APPENDIX CALL FOR APPLICATIONS FOR PHD SCHOLARSHIPS FOR PROGRAMS DEDICATED TO THE INCREASE OF HUMAN CAPITAL INVOLVED IN RESEARCH-ORIENTED ACTIVITIES, IN PUBLIC ADMINISTRATIONS AND CULTURAL HERITAGE – Ministerial Decree 351/2022 – AND FOR PROGRAMS DEDICATED TO INNOVATIVE DOCTORATES THAT MEET THE INNOVATION NEEDS OF COMPANIES – Ministerial Decree 352/2022

Research Topics

PhD Programme	**ANIMAL AND FOOD SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	A. Research on digital and environmental transitions
Project title	Development and application of indicators for agro-ecological transition in dairy farming systems
Supervisor	Enrico Sturaro
Supervisor Email	enrico.sturaro@unipd.it
Project description	The PhD project is coherent with the European Green Deal and with the Farm to Fork Strategy, that aim to favour the agroecological transition of agricultural and livestock farms. The project aims to develop and to apply indicators for agroecological transition in dairy farming systems, by using a multicriteria and interdisciplinary approach. A representative sample of dairy cattle (intensive and extensive systems) and small ruminants' farms will be selected to test different indicators. The results will be used to formulate recommendations for strategies and policies aiming to support the agroecological transition of these farming systems. The PhD student will have the opportunity to collaborate with CITA Aragon (Spain) and INRAE – Clermont Ferrand (France), in the frame of the scientific partnership developed by the research unit of UNIPD in the last years. A period of stage from 6 to 12 months will be defined.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	FEDERAZIONE PROV.LE ALLEVATORI TRENTO SOC. COOP. AGR.

PhD Programme	**ANIMAL AND FOOD SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Use of biochar for sustainable viticulture: a study from field to glass
Supervisor	Paolo Carletti
Supervisor Email	paolo.carletti@unipd.it
Project description	Previous long term field trials have demonstrated that biochar can increase soil chemical and physical fertility, and increase vine growth and increasing yield. The present project focuses on the potential of biochar obtained by pyrolysis of plant biomass and used according to the Italian legislation on fertilizers (DM 75/2010) and the European Regulation 1009/2019, to improve the fertility of a vineyard soil. The experiment will be conducted at real farm scale at the Poggiobello Farm of Le Tenute del LeoneAlato (Gruppo GenAgricola). As compared the previous studies the project will focus not only on soil fertility and vine plants growth, but also on the full analyses of grapes and quality of produced wine. The present project will create new highly qualified figures with interdisciplinary competences in the sectors of agriculture, food, and environmental sciences, increasing the economic sustainability of the wine production through the valorisation of the biochar-C credits, and the environmental sustainability, in line with EU Soil Strategy and the EU Climate protection.
Mandatory traineeship	n. 8 months
Company/ research centres/Public Administration	Le Tenute del Leone Alato

PhD Programme	**ANIMAL AND FOOD SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Insects farming techniques and valorization of insect products
Supervisor	Antonella Dalle Zotte
Supervisor Email	antonella.dallezotte@unipd.it
Project description	The research project pursues the objectives stated in the missions M2C1 (sustainable agriculture and circular economy) and M4C2 (from research to business) of the PNRR. The project will insist on the insect breeding sector, a rapidly growing segment at national and international level. Insects have been identified as a source of innovative feed to improve the sustainability of animai production, and as food for humans. In insect farming, the choice, processing and quality of rearing substrates are key aspects to enhance production efficiency and product quality, within a circular economy approach: this will be the research core. The research will be developed and conducted following the Open Science and FAIR Data principles. Thanks to the interaction with a locai insect company, the project aims to train a professional figure who can promote the sustainable development of a small business, to enter in strategie agri-food chains for national and European competitiveness.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Insect Novel Ecologie Food - INEF

PhD Programme	**BIOSCIENCES**
Curriculum (if foreseen)	**EVOLUTION, ECOLOGY AND CONSERVATION**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Plant biodiversity between history and genomics: studying, promoting and digitalising the historical herbarium collections of the Botanical Garden of the University of Padua
Supervisor	Francesco Dal Grande
Supervisor Email	francesco.dalgrande@unipd.it
Project description	The herbarium collections at the Padua Botanical Garden are of high historical value and represent a valuable record of information on plant biodiversity. The aim of this PhD project, in collaboration with the Kew Royal Botanic Gardens (UK), is to valorise the historical herbaria of the Garden by (i) studying the history of the collections, and (ii) integrating high-throughput sequencing data ('herbariomics') with metadata from the digitisation process. The result of this research will be, on the one hand, an innovative tool to reconstruct the changes and evolution of plant biodiversity over the last centuries, and on the other hand, a formidable tool to disseminate the historical-scientific value of the collections. This will be accomplished in synergy with the new Botanical Museum, due to open at the end of 2022. The collaboration with the Kew Gardens will allow an integrated, multifaceted approach to the study of historical botanical collections.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Royal Botanic Garden

PhD Programme	**BIOSCIENCES**
Curriculum (if foreseen)	**GENETICS, GENOMICS AND BIOINFORMATICS**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Targeting fibrofatty replacement in Arrhythmogenic Cardiomyopathy
Supervisor	Alessandra Rampazzo
Supervisor Email	alessandra.rampazzo@unipd.it
Project description	Fibrofatty remodeling in the myocardium is a cause of significant morbidity both in acquired and congenital heart diseases. We propose to tackle this problem in the context of arrhythmogenic cardiomyopathy (ACM), a genetic disease that predisposes to ventricular arrhythmias and sudden death, particularly in the young and athletes. ACM is characterized by progressive cardiomyocyte loss and fibrofatty replacement and at present it cannot be effectively treated. Existing data point to a key role of epigenetic regulators, chiefly HDACs, in modulating fibrofatty replacement in striated muscle. Here we therefore propose to: 1. develop and characterize novel knock-in mouse models for ACM and use them to identify molecular pathways that can be therapeutically targeted. 2. use these models to investigate the therapeutic potential, in terms of reducing fibrofatty replacement, of HDAC inhibitors in ACM. The expertise of Italfarmaco group in the development of highly innovative HDACinhibitors, makes it an ideal partner for this proposal.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Italfarmaco SpA

PhD Programme	**BRAIN, MIND AND COMPUTER SCIENCE**
Curriculum (if foreseen)	**Neuroscience, Technology and Society**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Addressing the gender gap in informatics
Supervisor	Barbara Arfè
Supervisor Email	barbara.arfe@unipd.it
Project description	Women are vastly underrepresented in informatics, with an impactful gap to a central trait of modern society. While efforts are being made to address gender gap in general (Agenda 2030), little is known of the individual and societal factors that cause the emergence and persistence of the gender-gap in informatics. This PhD project studies this research question, with interventions aimed to help prevent or reduce gender inequalities in informatics, in collaboration with SORINT.LAB (IT), a private firm committed to digital innovation and societal dissemination of informatics. The project will explore, across the 6-25 year range, the socio-cognitive and motivational factors, and the instructional and sociodemographic factors of influence to such gap. The project will study: (1) orientation and performance, toward and in informatics; (2) de-motivation and drop-out; (3) evaluation of interventions aimed to reduce gender stereotypes and to increase female's self-efficacy in informatics
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	SORINT-LAB

PhD Programme	**BRAIN, MIND AND COMPUTER SCIENCE**
Curriculum (if foreseen)	**Neuroscience, Technology and Society**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Privacy notices and transparency: User-centred conversational patterns for virtual assistants
Supervisor	Anna Spagnolli
Supervisor Email	anna.spagnolli@unipd.it
Project description	The digitization of the services provided by the public administration involves a massive number of transactions via web interfaces, and the related abundant collection of personal data. The GDPR demands to acquire the voluntary and informed consent before collecting EU citizens' personal data, and that such consent be comprehensible. To comply with this latter principle in a way that is effectively and not just formal, the design of the consents must be centered on the user. This project aims at identifying structures for explanatory conversations that minimize misunderstandings, consider the users' expectations, and provide answers to the user's concerns. These structures will then be translated into guidelines and user requirements to design virtual assistants able to provide such explanations. The project, although centered on the psychological factors of design, also includes the programming of chatbots to test those guidelines and the collaboration with a leading company in the area of natural language queries, currently also active in the automatic comprehension of legal texts (Expert.ai). The results are consistent with the PNRR commitment to a simplified public administration.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Expert.ai Spa

PhD Programme	**BRAIN, MIND AND COMPUTER SCIENCE**
Curriculum (if foreseen)	**Computer Science for societal challenges and innovation**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Data-driven Optimization of Processes in Public Administrations: When Human Perception meets Objectivity
Supervisor	Massimiliano de Leoni
Supervisor Email	massimiliano.deleoni@unipd.it
Project description	Administrations provide services through the execution of processes that encode local and (inter)national norms. This project aims to optimize these processes, providing directions to modify the operational mechanisms and the resource utilization. Traditionally, the optimization has been based on the subjectivity of stakeholders' feedback, thereby ignoring the objective of the process transactional data. This has often yielded process that are better "on paper", but not in reality. The project aims at an actual optimization of the real process, margining together data and stakeholders' feedback, on the one side, and techniques for user evaluation, AI and Process Mining, on the other side. The final process goal is to interpret the current norms and provides insights into how to both improve the norms and their operationalization. The project will also involve a specialized centre at Fraunhofer, with long-lasting experience on these topics
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Process Mining Cluster at Fraunhofer Institute for Applied Information Technology FIT, Aachen, Germania

PhD Programme	**BRAIN, MIND AND COMPUTER SCIENCE**
Curriculum (if foreseen)	**Computer Science for societal challenges and innovation**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	COmputational MOdel for DOcumentation and preservation of Multimodal Artistic Installations
Supervisor	Antonio Rodà
Supervisor Email	antonio.roda@unipd.it
Project description	COMODO MAI will define a computational model for the conservation and reactivation of contemporary art installations, characterized by a short life (a few years). The most advanced artistic practices make use of computer tools. The installations, using augmented reality systems, become biosemiotic (mechanical, computer, biological) technological environments in museums (or parks, urban landscapes), interactive (biosensors: brain wave detection, eye-tracking, etc.), with multisensory extension (sound, visual, tactile, olfactory), software mediated (often based on artificial intelligence models) and focused on human vs. non-human (bacteria, plants, different forms of artificial intelligence). Therefore they pose conservation problems both on an artistic and cultural level, to be solved on an IT level. In addition, they bring great value to AI research by providing datasets for training deep learning based algorithms.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Audio Innova srl

PhD Programme	**CROP SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Innovative strategies to enhance grapevine sustainability and resilience against stresses
Supervisor	Serena Varotto
Supervisor Email	serena.varotto@unipd.it
Project description	The PhD project will apply biotechnological approaches, both molecular (genome editing) and microbiological (SynCom), to improve sustainability and resilience in the vineyard ecosystem following PNRR AGRITEC Spoke 2 activities. At least three grape genotypes relevant for the Italian viticulture will be selected and strategy to obtain embryogenic calli developed. Genome editing procedures will be applied to generate improved genetic material, tolerant/resistant to the main biotic (downy and powdery mildew) and abiotic stresses. The final goal will be to reduce the environmental inputs improving water use efficiency, nutrient use efficiency and defence responses. In parallel, SynCom will be developed to enhance sustainability and resilience of the agroecosystem looking at the principal disease, including esca disease for which no susceptible and/or resistant gene are available to date. The activities will be mainly performed at CREA-VE, Conegliano, under the supervision of the co-tutor Dr. Walter Chitarra.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	MIVA – Moltiplicatori Italiani Viticoli Associati

