potentially able to modulate the activity of these proteins	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Diego Dal Ben

60	**Design, synthesis and characterization of new molecules and their biological activity as receptor ligands, antitumor and antibacterial agents and enzyme inhibitors.** The research topic is focused on the design, synthesis and characterization of nucleosides, nucleotides and heterocyclic molecules as new ligands of various class of receptors involved in neuroinflammation and neurodegeneration, potential antitumor and antibacterial drugs and enzyme inhibitors. The new molecules will be evaluated in in vitro and ex vivo studies in specific cell lines or in animal tissues	Chemical and Pharmaceutical Sciences - Pharmaceutical Sciences	Rosaria Volpini, Gabriella Marucci
61	**"Safe" programming paradigms for Intelligent environments.** Intelligent Environments (IE) are a very active area of research and a number of applications are currently being deployed in domains ranging from smart home to e-health and autonomous vehicles. In a number of cases, IE operate together with (or to support) humans, and it is therefore fundamental that IE are thoroughly verified. The main goal of the project is to study how techniques and tools, developed for the verification of software code, can be employed/redefined in the verification of IE described by means of event-condition-action rules.	Science and Technology - Computer science	Leonardo Mostarda, Diletta Romana Cacciagrano
62	**Active graphene based FOOD packaging systems for a modern society**	Life and Health Sciences - Molecular Biology and Cellular Biotechnology	Stefania Silvi
63	**Physics without calculus?** Physics is often taught well before the required underlying math¬ematics is mastered by the learners. This happens at the university level, where physics is a first year course, and even more in secondary school. For example, mechanics is studied well before calculus. This three-year project addresses the following research questions: Is it possible to teach physics in an effective and meaningful way without resorting to advanced mathematical tools and concepts? What is the minimal mathematical toolkit to understand physics, to apply its laws and equations to make quantitative predictions? Can we introduce numerical methods instead of relying solely on analytical solutions?	Science and Technology - Theoretical and experimental physics	Silvia Benvenuti, Irene Marzoli
64	**Health risk in the global society due to environmental contamination by haevy metals and hydrocarbons:** i) monitoring the affected genes and their functions using unicellular eukaryotic models; ii) applying bioremediation approaches to solve high levels of contaminations	Life and Health Sciences - Molecular Biology and Cellular Biotechnology INTERDISICPLINARY TOPIC OF "DISASTER RISK REDUCTION"	Cristina Miceli, Sandra Pucciarelli
65	**Multi-omics (genomics, transcriptomics, metabolomics) approaches applied to unicellular eukaryotic models.** 1) construction of the first multi omic metabolic models of a ciliate 2) Calibration of ciliates as environmental change responders. 3) construction of a software platform that could be available to the research community in order to extend the use of ciliates as marker organisms of environmental stressors	Life and Health Sciences - Molecular Biology and Cellular Biotechnology INTERDISICPLINARY TOPIC OF "DATA SCIENCE"	Cristina Miceli, Sandra Pucciarelli
66	**Innovative diagnostic and therapeutic approaches in veterinary clinic.** The research for new diagnostic and therapeutic tools in veterinary medicine includes direct, instrumental and laboratory diagnostics. Research in this field aims at acquiring new information with possible direct application on animals but also on human being, in respect to the objectives of translational medicine and in full agreement with the "one health" approach.	Life and Health Sciences - One Health	Fulvio Laus
67	**Research on teaching and learning processes in Science education.** This PhD project aims at the development of new approaches to teaching and learning Science in the Italian schools. The program is especially dedicated (but not reserved) to high school Science teachers, willing to explore new ways to approach Sciences. Focus of this topic is also the development of innovative methods for education in science through use of lay language for the general public, use of research laboratories, development of interactive museums activities.	Life and Health Sciences - Molecular Biology and Cellular Biotechnology OR Science and Technology - Physical and Chemical Processes in Earth Systems	
68	**Security and enhancement of the sources of legal research**	Legal and Social Sciences - Fundamental Rights in the global Society	Carlotta Latini
69	**Emergency, security, risk management and emergency decree**	Legal and Social Sciences - Fundamental Rights in the global Society INTERDISICPLINARY TOPIC OF "DISASTER RISK REDUCTION"	Carlotta Latini

70	**Neo-humanism, protection and enhancement of legal sources**	Legal and Social Sciences - Fundamental Rights in the global Society INTERDISICPLINARY TOPIC OF "DISASTER RISK REDUCTION"	Carlotta Latini
71	**Nutrigenomics.** Modulation of the epigenome by nutrition and xenobiotics during early life and their long term effects on health.	Life and Health Sciences - Molecular Biology and Cellular Biotechnology	Rosita Gabbianelli
	- to be continued -		