PhD Programme	**CROP SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	GMO-free approaches: double stranded RNAs for sustainable grapevine protection
Supervisor	Claudio Bonghi
Supervisor Email	claudio.bonghi@unipd.it
Project description	The PhD project will apply GMO-free biotechnological approaches using double stranded RNAs (dsRNAs) molecules to improve sustainability and resilience in the vineyard ecosystem following PNRR spoke 2 activities. During the PhD project, target plant endogenes and/or essential ones of grape fungal pathogens will be selected for dsRNAs production and application in grapevine tissues. In parallel, mechanisms of recognition pattern by the RNAi machinery, siRNAs production, transport and dsRNAs length and delivery approaches will be analyzed by means of multidisciplinary approaches. DsRNAs will be applied to prime grape plants against the main biotic (e.g. powdery mildew, esca syndrome and other trunk diseases) and abiotic stresses (e.g. drought). The final goal will be to reduce the environmental inputs improving water use efficiency and defence responses. The activities will be mainly performed at CREA-VE, Conegliano, under the supervision of the co-tutor Dr. Walter Chitarra.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	VCR – Vivai Cooperativi Rauscedo

PhD Programme	**CROP SCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Evaluation of soilless systems for medical cannabis
Supervisor	Stefano Bona
Supervisor Email	stefano.bona@unipd.it
Project description	This research will aim to evaluate the possibility of cultivating medical cannabis in a vertical farming system that allows complete control of environmental and edaphic parameters and consents to optimize the use of resources obtaining an increase of the efficiency in the production of molecules. The research will be divided into four partially overlapping phases: 1) Initial evaluation of the optimal parameters to obtain standardization of the cannabis production process 2) optimization of yields in inflorescences through a precise definition of the controllable environmental parameters in indoor productions 3) evaluation of the effects of the single breeding parameters on cannabinoid and terpenes yields; a) definition of a deterministic model to relate the variations of the crop parameters with the variations in yield in inflorescences, the concentration of cannabinoids, the concertation of terpenes
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Labomar Next

PhD Programme	**INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Password ergo sum
Supervisor	Lorenza Bullo
Supervisor Email	lorenza.bullo@unipd.it
Project description	The project concerns the issue of digital identity, its authentication levels and the related procedures. The research will move from the analysis of the national and supranational legal framework on digital identity ("Codice dell'Amministrazione Digitale" - CAD), its life cycle and the incentives for its implementation. The project will also include a period of empirical research at the Chamber of Commerce of Venezia - Rovigo, the body responsible for issuing the SPID Codes issued by providers. At the Chamber of Commerce the Ph.D. candidate will have the chance to engage in various activities, such as the issuance of digital signature devices, digital tachograph cards and SPID credentials, the disclosure to companies of the Chamber of Commerce's digital services such as the "Cassetto dell'Imprenditore" and the portal "Impresainungiorno", the guidance of companies towards the network Points of Digital Business or the Digital Innovation Hubs and Competence Centers. The purpose of the research is to achieve a significant development of legal understanding and applied knowledge with respect to the issue of digital identity.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Camera di Commercio di Venezia e Rovigo - sede di Rovigo

PhD Programme	**INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Simplify and Digitalise Corporate Formation and Disclosure
Supervisor	Claudia Sandei
Supervisor Email	claudia.sandei@unipd.it
Project description	One of the imperatives of PNRR is the achievement of efficiency of public administration at all levels. Traditional roles of government and public administration need to adjust to emerging and future needs of societies. Technology could bring innovation opportunities: improve interaction between government and citizens through the simplification of procedures. The research project concerns particularly company disclosure and the role of business register (/office). Its aim is to propose amendments to certain disclosure requirements that may have become redundant, duplicative, overlapping, outdated, or superseded, in order to make the process of business disclosure easier and more effective. Technology and data protection will also be considered as a mean to achieve a balance between private and public instances, with special reference to the widespread obligation of companies to provide information on their ultimate beneficiaries.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Camera di Commercio di Padova (CCIAA)

PhD Programme	**INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	New job profiles in the public sector of "Funzioni Locali": analysis, update and management, in order to improve human resource management and to support Public Administration's digitai and ecological transition
Supervisor	Elena Pasqualetto
Supervisor Email	elena.pasqualetto@unipd.it
Project description	The d.l. 36/22 (PNRR 2) provides for the adoption of guidelines related to the planning of personnel needs; these guidelines include the new job profiles identified by the collective bargaining, with specific focus on the knowledge, expertise, and skills of the personnel to be hired, in order to support the Public Administration's digital and ecological transition. The collective negotiations for the "CCNL Funzioni locali" renewal are currently taking place and the new collective agreement will introduce a new system of personnel classification, developed in four areas, one dedicated to highly specialized profiles (art. 52-bis d.lgs. n. 165/2001). The research, in synergy with the HR Department of the Comune di Padova, focuses on the analysis, the updating and the management of new job profiles, with the objective of bettering the HR management, and indirectly affects educational needs, recruiting processes, mobility, performance evaluations, economic and vertical progressions.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Comune di Padova

PhD Programme	**ECONOMICS AND MANAGEMENT**
Curriculum (if foreseen)	**ECONOMICS**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Predicting the demand of local public services from "new digital data"
Supervisor	Lorenzo Rocco
Supervisor Email	lorenzo.rocco@unipd.it
Project description	The project aims to develop predictive models of the demand of local public services, such as local transportation, health, connectivity, starting from a combination of administrative data and digital information that can be drawn from digital platforms, such as Facebook or other social networks. The latter provide data aggregated at the local level on the socio-demographic features of their users, their interests, preferences and behaviours. Such information is typically unavailable in administrative archives and is not available at such a fine geographical level in survey data. Moreover, it is correlated with characteristics of the residents which are typically not collected from questionnaires. The combination of administrative data and "new digital data" allows to significantly improve the predictive power of the demand models of local services, and hence to plan with an enhanced effectiveness the distribution of resources on the territory, reducing the cases of under or over-supply.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	ISI Foundation, Torino

PhD Programme	**ECONOMICS AND MANAGEMENT**
Curriculum (if foreseen)	**ECONOMICS**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Enhancing public debt management strategies: assessment and forecasting tools
Supervisor	Luciano Greco
Supervisor Email	luciano.greco@unipd.it
Project description	In the framework of the ongoing scientific agreement among CRIEP-Unipd, the Italian Treasury (Debt Management Office), and MTS Italy, new research topics will be developed aimed at providing support to the government decision-making process concerning fiscal policy, monitoring and regulation of the public debt markets. Particularly, the objective of future research is twofold. First, we aim at identifying the main trends of the microstructural liquidity of public debt, analyzing potential disruptive events and providing regulatory solutions to foster the efficiency of primary and secondary markets in the medium-long term. Second, we aim at developing new forecasting tools to study the conditions behind public debt stability. Of course, the latter issue will be addressed in cross-country perspective, taking into account the strong debt externalities (fiscal interdependences) characterizing the Euro-area.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Direzione II del Dipartimento del Tesoro, Ministero dell'Economia e delle finanze

PhD Programme	**ECONOMICS AND MANAGEMENT**
Curriculum (if foreseen)	**MANAGEMENT**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Inclusive and sustainable development of smart cities ecosystems
Supervisor	Silvia Rita Sedita
Supervisor Email	silvia.sedita@unipd.it
Project description	The concept of a smart city is often associated with the implementation of smart technologies. However, it is extremely reductive to equate the sustainable development of a city with its digital infrastructure. This research project intends to build on the classical notion of a smart city as a digital city to include the human and social side of urban planning. The research intends to collect a set of original indicators that are a thermometer of the ability to design and implement a smart city as a result of a bottom-up co-creation process. The Ph.D. student will carry out a series of qualitative and quantitative analyses, which will bring out critical issues and useful tools for the sustainable development of the territory: develop urban laboratories on the national territory; identify some exemplary cases of smart cities development abroad; and start a national observatory on smart city development.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Blum Comunicazione Srl

PhD Programme	**ECONOMICS AND MANAGEMENT**
Curriculum (if foreseen)	**MANAGEMENT**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Stakeholder-engagement instruments in art and cultural projects of grant-making foundations
Supervisor	Giacomo Boesso
Supervisor Email	giacomo.boesso@unipd.it
Project description	How much and how do foundations use planning and control tools for co-managing cultural and artistic projects with local stakeholders (associations, cultural institutions, other social bodies)? The active involvement of local stakeholders is suggested by many researchers as the primary strategy for maximizing the social returns of cultural and artistic initiatives funded by grant-making foundations. These advantages, however, are not automatic or easy to obtain, they require careful definition in the roles of the different stakeholders, as well as evaluation processes that use multidimensional measurement approaches. This research phd grant is proposed to carry out a first national survey on the use of planning and control tools for the managing of stakeholders relations, in order to measure stakeholders' involvement and the related hypothesized improvement in the impact of the cultural projects funded by foundations.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	ACRI – Associazione di Fondazioni e di Casse di Risparmio Spa – Roma

PhD Programme	**PHILOSOPHY**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Administration and cities between democratic participation and technological innovation
Supervisor	Antonino Scalone
Supervisor Email	antonino.scalone@unipd.it
Project description	The city presents itself as an essential level of constitutional democracy. Its centrality is manifested both at the political and administrative level and at the social and economic level, as well as in the management of pathways to inclusion and citizenship, constituting an essential laboratory for experimenting with unprecedented forms of integration. However, the specific issue of the city has not received adequate attention to date. To pursue this aim requires an approach that can overcome rigid disciplinary partitions by effectively hybridizing the legal, political and philosophical dimensions in the direction of a critical interrogation of the city's current status and its possible future developments. The present research project aims precisely at this end, being able to make use of the wealth of experience and reflections accumulated by the research group on the city active in our University, of which the proposer is one of the coordinators, and the relationship with the "Centro per la riforma dello Stato".
Mandatory traineeship	n. 8 months
Company/ research centres/Public Administration	Fondazione CRS - Archivio Ingrao - Centro di Studi e Iniziative per la Riforma dello Stato

PhD Programme	**PHILOSOPHY**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Artistic Heritage and Future Generations: New Philosophical Perspectives in the Context of Digitization and Multimedia
Supervisor	Gabriele Tomasi
Supervisor Email	gabriele.tomasi@unipd.it
Project description	The issue of transgenerational responsibility is animating philosophical debate at various levels, from the environment to the common goods (see works by Andina, D'Amato, De-Shalit, Gündling, Parfit, Sikora, Stiegler, Tremmel, Weiss). In this context, the aim of the project is to analyze the problem of the transmission of artistic heritage to future generations. Starting from a consideration of the traditional sites of transmission of cultural heritage (archives, museums, libraries), the doctoral student will be expected to examine their transformation as they engage with technological innovations. Two fields in particular will be investigated, namely: 1) the digitization of archival material, with the consequent dislocation of both user and text/artwork, resulting in a new experience of accessing the material; 2) the effect of multimedia on the museum institution, which is on its way to becoming, from an "encyclopedia of knowledge," a place of "knowledge experience" and new ways of dealing with artworks.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	M9 - Museo del Novecento - Fondazione M9

PhD Programme	**GEOSCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Diagnostic study and evaluation of the restoration interventions of plaster replicas preserved at the Museum of Roman Civilization (Rome)
Supervisor	Claudio Mazzoli
Supervisor Email	claudio.mazzoli@unipd.it
Project description	Among the tangible assets of cultural interest, we find the historical plaster replicas of ancient monuments. Besides their historical value, these works are acquiring increasing importance in assessing the deterioration of monuments due to pollution and climate change. The Museum of the Roman Civilization in Rome preserves the integral cast of the reliefs of the Trajan's Column realised in 1861-2, which requires an intensive restauration campaign, due to the presence of traces of oxidation, cracks and detachments. In order to be able to formulate an effective restauration project, the research will focus on the analysis of the forms of degradation, on the identification of the causes, and on the evaluation of the most suitable types of intervention, using a multidisciplinary approach based on non-invasive diagnostics (photogrammetry, hyperspectral analysis, IR thermography, μ-Raman, μ-XRF, spectrophotometry, microclimatic monitoring), in a collaboration between University and Museum.
Mandatory traineeship	n. 8 months
Company/ research centres/Public Administration	Sovrintendenza Capitolina - Direzione Musei Capitolini e musei archeologici (Roma, Italia) -Muzeul Naţional de Istorie a României (Bucarest, Romania)

PhD Programme	**GEOSCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	OPTimization of SHM Systems for Infrastructural Safety – OPTIS3
Supervisor	Francesca da Porto
Supervisor Email	francesca.daporto@unipd.it
Project description	The PhD programme will be focused on the optimization of SHM systems on bridges and viaducts. The optimization will involve the development of systems aimed at finding structural and environmental parameters relevant to the description of the state of the system, highlighting anomalous actions and/or behaviour of structural interest. The study will take place through numerical modelling and experimentation, also with the direct participation of the PhD student in the pertinent activities of the sponsoring company. A substantial part of the research path will focus on the acquisition of skills in the use of predictive statistical behavioural models and self-learning algorithms, benefiting from the rapid development in the field of machine learning. The PhD programme will therefore include participation in specific training courses in the fields of algorithm implementation, use of artificial intelligence programs, data analysis, programming, with periods of study at foreign research institutions or universities.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Expin s.r.l. buildings

PhD Programme	**LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Legal history methodologies for the verification of collective ownership by administrative means under l. Nov. 20, 2017 No. 168.
Supervisor	Raffaele Volante
Supervisor Email	raffaele.volante@unipd.it
Project description	The law n. 168 of November 20, 2017 has regulated, acknowledging the teachings of the Constitutional Court, a third civil property system (SS.UU.n. 12482/2020): the collective property. It has as its title the custom, which has brought a land in the ownership of a community, in the form of the civic state property or mountain family communion constituted by ancient title (so-called laudo), already governed by the law n.97 of January 31, 1994. Collective land is indivisible and inalienable. Their occupation does not produce legal effects. Hence, numerous problems of application of the regional legislation of Veneto (Regional Law n.31 of July 22, 1994), whose territory has both forms of collective ownership. In this context, the PhD student will have to contribute to the developing of historical and legal investigation models for the identification of collective assets and administrative discipline for their understanding in the regional territorial planning tools.
Mandatory traineeship	n. 8 months
Company/ research centres/Public Administration	Regione Veneto. Direzione Enti locali. Ufficio usi civici

PhD Programme	**LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Developing a participative and inclusive Climate City Contract in a cities/EU cooperative framework. An Applied Transnational Legal Studies project supporting the City of Padova Horizon Europe Climate Neutral and Smart Cities Mission
Supervisor	Bernardo Cortese
Supervisor Email	bernardo.cortese@unipd.it
Project description	The EU Commission has chosen Padua for its "Horizon Europe Mission: 100 Climate-Neutral & Smart Cities by 2030". Padua is called to operate as a center of experimentation and innovation, developing policies by which the city -a venue for community relations, social and economic development- will become a climate-neutral ecosystem by 2030 and be a model for other EU cities, called to achieve the goal by 2050, within the framework of the EU climate change goals. In particular, a Climate City Contract is to be adopted and implemented with citizens and stakeholders, with UNIIPD leading the way. Within this framework, the PhD student will have to contribute to developing models of participatory and inclusive social relations and administrative action, contributing to the management of the City's relations with EU institutions and to the development of a system of transnational city cooperation, enhancing existing networks, identifying new ones, and based on a City/University integration.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Comune di Padova – Sindaco pro tempore

PhD Programme	**LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Legal structure of cultural heritage recognition
Supervisor	Raffaele Volante
Supervisor Email	raffaele.volante@unipd.it
Project description	The legal protection of cultural heritage is, in our legal system, extraordinarily complex, given by the double responsibility of protection and enhancement, as set out in art. 9 of our Constitution, the first one to include a provision on cultural heritage among the fundamental principles. The identification of cultural heritage for the purpose of its own protection is based on a series of complex recognition procedures, through the verification procedure or the declaration of cultural interest of an asset, depending on its ownership nature. This has led to the formation of a vast and multifaceted administrative practice, which has had judicial control only in a limited percentage of cases. In this context, the PhD student will have to help develop models of recognition of cultural heritage by identifying, classifying and reviewing the administrative practices used in order to balance protection and promotion needs.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Segretariato regionale del Ministero della Cultura per il Veneto

PhD Programme	**LAW**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Beyond Faro, between Naples and Padua - habi(li)tating culture: dialogues and contaminations on cultural heritage, society and human development, inclusion, diversity and disability. Study of models and good practices beyond the implementation of the Coun
Supervisor	Bernardo Cortese
Supervisor Email	bernardo.cortese@unipd.it
Project description	Starting from the analysis of the policies developed by Museo Archeologico Nazionale Napoli – a lab of reflection and good practices on the contribution of cultural heritage to society and human development- and of policies developed in institutions of similar international standing, as well as through the review of the approaches implemented at the civic museums of the two cities involved in the project (Naples and Padua), and at Centro Ateneo Musei UNIPD, the research intends to propose models and good practices of participation, inclusion and enablement, also through the opening of participatory discussion forums in the two cities. The aim is thus to elaborate an approach that enables the fusion of some of the main objectives of the Faro Convention - shared responsibility, public participation and inclusion, with the enabling approach of the United Nations Convention on the Rights of Persons with Disabilities, and its Article 30 in particular (participation in cultural life).
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Museo Archeologico Nazionale di Napoli - MANN Museo Civico Filangieri di Napoli Museo Civico di Padova

PhD Programme	**HUMAN RIGHTS, SOCIETY, AND MULTI-LEVEL GOVERNANCE**
Curriculum (if foreseen)	**Inclusion and Psychological growth**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Right to dignity to the end: Implementing Law 219/2017 on the ground between public administration and health service
Supervisor	Ines Testoni
Supervisor Email	ines.testoni@unipd.it
Project description	The doctoral fellowship is aimed at defining a useful strategy to optimize the relationship between public administration and the healthcare system for the management of advance treatment directives in line with Law 219/2017. A strategy will have to be defined to optimize the relationship between the population and the public administration to remove the psychosocial and cultural resistances that prevent the dispositive of the law from being sufficiently operationalized. The project is divided into several stages: investigation of the functioning of the law and communication between administrations and the health system, detection of obstacles in the functioning of the communication and the relationship with the population, study of psychosocial representations that hinder access to the law dispositive, and proposal of implementation strategies. Special attention will be offered to death education programs that can help make it easier for people to cope with the problem.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Comune di Padova

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and Environmental Engineering**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Promoting the development of innovative and sustainable food processes for the pasteurization and drying at low temperature thought an holistic analysis
Supervisor	Sara Spilimbergo
Supervisor Email	sara.spilimbergo@unipd.it
Project description	The aim of the research project is to support the development of new food products by sustainable innovative processes with a holistic approach, taking into account technical, legislative, social and economic aspects. In this regard, the project aims at integrating the national and international legislative context (technical specifications, guidelines about novel food etc.) throughout the development and analysis of case studies. The PhD project will be a highly multidisciplinary work concerning STEM, economic, social and legislative aspects, in order to develop essential tasks for the "policy makers". Indeed, the PhD student will be host in an industrial reality for six months, to develop a PhD work industrial oriented. Moreover, the doctorate will include a 6-8 months period of study and research abroad. Finally, the project will evaluate aspects related to the protection of the intellectual property of the innovative processes.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Granarolo S.p.a.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and Environmental Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Innovative materials for flexible packaging in the framework of the circular economy
Supervisor	Michele Modesti
Supervisor Email	michele.modesti@unipd.it
Project description	Packaging materials for food and no-food application are in a criticai transition phase, due to sustainability request. Both chemical and mechanical research fields are involved. The research project concerns the study of innovative materials for flexible packaging solutions, compatible with both incoming directives and processing machines. Thanks to this pushing towards a greater sustainability, eco-design of packaging is necessary in arder to ensure the required performances and to increase its recyclability. Eco-sustainable polymers will be evaluated and compared with traditional ones, in terms of physicals, chemicals and machining properties. New eco-sustainable films, in particular multilayer mono-materiai polymeric films, paper-based films, bio-polymer films have to be characterized. An assessment of the sealability and global performances will be done at PFM company, leader in Nord-Est packaging district, in arder to compare laboratory and machining test results and evaluate any criticai issues in the packaging and product shelf life (packaging gas-tight).
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	PFM S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and Environmental Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Complex polymeric systems enhancement by chemical and mechanical recycling in the textile and footwear industries
Supervisor	Michele Modesti
Supervisor Email	michele.modesti@unipd.it
Project description	The aim of this research is to recycle complex plastic materials deriving from the textile and footwear industries for their reintroduction into the original market or in another one without compromising the used polymers' intrinsic value. In particular, the purpose is to compare and identify the most appropriate recycling methods for different types of complex polymeric systems mainly made up by polyurethane, polyesters and polyamides. Recycling of plastics is an expanding industry, which responds to the increasingly need for circular economy. The plastic recycling process makes it possible to transform a polymeric waste into a new raw material that can be reused to create new objects. Until a few years ago, incineration was the only viable strategy when the waste had very different compositions and therefore hardly separable. Over the years, a number of techniques for recycling polymer materials have been developed and consolidated considering the different characteristics and compositions of input materials. However, nowadays there aren't any recycling processes tailored for such complex systems. Processes deal in this research project will require a combination of mechanical and chemical recycling and a continuous monitoring of the characteristics, through different operating parameters.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	LAPRIMA GREEN SOLUTIONS

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and environmental engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Quality by Design (QbD)-based approach to crystallization and drying processes of Active Pharmaceutical Ingredients and Intermediates
Supervisor	Santomaso Andrea Claudio
Supervisor Email	andrea.santomaso@unipd.it
Project description	The research activity of the project aims at a deeper understanding of the interconnections between crystallization and drying processes of Active Pharmaceutical Ingredients and Intermediates from a Quality by Design (QbD) perspective. By introducing QbD principles, future crystallization/particle handling problems can be avoided facilitating the Right-First-Time scale-up of processes. This will be done through the development of numerical approaches which will be verified in the field on partner company plants that synthesize APIs and pharmaceutical intermediates. Among the major aims of the project there is the creation of know-how, characterized by a strong component of innovativeness, that will be transferred to the company, during the period of stay of the PhD student in the company, and at the end of the PhD through the employment of this professional figure equipped with a solid modeling base, dropped into the knowledge of the specific production process.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	FIS - Fabbrica Italiana Sintetici S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and Environmental Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Design and development of 3D bioprinted tissue substitutes for biomedical applications
Supervisor	Elisa Cimetta
Supervisor Email	elisa.cimetta@unipd.it
Project description	3D bioprinting uses a combination of biomaterials and cells to create structures more faithfully representing natural tissues or organs than standard in vitro techniques. 3D bioprinting enables the creation of complex structures from relatively simple raw materials and processes. This technique holds incredible potential in disrupting the current standards for biological studies and ultimately bring great improvements to human lives and the healthcare system more in general. We will focus on the development of innovative and environmental-friendly hydrogel-based biomaterials for 3D bioprinting of tissue substitutes. Our biomaterials will be biocompatible and enable the formation of structured cellularized constructs. To better mimic in vivo tissues, we will increase complexity starting from a simple 3D cell-laden sample to a vascularized, multicellular construct. Applications range from cancer dissemination studies to pharmacological screenings for both testing and drug repositioning.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	BIO SYSTEM LAB S.R.L.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Chemical and Environmental Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Upgrading of kilns for clay bricks production using H2 as fuel
Supervisor	Paolo Canu
Supervisor Email	paolo.canu@unipd.it
Project description	Kilns for clay bricks production use intensively thermal energy, from methane. Its replacement with (green) H2 will significantly reduce their carbon footprint. This requires redesigning the furnaces and specifically burners, to preserve product quality and safety. The project aims to analyze, and provide effective solutions, the technological aspects related to this conversion, mainly concerning the adoption of equally effective and stable burners, and also the management of H2 in the plant. The project extends to the H2 production phase using electrolysers, intermediate storage, distribution and combustion. The conversion of the burners is expected to be gradual, starting from mixtures with a prevalence of methane, to progreessivley reduce its fraction, until it is completely removed.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Bedeschi SpA

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Energy Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of hydraulic power units for the energy ìndustry through life cycle assessment and energy performance optimization
Supervisor	Alberto Benato
Supervisor Email	alberto.benato@unipd.it
Project description	Efficient and sustainable hydraulic systems are essential for the exploitation of renewable sources. Therefore, components and power plants require continuous improvements in terms of both energy performance and environmental compatibility. To this end, the research project, focused on hydraulic power plants for the movement of solar trackers and wind and hydraulic turbine blades, aims to: - Analyze plant components and layouts to build mathematical models capable of predicting their dynamic behavior and evaluating their entire life cycle. - Experimentally measure the energy performance to calibrate the mathematical models. Then, the development of more energy and environmentally efficient components and layouts will be carried out through fluid dynamics and energy optimization procedures as well as life cycle analysis. The developed components and control units will be experimentally tested to evaluate the real improvements.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	I Hydroven srl

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Energy Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Thermo-fluid dynamics optimization of forced convection cooling in rotating electrical machines
Supervisor	Giovanna Cavazzini
Supervisor Email	giovanna.cavazzini@unipd.it
Project description	One of the key aspect to face the continuous growth in electricity demand, is not only to increase the share of renewable electricity production but also to develop more and more efficient machines. The research project will be aimed at optimizing the forced convection cooling in rotating electrical machines, with a particular focus on electric generators, in order to increase the resulting performance. The thermo-fluid dynamics inside different geometrical configurations will be numerically analysed in order to identify critical aspects of the electric machine design, fan included. The different machine components will be parametrized and a sensitivity analysis will be carried out to identify the ones mainly affecting the heat exchange and the pressure drops. Then, meta-heuristic optimization algorithm will be adopted to maximize the cooling performance, taking properly into account the design constraints.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Marelli Motori s.r.l.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Energy Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of techniques for the realization of digital twins of electrical, electronic and electromechanical components and systems
Supervisor	Piergiorgio Alotto
Supervisor Email	piergiorgio.alotto@unipd.it
Project description	The research project aims at developing methodologies for generating real-time embedded digital twins of electrical, electronic and electromechanical powertrain components. Such digital twins can be used as software sensors for temperature, torque, power, efficiency, and other relevant system parameters, predicting values at critical positions where they cannot be physically measured. Using a hybrid approach that is more oriented towards being physics-based than data-based, then applying rigorous physical models to replicate asset-specific behavior, allows for the development of accurate and reliable control systems in operational contexts. The research project will be vertical on a specific type of asset. In particular, the components to be studied with the aim of finding the appropriate methodology to generate their embedded digital twins will be electric motors (generators, alternators), power electronics modules (inverters and converters) and energy storage systems (batteries).
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Hexadrive Engineering SRL

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Energy Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	The HFO in the future scenario of commercial refrigeration market: environmental, efficiency and technological challenges
Supervisor	Anna Stoppato
Supervisor Email	anna.stoppato@unipd.it
Project description	The research work has as its objective the study of the commercial refrigeration market to evaluate and improve its environmental sustainability. Starting from the study of the different technologies and devices present on the market and / or soon to be applied, some models will be implemented to evaluate the performance of commercial refrigerators using different refrigerants (CO2 and HFO) and different technologies. Both design and annual performances will be evaluated and optimized, appropriately assuming possible work cycles. The models will be applied to different case studies, considering different places of use, user size, arrangement of refrigerators, ... The study will consider not only the performance in terms of energy efficiency, but also the environmental aspects (GTP, ODP, lack of material, water eutrophication, acidification, ...) from a life cycle perspective.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Honeywell Advanced Limited

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Materials Engineering**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	New materials and compounds from coffee processing by-products: a green approach in a circular economy perspective
Supervisor	Roberta Bertani
Supervisor Email	roberta.bertani@unipd.it
Project description	The project aims to create a regulatory reference framework, in terms of technical/application instructions, for the new materials obtained from intermediates/production residues of the food industry that, starting from Veneto, can extend beyond the region. New skills will be developed for the organization and management in public administrations involved in coordinating innovative actions in the field of green economy and ecological transition. As a case study, the by-products from coffee processing will be studied, such as silverskin, a powdery residue released in high amount in roasting that represents a problem due to its volatility and tendency to self-ignition, but from which cellulose and organic compounds of industrial (e.g. polyphenols) and pharmacological (e.g. chlorogenic acids) interest can be extracted, leaving a residue that can be converted to activated carbon to be used in treatments of water purification. The activity will take place both in DII/UNIPD and in DERSUT.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	DERSUT, S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Materials Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	New generation of ECO Products by post industrial and post consumer recycled materials supporting new business models development
Supervisor	Michele Modesti
Supervisor Email	michele.modesti@unipd.it
Project description	The study of recycled materials' sources is crucial for the strategic approach of Fitt S.p.A. in the Market, it will involve the creation of specific supply chains of polymeric materials and additives and consequently Products and Articles developed in eco-design will be relevant, because of the increasing sensitivity of Consumers and Governments in terms of environmental impact. The research project concerns the study of a new generation of Eco-Products made of a great percentage of post-industrial and post-consumer recycled materials supporting new business models development. Both chemical and mechanical research fields will be involved consisting in the characterization of new polymeric material formulations and new industrial processes as well. Eco-sustainable materials and products will be specifically designed and a LCA study will be carried out to measure products' sustainability improvement involving fittings, hoses and pipes made of recycled PVC, TPE and Polyolefins.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	FITT S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Materials Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Enhancing the sustainability of functional glasses
Supervisor	Enrico Bernardo
Supervisor Email	enrico.bernardo@unipd.it
Project description	Modern devices involve glass panels with complex functionalities. Low-E, hard and soft coatings modify mechanical, thermal, electrical and optical properties. The enhancement of performances, however, has a controversial impact on sustainability. Engineered panels may lead to important energy savings, but the environmental impact of production is significant, in terms of amounts of coating products which are not effectively deposited and the number of faulty panels, typically disposed in landfills. The projects aims at improving the sustainability by: i) revision of the deposition technologies and formulations; ii) application of upcycling strategies to faulty products. Discarded panels may be transformed into a new generation of cementitious materials, according to alkali activation of finely ground glass particles. The investigation will be supported also by the FunGlass centre at the University of Trencin, Slovakia (Prof. Galusek), specifically for the characterization of coatings.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Borgna Vetri S.r.l.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Materials Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of digital twins to increase the efficiency and sustainability of the injection molding process
Supervisor	Giovanni Lucchetta
Supervisor Email	giovanni.lucchetta@unipd.it
Project description	The goal of this research project is the development of digital twins that make it possible to reduce time, waste and energy used in the start-up phase of the injection molding process. In a lean production context, characterized by frequent mold changes, the start-up phase has the most significant impact on the efficiency and sustainability of the entire process. The most advanced machine learning techniques will be applied to the data acquired through sensors and IoT gateways to determine the optimal start-up procedure, shortening the thermal transients for each specific component / material / mold combination. The project will be divided into the following phases: characterization of the efficiency and energy consumption of the process; sensorization and IoT interfacing of the molding system; data acquisition and model training with experimental data and numerical simulation results; implementation and validation of digital twins.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Vimar S.p.a.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Materials Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Manifattura additiva di geopolimeri per filtrazione di brine
Supervisor	Paolo Colombo
Supervisor Email	paolo.colombo@unipd.it
Project description	The project aims at developing versatile and bespoke filtrations solutions for the purification of brine for the removal or recovery of specific elements. In particular, Additive Manufacturing will enable to achieve unique advantages in terms of part morphology. The research program is: 1) design of the most appropriate geopolymer matrix and potential selection of additional materials possessing suitable absorbance characteristics. In particular, at least some of the raw materials will be derived from waste; 2) development of a suitable ink for additive manufacturing by Direct Ink Writing; 3) design of filter components with different architectures; 4) functionalization of the filters' surface to enhance performance; 5) characterization and testing of the filters, using model liquid systems. The combination of various filtration mechanism strategies will also be pursued, and the development of the parts will be carried out according to DFAM (Design for Additive Manufacturing) principles.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Eni S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Mechanical Engineering**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Enhancing vehicle safety through state estimators and innovative control system for vehicle dynamics
Supervisor	Basilio Lenzo
Supervisor Email	basilio.lenzo@unipd.it
Project description	With 1.2 million deaths every year, road accidents are the 8th leading cause of death in the world. The World Health Organization estimates that traffic-related fatalities will likely become the 5th leading cause of death by 2030, unless action is taken. Within such context, this project is devoted to the development of new paradigms of active safety systems. As of today, many key quantities related to lateral vehicle motion cannot be measured. But, if reliably estimated, such quantities could be harnessed along with the current electrification trend - e.g. by implementing torque vectoring techniques. While current safety systems only intervene when a dangerous situation is detected, it would be possible to anticipate such situations. This PhD project will allow the candidate to work at the forefront of vehicle dynamics, safety and electrification, which are key trends in modern vehicle industry as well as in national and international research programmes (e.g. PNRR, Horizon).
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Megaride s.r.l.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Mechanical Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Aeraulic systems and processes for the sustainability of the steel industry
Supervisor	Andrea Lazzaretto
Supervisor Email	andrea.lazzaretto@unipd.it
Project description	Aeraulic separation is one of the main technologies for cleaning and treating ferrous and non-ferrous scrap. Air separation systems are used in complementary way to magnets, sensors and separators to clean the metallic fraction from the waste/contaminated one. Examples of aeraulic separation, are Z-box/cascade system, tumble drum system, air knives (air curtains), air density tables. The panorama of aeraulic separation systems in scrap treatment is very varied and the engineering is based on empirical solutions. Hence the need to develop scientific models to analyze the process and find the optimized solutions to process different types of material. This is the goal of this project with particular focus on reduction of emissions into the atmosphere and enhancement of non-metallic fractions with a view to circular economy and minimization of the component to be disposed of in landfills. Physical and numerical models will be built to achieve these goals, in addition to experimental tests.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	DANIELI & C. OFFICINE MECCANICHE S.p.A.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Mechanical Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Simulation and validation of load spectra for drivelines of Off-Highway vehicles
Supervisor	Giovanni Meneghetti
Supervisor Email	giovanni.meneghetti@unipd.it
Project description	The drivelines of Off-Highway vehicles (tractors and earth-moving machines) are supposed to transform over next years due to the hybridization trend coming from the Automotive sector. Electrification changes significantly the weight distribution due to battery pack installations, thus imposing to redesign structural components towards lightweighting, CO2 saving and sustainable products made in Italy. Gear speed will increase, thus modifying torque spectra (along with the presence of energy recovering systems) which will lead to lighter faster gears and shafts with longer target life. This project aims to set up a digital-twin (by means of lumped-parameters models) of an Off-Highway existing vehicle, which will allow to estimate load spectra and torque/speed duty cycles (i.e. the design parameters) of future vehicle's driveline components. The model will simulate different mission profiles for specific geographical market requirements and allow setting predictive maintenance strategies.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Carraro Spa

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Mechanical Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of a Mobile Robotic Manipulation System for Pick&Place of Non-Standard Cartons in Decathlon Logistics Fulfillment Centers
Supervisor	Silvio Cocuzza
Supervisor Email	silvio.cocuzza@unipd.it
Project description	One of the main unsolved bottlenecks in fulfillment centers (as in warehouses, distribution centers, etc) is the non-standard cartons (in shape, size or weight) handling (NSCH). The cause is the High Mix Low Volume (HMLV) of each stock that does not permit to dedicate an automated equipment; so far, the only solution is the human operator, with time management issues for companies, and the high risk of labor injuries. This project will develop a robot manipulator able to pick&place these tailor-made packaging. To successfully reach this goal, the robotic system will be based on commercial equipment (i.e. AGV, robotic arms, etc), thus research will focus on cognitive mechatronics for decision making, grasping strategies and grippers design. Semi-autonomy is envisaged to have the human-in-the-loop for making tasks easier. This project will improve the state of art of the NSCH manipulation and will be exploited not only in fulfillment centers, but also in all the activities facing HMLV.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	DECATHLON ITALIA S.r.l.

PhD Programme	**INDUSTRIAL ENGINEERING**
Curriculum (if foreseen)	**Mechanical Engineering**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Kinematics and dynamics optimization of robots by numerical modeling and experimental validation
Supervisor	Silvio Cocuzza
Supervisor Email	silvio.cocuzza@unipd.it
Project description	The High Mix Low Volume production pushes robot producers to improve the flexibility of robots, without reducing their performance. Kinematics and Dynamics play a fundamental role, because weight, stiffeness, and workspace are at the basis of velocity/acceleration performance, accuracy, and energy consumption. Campetella has an extensive experience in robot design and construction (from cartesian to SCARA robots, up to parallel and hybrid ones), but it lacks in virtual prototyping design. This project will focus on creating fully parametrized robot models. After experimental validation, the model parameters will be optimized in order to improve the perfomance (e.g., accelerations, vibrations, workspace). The main parameters will be experimentally identified in order to improve the models reliability during the whole robots life cycle. The developed models will be useful to improve the performance of existing robots, and to design a new generation of robots with increased performance.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Campetella Robotic Center S.r.l.

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	351
Action Line	B. Research on RRP topics
Project title	Mathematical models for the virtual brain
Supervisor	Sandro Zampieri
Supervisor Email	sandro.zampieri@unipd.it
Project description	The brain is composed by neurons. Each neuron can be seen as a non-linear circuit modeled by a set of complex nonlinear differential equations. The most popular neuron model is the Hodgkin-Huxley model. This provides a very accurate description of the neuron dynamics, but is rather difficult to analyze. Indeed, while these models are very successful for studying populations of few neurons, they appear to be too complex for the study of large populations of interacting neurons. For this reason, simpler phenomenological linear models have been proposed to explain emergent phenomena of neuronal populations. However, these models fail to capture important functional features of the brain dynamics. Other more complex nonlinear models have been proposed, such as the Kuramoto model or the Wilson Cowan model. These, on the other hand, are too complex mathematical object to analyze. The aim of the project is to propose an intermediate model that is both descriptive enough but also treatable.
Mandatory traineeship	n. months
Company/ research centres/Public Administration	

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Study and development of real-time adaptive on-chip models of electrical, electronic and electromechanical components in powertrain applications
Supervisor	Ruggero Carli
Supervisor Email	ruggero.carli@unipd.it
Project description	This research project aims to develop methodologies for real-time parameter estimation of embedded digitai twins of electrical, electronic, and electromechanical components. Digitai twins can be used as software sensors for estimating temperature, torque, power, efficiency, and other relevant system parameters, predicting values at criticai points where they cannot be physically measured. Specifically, the project is divided into three phases: 1- Study of the state of the art of filtering and estimation in linear and nonlinear parametric modeling. 2 - Implementation of different estimation strategies in third software and hardware platforms, testing their accuracy and real-time execution through simulation analysis and experimental tests. 3 -Development of fault identification, aging estimation, and predictive and preventive maintenance algorithms for electrical, electronic, and electromechanical systems such as motors, power modules, and energy storage systems
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Hexadrive Engineering Sri

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Advanced Al techniques far industriai human-robot collaboration
Supervisor	Ruggero Carli
Supervisor Email	ruggero.carli@unipd.it
Project description	Human-robot collaboration (HRC) aims at a direct synergy between robots and humans to reach higher productivity. This poses unprecedented challenges and substantial changes with respect to traditional frameworks, in particular humans-robots share un/semi-structured enviroments with the need of accommodating far humans' behaviour. In this project we consider a workcell composed by one human and one robot collaborating to perform a given task. The ultimate goal is to create the tecnology (based on modem Al tools) far making the workcell capable of: i) detecting the human worker and understanding his/her intentions; ii) acquiring detailed infarmation about the environment/objects being processed; iii) developing an intelligent robotic behavior to cooperate with the human. This is a holistic approach to HRC, because an efficient coordination between human and robot can be achieved only if an accurate perception of the worker and a deep understanding of the actions performed is available.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Mitsubishi Electric Research Labs

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Test and modeling of fiber infrastructure for application classical and quantum communication (QKD)
Supervisor	Giuseppe Vallone
Supervisor Email	giuseppe.vallone@unipd.it
Project description	Quantum computers will put classical cryptography at risk. Today maturity of quantum technologies represents the best answer to the growing demand for security in communications: an encryption can be based on the exchange of a key based on the physical status of photons and thanks to quantum properties endeavors attempts can be identified. These systems are commonly referred as Quantum Key Distribution, QKD. Design and deployment of future Quantum Communication Infrastructures require an advanced understanding of fiber networks. The proposed research program aims to develop a specific knowledge on fiber infrastructure for QKD and co-existence of quantum/classical communication. Planned activities are reported in the following: - analysis of existing state of the art; - fiber characterization (labs / on-field test) with critical variables and relevant kpi (QKD, co-existence quantum/classical comm); - comprehensive modelling of fiber network.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Telebit SpA

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Big-data Analytics for Mobility
Supervisor	Francesco Silvestri
Supervisor Email	francesco.silvestri@unipd.it
Project description	Mobile network data are a powerful source of information for studying human mobility and providing innovative services due to the high penetration of mobile phones. These data are made up of logs recording which cells phones are connected to at a given time, providing an approximation of people moving patterns. We aim to develop innovative and scalable analytics for processing large datasets of trajectories extracted from these data. We will develop methods for similarity-search and pattern-mining of trajectories and advanced analytics providing new insights from mobile networks data. The project involves the Department of Information Engineering of the University of Padova and Motion Analytica srl, a national market leader in developing mobility analytics from telco data. These research results will foster the development of innovative mobility services with high economic and social potentials, such as more sustainable mobility planning and customized services for the tourism industry.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	Motion Analytica srl

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Underwater acoustic communications and positioning systems
Supervisor	Michele Zorzi
Supervisor Email	michele.zorzi@unipd.it
Project description	The project will focus on the analysis of innovative underwater acoustic communications and positioning systems based on software-defined acoustic modems and precise oscillators such as oven-controlled crystal oscillators (OCXO) and rubidium-based atomic clocks. The use of software-defined acoustic modems will allow to investigate not only new modulation and coding schemes, but also new multiple access control (MAC) protocols. High-precision oscillators, instead, enable the possibility to perform one-way travel-time (OWTT) ranging techniques: different OWTT ranging procedures will be investigated by the PhD candidate. The acoustic modem will be implemented in all its hardware and software components. The system evaluation will be performed in two steps: in the first step the modem will be tested in a controlled laboratory environment, in the second step the modem and the developed OWTT ranging and MAC protocols will be tested in sea or lake waters.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Wireless and More srl

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Communications networks for monitoring aquatic environments
Supervisor	Michele Zorzi
Supervisor Email	michele.zorzi@unipd.it
Project description	The goal of this project is to study and design innovative wireless communications techniques for data collection in order to monitor aquatic environments. Monitoring these areas, which can involve river, lake, lagoon and even marine and oceanic environments, represents a fundamental tool for the protection of our ecosystem, especially in the face of the climate change and global warming threat. Communications in aquatic environments, however, presents specific challenges, due to the presence of large bodies of water. In this study we plan to develop new technology for the support of data transmission, and to implement new algorithms and new protocols for reliable and efficient transmission in the underwater environment. We will consider acoustic and optical communications underwater, as well as wireless radio networks above large bodies of water, to reach the data collection center onshore, where data can be analyzed by specialists and/or shared with other research institutions.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Wireless and More srl

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	QoE Evaluations for 5G and 6G Mobile Networks
Supervisor	Michele Zorzi
Supervisor Email	michele.zorzi@unipd.it
Project description	Traditionally, the performance of mobile communications systems has been measured in terms of Quality of Service (QoS), using network-level metrics such as throughput, delay, and packet error rate. However, these metrics are ill-prepared to understand the Quality of Experience (QoE) that 5G extreme-high broadband use cases bring: high-speed internet, virtual and augmented reality and online gaming. Unsurprisingly, mobile operators are increasingly interested in determining QoE rather than QoS, optimizing their networks with a user-centric approach. Similarly, ultra-reliable and critical use cases such as industrial IoT require new measurement techniques. In this industrial project, done in cooperation with Keysight Technologies, we aim to propose new methods to measure and verify the performance of today's 5G and future 6G networks using emulated and live networks. In addition to scientific contributions, Keysight is interested in promoting the work at ITU, where it is an active member.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Keysight Technologies Denmark ApS

PhD Programme	**INFORMATION ENGINEERING**
Curriculum (if foreseen)	**INFORMATION SCIENCE AND TECHNOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Agricolture 4.0: advanced control and ICT methodologies for automated precision farming
Supervisor	Luca Schenato
Supervisor Email	l.schenato@unipd.it
Project description	The project is part of the second mission of the PNRR (Green Revolution and ecological transition) and in particular the M2C1 - Agriculture submission sustainable and circular economy where information engineering technologies and control systems play a fundamental role in the digital transition of agricultural sector (Agriculture 4.0). In particular the project aims to develop advanced control methodologies for the automation of agricultural machinery, of data acquisition and processing for predictive maintenance and precision control via Internet-of-Things (IoT), integration of communication systems and remote navigation. The need to integrate ICT devices and IoT wireless sensors and to have at the same time a reliable and flexible system, pose challenges noteworthy that this project aims to address through the use of innovative methodologies such as cooperative predictive model control over wireless.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	MASCHIO GASPARDO S.p.A.

PhD Programme	**MANAGEMENT ENGINEERING AND REAL ESTATE ECONOMICS**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Lean and safety management to improve sustainability and performance of healthcare pathways
Supervisor	Chiara Verbano
Supervisor Email	chiara.verbano@unipd.it
Project description	The objective of the research project is to develop an innovative methodology for the management of healthcare pathways aiming at continuously improving the performance in terms of efficiency, effectiveness, patient safety and satisfaction. Lean healthcare and clinical risk management methodologies will be integrated with the care continuity model with the final intent to guarantee economic and social healthcare sustainability, thanks to the identification and synergic reduction of wastes and risks and the diffusion of the continuous improvement and patient satisfaction managerial culture at strategic and operative level. This methodology will be designed and tested within the Local Health Authority Marca Trevigiana considering the care organization model introduced by the Decree 71/2022 and in other international contexts. The expected results will consist of the methodology obtained, the care pathways improvement and the managerial culture dissemination in the considered contexts.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	ULSS 2 MARCA TREVIGIANA, legale rappresentante Dr. Francesco Benazzi

PhD Programme	**MANAGEMENT ENGINEERING AND REAL ESTATE ECONOMICS**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of customized and sustainable solutions far smart building
Supervisor	Cipriano Forza
Supervisor Email	cipriano.forza@unipd.it
Project description	Energy efficiency solutions are growing in importance to preserve the environment and limit costs. Among these solutions, the use of digitai technologies to monitor and remote control energy consumption is a promising one, which acts at the intersection of the two hot areas of green and digitai transition. This solution complements the design of buildings that use energy from renewable sources and maximize autoconsumption. This doctoral project aims to unveil how firms in the construction industry can innovate their business offer to clients along a smart, customized and sustainable solution. The idea is to design buildings and appliances equipped with loT devices that, by means of big data analytics, allow builders offering packages of customized services to contain consumption and live smartly. In order to understand how these firms can change their business model offering these smart solutions, a qualitative methodological approach will be employed, using Edilvi as a case study.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Edilvi SpA

PhD Programme	**MANAGEMENT ENGINEERING AND REAL ESTATE ECONOMICS**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Ecosystems for diagnostic market: a strategic business model to create value for patients
Supervisor	Anna Nosella
Supervisor Email	anna.nosella@unipd.it
Project description	Genomics and molecular biology combined with bioinformatics have opened up new frontiers in the field of diagnostic services. Unfortunately, the persistent fragmentation of diagnostic markets and the heterogenous specialization of the operators hinder the exploitation of these possibilities. These obstacles can be overcome by establishing collaborations between actors by means of digital technologies. The research project therefore builds on existing ecosystems with the aim to aggregate them, support their development process and define their value proposition targeting patients in the field of reproductive genetics and oncology. Thus, we propose the use of technological platforms that make it possible to collect health information and to follow and manage the patients during the illness. Based on a qualitative methodology, the PhD student will develop the ecosystem business and operational model considering POLO GGB as a case study due to the partnerships developed over the years.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Polo Innovazione Genomica Genetica e Biologia Srl

PhD Programme	**LAND, ENVIRONMENT, RESOURCES, HEALTH**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Geospatial intelligence analytics and big-data for improving knowledge of ecosystem dynamics in the context of regional planning
Supervisor	Francesco Pirotti
Supervisor Email	francesco.pirotti@unipd.it
Project description	A multi-disciplinary approach is essential for understanding the mechanisms of cause and effect in the context of the study of the ecosystem in its various parts. The responses to different pressures (e.g. climate change) have a complexity space-time that can be validly analyzed using sensor data proximity and remote processes developed with new big-data analytical technologies e artificial intelligence. In this project the candidate will collaborate with the public administration (PA) integrating the data available from the offices with these new ones technologies. The goal is to evaluate and define the best methodology, which capitalizes the available data integrated with geospatial data from different sources, and allows you to increase the understanding of ecosystem dynamics from a managerial point of view and for large area planning. The research will be done in collaboration with public administration at the Regione Veneto - U.O. Pianificazione e Gestione faunistico-venatoria
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Regione del Veneto Area Marketing Territoriale, Cultura, Turismo, Agricoltura e Sport Direzione Agroambiente, Programmazione e Gestione ittica e faunistico-venatoria

PhD Programme	**LAND, ENVIRONMENT, RESOURCES, HEALTH**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Transformative Governance for Green Communities in Rural Areas: Innovations and Challenges for Local Action Groups (LAGs) in Italy
Supervisor	Laura Secco
Supervisor Email	laura.secco@unipd.it
Project description	In the current phase of EU policy reform, Public Administrations such as the Local Action Groups (LAGs) of the EU LEADER programme, public-private partnerships active in rural areas, are increasingly facing uncertainties and wicked problems. As agents of local development, they are called upon to manage various intervention strategies and allocate related funds, which are often neither coordinated nor interlinked each other: Wide Area Projects, Programmatic Agreements, Territorial Cooperation, National Strategy for Inner Areas, Integrated Strategy for Sustainable Urban Development, Recovery and Resilience Plan Funds 2021-2026. By applying quanti-qualitative mixed methods and transdisciplinary approaches of system thinking and network analysis in the LAG Prealpi and Dolomiti (Belluno province) and other case studies, the research will explore possible governance, organisational/institutional and social innovations to transform the system and the LAGs themselves making them more effective/efficient in supporting the development of Green Communities in rural areas with a view to sustainability.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Associazione Gruppo di Azione Locale Prealpi e Dolomiti

PhD Programme	**LAND, ENVIRONMENT, RESOURCES, HEALTH**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Mapping forest parameters using remote and close-range sensing techniques
Supervisor	Francesco Pirotti
Supervisor Email	francesco.pirotti@unipd.it
Project description	Forest management is now widely supported by remote sensing data and new modelling approaches that use artificial intelligence (AI) to predict and map information. This PhD project will research new technologies that provide rigorous information of agro-forestry environments. The successful candidate will work with remote sensing - optical-passive and active sensors - hyperspectral cameras, laser scanners, radar (SAR) ... - and latest AI methods for modelling forest variables of interest. She/he will compare existing measurement methodologies used in forestry with estimates from imagery and point cloud data and also investigate on the potential of creating digital twins of forest environments to create eXtended Reality (XR) scenarios with rigorous metrics for educational and research purposes. The research will be in collaboration with public administration, the Forest Service Office of the Autonomous Province of Trento.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Provincia autonoma di Trento

PhD Programme	**LAND, ENVIRONMENT, RESOURCES, HEALTH**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Ecosystem approach and nature-based solutions for climate crisis adaptation of Land Irrigation Authorities of Veneto Region
Supervisor	Davide Pettenella
Supervisor Email	davide.pettenella@unipd.it
Project description	Under the threat of climate crisis and driven by new policies, water irrigation in Veneto is changing from flood to drip irrigation. While impacts on water savings are known, environmental risks on the hydrogeological system are little investigated. By building on existing studies on the assessment of ecosystem services provided by the irrigation network, and in close cooperation with Land Irrigation Authorities, we will analyse the biophysical impacts and the socio-economic sustainability of irrigation regimes by integrating new adaptation strategies. To this aim, the research will adopt water footprint and mitigation hierarchy approaches to propose mitigation, adaptation and compensation strategies. Possible nature-based solutions will be considered for this, evaluating their effectiveness and their socioeconomic performances. Research results will be open access and knowledge transfer will be ensured by a partnership with ANBI Veneto, and with future PNRR and EC projects.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Etifor S.r.l.

PhD Programme	**LAND, ENVIRONMENT, RESOURCES, HEALTH**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Impact of climate change on extreme precipitation and related hydrological processes in the Italian North East
Supervisor	Marco Borga
Supervisor Email	marco.borga@unipd.it
Project description	Despite their societal importance, only few studies have explored potential climate change impacts on flash floods and associated hydro-geomorphic hazards (Blöschl et al., 2019). In fact, no accepted estimates of such changes to be used in engineering practice or environmental management planning exist, nationally or regionally. This is the result of 1) the limited availability of high spatial and temporal resolution climate model outputs, until recently limited to daily temporal scales and to spatial scales of several tens of km, and 2) the lack of statistical models capable of estimating the probability of rain and wind extremes based on short high-resolution climate model runs. This gap is going to change as a result of two recent major scientific advances. The first advance is the advent of Convection-Permitting Models (CPMs), which substantially improve the representation of precipitation at the sub-daily scales compared to the standard Regional Climate Models (RCM) and leads to a greater confidence in their projections thanks to a more realistic representation of local processes. The first multi-model CPMs ensemble run (i.e. a set of model outputs from twelve different numerical models with different representations of the main physical processes and exploring a range of different boundary and initial conditions) is now provided over Europe under the CORDEX-FPS Convection program at 2.5 km spatial resolution and at 1-hour temporal resolution. This CPM ensemble includes both current climate conditions as well as future climate scenarios, and thus represents an unprecedented opportunity for exploring climate change impacts at the temporal and spatial scales that characterize extreme events such as flash floods and debris flows. However, due to the computational costs of these high-resolution simulations, outputs for only three time slices are available: historical (1996-2005), near future (2041-2050), and far future (2090-2099). These 10-year time series are too short to provide reliable statistics of extremes if analyzed using the traditional extreme value theory. This limitation can now be overcome by exploiting a second recent advance in the field of extreme value theory, the Metastatistical Extreme Value Distribution (MEVD) (Marani and Ignaccolo, 2015). Given this background, the overarching objectives of the project are to quantify near (2041-2050) and far (2090-2099) future changes in extreme precipitation probability at sub-daily temporal scales over the Italian North East, with respect to the baseline (1996-2005) using the MEVD approach.

	Research results will be open access and knowledge transfer will be ensured by a partnership with ARPAV, and with future PNRR and EC projects.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	InsideClimateServices

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**BIOSTATISTICS AND CLINIC EPIDEMIOLOGY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Monitoring Patient Reported Outcomes and Lifestyles by Integrating Clinical Records with Digital and Social Media data
Supervisor	Dario Gregori
Supervisor Email	dario.gregori@unipd.it
Project description	The project is aimed at augmenting information about patients' outcomes of care, in particular regarding the quality of life and lifestyle changes, by integrating classic information derived from Case reports and Patient-Reported Forms with data collected through non-medical devices like smartwatches and mobile phones. In addition, data on specific treatments and outcomes will be derived from social media data (e.g.: Twitter, Facebook, …). This will allow seamless monitoring of outpatients, avoiding, in particular for low/medium impact diseases, the medicalization of the patient's life. The final goal is to provide a trial management platform to integrate real-world patient-level collected data with classic information collected bedside during the in-hospital stay. Noticeably, the idea fits the framework of a "paperless" outpatient monitoring process, improving the environmental sustainability of clinical research. Main scientific deliverables will be disseminated via open-access platforms.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Zeta Research S.r.l.

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**BIOSTATISTICS AND CLINIC EPIDEMIOLOGY**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Actuarial risk and management in health care insurance plans: novel integrated approaches using Artificial Intelligence
Supervisor	Dario Gregori
Supervisor Email	dario.gregori@unipd.it
Project description	The project aims to support the institutional design of an innovative system of governance of insurance procedures by the public bodies of the health care system for the coverage of claims to patients. The project has two objectives: (i) to develop an organizational model that integrates clinical risk management with financial and insurance management, connecting the health data warehouse with the administrative sector through (ii) the development of decision-making systems based on artificial intelligence (AI), to integrate health monitoring with the financial management of reimbursements. The project will have immediate repercussions in the construction of an innovative Veneto model in the management of regional insurance for health claims but also in the field of international research with the provision of publications (OA) of AI models, which will be developed using the Machine Learning laboratories of the DSCTV and those of the cooperating international Departments, like that of Actuarial Sciences of Hacettepe University (Ankara).
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	AZIENDA ZERO Regione del Veneto

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**CARDIOVASCULAR SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of a bioreactor with automatized and micro/macrofluidic control tor predictive and personalized cardiac regenerative medicine
Supervisor	Laura Iop
Supervisor Email	laura.iop@unipd.it
Project description	Cardiovascular diseases remain the Worldwide leading death cause despite the progress in prevention, diagnosis, and care. Cardiac disease modeling and drug testing using bioengineered tissues with human patients' cells and natural scaffolds are revolutionizing this scenario; still, it is demanding to fully recapitulate the subtle dynamics of a pathophysiological tissue to effectively study altered pathways, discover new targets, and/or test novel pharmacological treatment hypotheses. This Ph.D. project aims to develop a bioreactor with automatized micro/macrofluidic control to previde opportune biochemical, biomechanical, and electrical stimulation and in vitro mimic the pathophysiology of human pacemaker and working myocardium. The academic synergy with a leading engineering company will allow to develop an innovative device useful to reply to the relevant challenges of Health, by rendering available novel technologies fora predictive and personalized, cardiac regenerative medicine.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	I.R.S. Ingegneria Ricerca Sistemi S.R.L.

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**CARDIOVASCULAR SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Machine Learning models to create an Expert system to predict major cardiac adverse events in monitoring heart transplant patients
Supervisor	Chiara Castellani
Supervisor Email	chiara.castellani@unipd.it
Project description	Recent research (Castellani et al 2020) demonstrates that surface markers of extracellular vesicles (EVs) can be used as a non-invasive diagnostic tool for characterizing and monitoring rejection in heart transplant. Their prognostic capability can be enhanced by using machine learning. The main goal of this research project is to explore the capabilities of AI already validated in the cited paper, to develop the technological readiness from the actual leve I TRL4 (validated in lab) to TRL 7 (prototype in operational environment). The main deliverable is a Machine Learning Expert System (exploting the data coming from biopsies and EVs analysis) with an easy-to-use user interface able to characterize the different types of cardiac rejection and discover the temperai correlation of adverse events during the patients follow-up. The outcome will be a new diagnostic tool as a companion of the endomyocardial biopsy able to stratify patients with the highest risk of rejection for a closer follow-up.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	i4 Consulting S.r.l.

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**THORACIC AND PULMONARY SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Ischemic reperfusion injury on pulmonary graft for therapeutic transplantation preserved with continuous normothermic perfusion technique
Supervisor	Andrea Dell'Amore
Supervisor Email	andrea.dellamore@unipd.it
Project description	Reperfusion injury is a serious complication after lung transplantation. The use of more physiological preservation techniques, in particular the continuous normothermic perfusion after donor collection, represent a new frontier in lung transplantation. Our research is based on the comparative evaluation between lungs preserved in normothermia and continuous perfusion versus those preserved in cold static condition that are used for lung transplantation. The comparison between the two techniques will be based on the histopathological study of lung biopsies obtained before and after reperfusion in vivo, the laboratory evaluation of the post reperfusion cytokine storm and on clinical data in particular the incidence of primary organ dysfunction after transplantation. In the medium to long term, we will also evaluate the number and severity of pulmonary rejection episodes in relation to the conservation strategy used for that organ.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	TransMedics.Inc

PhD Programme	**TRANSLATIONAL SPECIALISTIC MEDICINE G.B. MORGAGNI**
Curriculum (if foreseen)	**THORACIC AND PULMONARY SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Weaving of microporous fibers of polymeric origin to be used in the biomedical field for the transfer of gas
Supervisor	Andrea Dell'Amore
Supervisor Email	andrea.dellamore@unipd.it
Project description	Objective: identification of equipment and techniques to manufacture a fabric with intertwining fibers perpendicular or inclined to each other, to obtain a warp, with the aid of a machine called a loom. Identification of the operating parameters of the loom to obtain the specific warp weft. Obbiettivo: individuazione di apparecchiature e tecniche per fabbricare un tessuto con intreccio di fibre perpendicolari oppure inclinate fra di loro, per ottenere un ordito, mediante l'ausilio di una macchina chiamata telaio. Individuazione dei parametri di funzionamento del telaio per ottenere la trama dell'ordito a specifica.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Eurosets

PhD Programme	**NEUROSCIENCE**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	A. Research on digital and environmental transitions
Project title	Unsupervised multimodal knowledge discovery from biomedical data for the exploitation of clinical Data
Supervisor	Manfredo Atzori
Supervisor Email	manfredo.atzori@unipd.it
Project description	Exascale volumes of multimodal clinica! data are continuously produced in healthcare, including for instance bio-images, bio-signals genetic and clinica data. Fully exploiting them with machine learning and data science approaches is stili an open challenge due to several factors, including the difficulty to obtain data and annotations, data heterogeneity and the challenge to represent data as homogeneous vectorized semantic entities. In accordance with the PNRR objectives for digitai transition and healthcare, this interdisciplinary PhD project aims at developing computational and machine learning methods to harmonize and to extract knowledge from multimodal biomedica! data without human supervision, leading to multimodal knowledge exploration of healthcare data, to the creation of links between clinical data and medicai knowledge references, and paving the way to the development of precision medicine applications, allowing to extract value from clinical healthcare data.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Information Systems Institute, University of Applied Sciences Western Switzerland

PhD Programme	**PHYSICS**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	B. Research on RRP topics
Project title	Neurodevelopment functional alterations caused by polyfluoroalkyl substances (PFAS) investigated in vitro by human brain organoids
Supervisor	Mario Bortolozzi
Supervisor Email	mario.bortolozzi@unipd.it
Project description	Perfluoroalkyl substances (PFAS) are a large and ever-expanding group of manufactured chemicals that are widely used to make various types of everyday products. Once ingested or inhaled they reach the blood stream and accumulate in cell membranes causing neurological and reproductive disorders. The Resolution of the Council of Ministers of 21-03-2018 declared a state of emergency due to the PFAS contamination of the water tables in the territories of Vicenza, Verona and Padua. In a recent publication, we highlighted for the first time that the accumulation of PFAS can alter the development of human dopaminergic neurons (Di Nisio et al, Env Int, 2022). This PhD project aims to continue this study in a human three-dimensional model (organoid) already in use in our laboratory that reproduces the area of the brain richest in these neurons. The PhD student will therefore have to study organoids treated with PFAS using advanced biophysical imaging and electrophysiological techniques.
Mandatory traineeship	n. months
Company/ research centres/Public Administration	

PhD Programme	**PSYCHOLOGICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Learning disabilities and technology-mediated interventions: effective for whom and under what conditions?
Supervisor	Barbara Carretti
Supervisor Email	barbara.carretti@unipd.it
Project description	Tele-rehabilitation (TR) is widely used for neurodevelopmental disorders as well. The use of technology-mediated interventions has undoubted advantages by allowing, for example, an increased intensity of sessions. From the perspective of the National Health Service, the guidelines approved in the State-Regions Conference (2021) provide instructions for the provision of tele-rehabilitation services, offered by healthcare professionals, with the purpose to offer opportunities of organizational and cultural renewal, in line with WHO's principles on primary health care. Nonetheless, there are few data regarding the effectiveness of these interventions, especially on the individual (e.g. severity of disorder) and contextual (e.g. family resources) factors that may influence their effectiveness. The goal of this doctoral project is to analyze potential factors associated with the effectiveness of TR interventions in order to define procedures for optimizing interventional choices.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	AZIENDA SOCIOSANITARIA LIGURE 5

PhD Programme	**PSYCHOLOGICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	WE-BOOST! A new evidence-based approach to reduce conflicts and disparities while promoting well-being and learning at school
Supervisor	Scrimin Sara
Supervisor Email	sara.scrimin@unipd.it
Project description	The immediate future of Italy depends upon youths' well-being and success. The increasing number of NEET in our country is a major concern as it has severe adverse consequences for the individual, society, and economy. Poorly educated, emotionally distressed, and immigrant youths are more at risk. The present project aims at creating an evidence-based technology to guide and support teachers in reducing disparities and conflicts within the classroom as well as in promoting academic engagement and well-being. In the first two years, the link between specific cooperative learning actions, self-regulation (indexed by cardiac vagal tone), academic achievement, and emotional well-being will be investigated. Based on these data, and through international collaborations, an intervention (including an online platform) targeting elementary and middle school students will be implemented. In the third year, its efficacy in promoting well-being and reducing disparities will be tested.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	EDIZIONI CENTRO STUDI ERICKSON SPA

PhD Programme	**SCIENCES, TECHNOLOGIES AND MEASUREMENTS FOR SPACE**
Curriculum (if foreseen)	**Mechanical Measurements for Engineering and Space**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Technologies and Science for Space exploration
Supervisor	Stefano Debei
Supervisor Email	stefano.debei@unipd.it
Project description	The PhD project is related to the activities of PNRR PE15 "Space Activities" and in particular to Spoke 9 (Identification and Characterization of Extraterrestrial Habitats, Space and Science) and 8 (Robotic and Human Exploration of Extraterrestrial Habitats, Architectures and Infrastructures). In preparation of a long-term human permanence in extraterrestrial space, it is necessary to characterize the possible targets of human settlements on extraterrestial bodies. The PhD project aims at fostering research and development activities to support these preparatory tasks for future human missions. It will focus on original technologies for robotic exploration of potential extraterrestrial habitats considering sensors and instrument, robotic systems and mechanisms. Mission analysis for smart autonomous probes will be also taken into account in order prepare and support extraterrestrial human exploration missions.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Thales Alenia Space Italia S.p.A.

PhD Programme	**SCIENCES, TECHNOLOGIES AND MEASUREMENTS FOR SPACE**
Curriculum (if foreseen)	**Mechanical Measurements for Engineering and Space**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of measurement techniques based on image analysis for multiphase flows
Supervisor	Gianluca Rossi
Supervisor Email	gianluca.rossi@unipg.it
Project description	The aim of this research is to develop new measuring techniques for displacement, velocity and deformation fields that allow to improve the existing ones (like Particle Image Velocimetry and Digital Image Correlation for example) in term of more practical experimental setup, instrumentation and information provided in high liquid concentration multiphase flows. The techniques can be based on Optical Flow image data processing for example, or similar techniques, so that velocity and displacement field of all the fluid phases or of interface surfaces can be measured. From these fields other quantities can be obtained, for example flow rates in single or multiphase flows or global parameters of motion of a surface etc., all with uncertainty levels useful for the industrial applications. These measurement techniques, particularly applied for multiphase flow analysis are fundamental for green economy development in progress and energy saving and optimization in many industrial processes.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Nuovo Pignone Tecnologie S.r.l.

PhD Programme	**SCIENCES, TECHNOLOGIES AND MEASUREMENTS FOR SPACE**
Curriculum (if foreseen)	**Sciences and Technologies for Aeronautics and Satellite Applications**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Technologies and Science for Space exploration
Supervisor	Francesco Picano
Supervisor Email	francesco.picano@unipd.it
Project description	The PhD project is related to the activities of PNRR PE15 "Space Activities" and in particular to Spoke 9 (Identification and Characterization of Extraterrestrial Habitats, Space and Science) and 8 (Robotic and Human Exploration of Extraterrestrial Habitats, Architectures and Infrastructures). Space exploration will aim to realize extraterrestrial habitats that allow to widen the knowledge on Solar System bodies and to provide logistic support for missions longer distances. In view of the return of the human being on the Moon and the landing on Mars, it is essential to form and develop a strong multidisciplinary researcher profile able to face the complex problems of space exploration. The PhD project will focus on the identification of possible terrestrial habitats also evaluating planetary resources. It will consider original technologies for the human being and life science.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Thales Alenia Space Italia S.p.A.

PhD Programme	**SCIENCE AND ENGINEERING OF MATERIALS AND NANOSTRUCTURES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	B. Research on RRP topics
Project title	Metal-organic nano-networks for electrochemical CO2 valorization
Supervisor	Francesco Sedona
Supervisor Email	francesco.sedona@unipd.it
Project description	Metal-organic nano-networks for electrochemical CO2 valorization. Electrochemical reduction of CO2 producing a variety of added value products is expected to play a key role in the struggle against climate changes. One of the main factors limiting this process is the scarce activity and selectivity of the electrocatalysts used for the electrochemical CO2 reduction. Nano-engineered metal-organic networks with multiple adjacent catalytic sites working cooperatively are indicated as one of the most promising routes to address this problem. The PhD project proposes the construction of 2D metal organic networks in UHV on metal surfaces or on oxide films thanks to the principles of bottom-up approach and their chemico-physical characterization with STM microscopy and XPS spectroscopy techniques. Reactivity towards CO2 will be studied at the atomic level in UHV, through adsorption experiments, and in real conditions, through electrochemical STM.
Mandatory traineeship	n. months
Company/ research centres/Public Administration	

PhD Programme	**BIOMEDICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Creation ofnew Saccharomyces yeast hybrids useful to agro-industriai purposes, through innovative genetic engineering strategies
Supervisor	Raffaele Lopreiato
Supervisor Email	raffaele.lopreiato@unipd.it
Project description	Yeast hybridization is a procedure widely applied in food and industriai biotechnology, to increase both ability and performance of Saccharomyces genus. However, standard protocols to obtain hybrid strains are expensive and time-consuming (up to 3-5 years). In this project, we aim to generate a collection of new hybrids, starting from the strains isolated by the partner company (> 150), through an innovative, CRISPR-assisted, strategy of genome editing, able to markedly decrease (to 2-3 months) the time required to generate any desired hybrid. The final goal will be to create and select nove! strains useful for some applications based on fermentative process, as industriai biotechnology (organic waste recovery, bioethanol production), agriculture (yeast-mediated phytotherapy), and food preparation (alcoholic beverages, nutraceutics). The properties of most-promising hybrids will be characterized during PhD, by multiple genetic, biochemical, and functional assays in vitro and in vivo.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	ITALIANA BIOTECNOLOGIE Sri

PhD Programme	**BIOMEDICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Retrograde signaling at the neuromuscular junction and its therapeutical applications
Supervisor	Marco Pirazzini
Supervisor Email	marco.pirazzini@unipd.it
Project description	Botulinum neurotoxin A (BoNT) is routinely used in human therapy to relieve neurogenic muscle hyperactivity. Despite remarkable efficacy, BoNT pharmacological action can be improved. Fastox Pharma is pioneering a treatment that combines BoNT with postsynaptic inhibitors of muscle contraction. Notably, animal models demonstrate faster onset and longer duration of BoNT action. An ongoing collaboration between Fastox and the host lab indicates that such inhibitors enhance presynaptic excitability, which in turn favors BoNT entry. How this happens is unknown. We hypothesized that postsynaptic inhibition enables muscle-motoneuron crosstalk whereby retrograde signals from muscles influence presynaptic activity. The PhD candidate will test this hypothesis by receiving training at the crossroad of neurophysiology, cell signaling and electrophysiology through the Fastox-host lab collaboration. Results will extend our knowledge of the neuromuscular system fostering novel muscle disease therapy.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Fastox Pharma SA

PhD Programme	**CLINICAL AND EXPERIMENTAL SCIENCES**
Curriculum (if foreseen)	**CLINICAL METHODOLOGY, METABOLISM, ENDOCRINOLOGY, NEPHROLOGY AND EXERCISE**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Exercise on ward: new practices to mitigate musculoskeletal disorders in healthcare workers
Supervisor	Marco Bergamin
Supervisor Email	marco.bergamin@unipd.it
Project description	Health care workers, especially those caring for non-self-sufficient patients result to be among the working categories, the most affected by musculoskeletal disorders and pathologies. This, moreover, is congruent with data from numerous surveys that document how manual handling activities of uncooperative patients, often involve overloads for the lumbar spine of absolute importance and consequent exceeding of limits considered as "physiological". The purpose of the project is to validate new multidisciplinary tools that include training interventions as well as preventive and compensatory therapeutic exercise protocols with the aim of introducing new practices to be adopted, also in organizational models, within the health professions involved in patient care with a view to integration of a technical/applicative nature that would complement the current regulatory framework.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Azienda Ospedale - Università Padova

PhD Programme	**SCIENCES OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING**
Curriculum (if foreseen)	**MATERIALS, STRUCTURES, COMPLEX SYSTEMS AND ARCHITECTURE**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Innovative design methods in plastic materials processing
Supervisor	Gianpaolo Savio
Supervisor Email	gianpaolo.savio@unipd.it
Project description	The project is focused on the development of innovative design methods for the production of auxiliary equipment for plastics processing. Adopting strategies such as Design for X, innovative design (e.g., TRIZ), and the principles of Life Cycle Assessment, it will be possible to achieve several benefits such as the reduction of lead time and cost of product development, and the efficiency of the developed machines, also aiming at reducing the carbon footprint. The project will be supported by innovative technologies such as Additive Manufacturing and CAD-CAE tools, which enable the creation and optimization of digital models for multiphysic simulations. The project is set up as an innovation strategy meant to be replicated by other companies, thanks to the dissemination of the research results based on the principles of "Open science" and "FAIR Data".
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	VISMEC SRL

PhD Programme	**SCIENCES OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING**
Curriculum (if foreseen)	**MATERIALS, STRUCTURES, COMPLEX SYSTEMS AND ARCHITECTURE**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Structural optimization of temporary works using innovative or recycled materials
Supervisor	Carlo Pellegrino
Supervisor Email	carlo.pellegrino@unipd.it
Project description	The research project aims to study and analyses the structural elements (Scaffolding systems, supporting systems, shoring systems, formwork systems etc.) used for temporary works construction. After the state-of-the-art analysis, the project proposes to evaluate the possibly to use innovative (fiber materials or other materials) or recycled materials for the realization of temporary works used for building of new constructions or as a support system of existing damage constructions after extreme actions (earthquakes, collisions, explosions, soil settlement etc.). To achieve the project objectives, experimental and numerical structural analyses will be the tolls used for the materials characterization and the structural interpretation of the mechanical behaviour of the studied elements. For the definition of design criterions, limits and advantages to use innovative/recycled materials as construction materials of provisional systems. The project results will be published in open access platform.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	FARESIN FORMWORK SPA UNIPERSONALE

PhD Programme	**SCIENCES OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING**
Curriculum (if foreseen)	**MATERIALS, STRUCTURES, COMPLEX SYSTEMS AND ARCHITECTURE**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Structural Analysis of connections between elements made of innovative materials for temporary works
Supervisor	Carlo Pellegrino
Supervisor Email	carlo.pellegrino@unipd.it
Project description	The research project aims to study and analyses the different connection systems (present in the target market) used in the realization of temporary works (Scaffolding systems, supporting systems, shoring systems, formwork systems etc.) made of innovative/recycled materials. After the state-of-the-art analysis, the project proposes to evaluate the possibly to optimize the connection systems for the realization of temporary works used for building of new constructions or as a support system of existing damage constructions after extreme actions (earthquakes, collisions, explosions, soil settlement etc.). To achieve the project objectives, experimental and numerical structural analyses will be the tolls used for the materials characterization and the structural interpretation of the mechanical behaviour of the studied connections. For the definition of design criterions, limits and the advantages to use innovative/recycled materials for the realization of provisional systems. The project results will be published in open access platform.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	FARESIN FORMWORK SPA UNIPERSONALE

PhD Programme	**SCIENCES OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING**
Curriculum (if foreseen)	**MATERIALS, STRUCTURES, COMPLEX SYSTEMS AND ARCHITECTURE**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	The architectural culture of the Cassinese Benedictine Congregation (XV-XVIII centuries): digital and spatial analysis strategies through BIM models
Supervisor	Gianmario Guidarelli
Supervisor Email	gianmario.guidarelli@unipd.it
Project description	The aim of the research project is the study of the architectural history of the Cassinese Benedictine Congregation from the 15th to the 18th century, from a comparative perspective and thanks to the experimental use of the methodology of Building Information Modelling (BIM). Thanks to BIM it will be possible to manage a large amount of material of different nature (archival, bibliographic, material, geometric-spatial) in order to be able carry out historical analysis of some interrelated case studies. The PhD Student will also use the bibliographic and digital resources of the Palladio Museum (Vicenza), where he will spend a six-month study period. The implications of the research for the future management of buildings (e.g. for restorations) and on their tourist enhancement (creation of apps) is consistent with the directives of the PNRR, in particular with the aim of a re-engineering of cognitive processes to facilitate the digital transition (creation of models and "corpora" of archival data).
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Palladio Museum (Vicenza)

PhD Programme	**SCIENCES OF CIVIL, ENVIRONMENTAL AND ARCHITECTURAL ENGINEERING**
Curriculum (if foreseen)	**RISK, VULNERABILITY, ENVIRONMENT, HEALTH AND TERRITORY**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Groundwater thermal monitoring and modeling to characterize streambed water fluxes in the Brenta river
Supervisor	Matteo Camporese
Supervisor Email	matteo.camporese@unipd.it
Project description	Water resources management will be subjected to increasing stress, due to climate and land use change. In Veneto, for example, in the last 30 years numerous issues have emerged showing the vulnerability of our drinking water supply sources, mainly springs and aquifers. To this we must add the planned conversion of irrigation methods from flooding to sprinkler, which will lead to fewer withdrawals from watercourses, but also likely te a reduction in the recharge of aquifers. Within this context, more research is needed on the interactions between aquifers and rivers, to previde water service managers with knowledge tools to support the prevention of problems relateci to the quality and availability of water resources. We propose a PhD project dealing with the characterization and modeling of surface water/groundwater exchange fluxes from/to the Brenta river streambed, which is critically important regional water supply system, using heat as a tracer in conjunction with water level measurements in the river and in piezometers close to the river. A hydrothermal model of the river and of the underlying aquifer will be developed to improve our knowledge of river/groundwater interactions and provide an effective water resources management tool.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	SINERGEO Sri

PhD Programme	**LINGUISTIC, PHILOLOGICAL AND LITERARY SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	A literary park for Padua: cultural and touristic valorization of the writers' places and their representations through computer tools
Supervisor	Attilio Motta
Supervisor Email	attilio.motta@unipd.it
Project description	The research aims at the realization of a project for a Literary Park of writers in Padua, through: a) the historical study and identification of the most significant houses and places of the writers who gravitated to Padua b) the identification and selection of the places in Padua that have been the object of literary representations c) the recognition of similar forms of valorization of writers' places in Europe d) the acquisition of computer skills on the possibilities of enhancement of the places thus identified through the internship at a company specializing in technologies for the creation of websites and applications for smartphones (geolocation, audio guides, augmented reality, web-app) e) the preparation of a project for the cultura! and tourist enhancement of the places thus identified through the design of a website and a smartphone application for the Literary Park of Padua f) the realization (subject to finding the necessary resources) of the above-mentioned website and application
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	MEEPLE SRL

PhD Programme	**MATHEMATICAL SCIENCES**
Curriculum (if foreseen)	**COMPUTATIONAL MATHEMATICS**
Ministerial Decree	351
Action Line	B. Research on RRP topics
Project title	Optimal dispatching in intraday electricity market when storage is possible
Supervisor	Tiziano Vargiolu
Supervisor Email	tiziano.vargiolu@unipd.it
Project description	The project aims to develop an optimization model to manage the dispatching activity in intraday electricity markets, where the energy of both renewable and conventional sources can be managed nearly in real time, taking into consideration the possibility to store the energy. On one hand, for a non-dispatchable renewable energy source (like e.g. photovoltaic or wind), the intraday market is the suitable trading floor to manage the more accurate forecasts available in near real time. On the other hand, the integration of energy storages into the market leads operators to make optimization choices on the management of renewable production and on the sales strategy, also taking into account the physical need of the grid and the economic impact of the trading strategy on the total revenues collected in the dispatching activity.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Phinergy S.r.l.

PhD Programme	**MATHEMATICAL SCIENCES**
Curriculum (if foreseen)	**COMPUTATIONAL MATHEMATICS**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Dictionary learning of sounds for monitoring machines and manufacturing processes
Supervisor	Fabio Marcuzzi
Supervisor Email	fabio.marcuzzi@unipd.it
Project description	Dictionary learning (DL) is a recent topic in machine learning, here interesting because it allows a better physical interpretation than deep neural networks. Various kinds of descriptive patterns may be inserted in the overcomplete dictionary, both analytical and data-driven, e.g. the well known Fourier modes used in applications of sound and vibrations analysis mixed with impulsive signals due to mechanical impacts. From a mathematical point-of-view, DL is an emerging topic in sparse recovery and requires to do research on the numerical linear algebra of both underdetermined linear systems and matrix factorizations, here in particular by considering them running on low-cost embedded systems used in Industry 4.0. The research project will have an industrial validation to be conducted within the technological facility of Lean Experience Factory. We will study the application of Dictionary Learning to the physical interpretation and monitoring of audio signals coming from machine tools (CNC) and compressors running into refrigeration systems. The impact of the research will be also widely spread as consulting on machine learning algorithms in industry.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	Lean Experience Factory s.c.a.r.l.

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	EPR/Raman/SERS characterization of copper-binder complexes in blue-green copper pigments from medieval illuminated codices
Supervisor	Alfonso Zoleo
Supervisor Email	alfonso.zoleo@unipd.it
Project description	Blue-green pigments involved in miniature paintings are mainly copper-based compounds, which are known to induce degradation on the parchment/paper support. This well-known phenomenon ("Kupferfrass") is not well understood and not very investigated, due to the difficulty to characterize copper-binder and copper-support complexes, likely the main species involved in the degradation mechanism. In this project, EPR (Electron Paramagnetic Resonance) is proposed as a technique able to characterize these complexes: indeed, EPR spots specifically copper-binder complexes, while binder or copper-pigments alone are usually not detectable. The investigation will consist in a part of EPR applied to model systems and a part applied to copper pigments in manuscript, crossing the data with Raman/SERS characterization
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	BIBLIOTECA DEL SEMINARIO VESCOVILE

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	EPR characterization of primary and secondary perfluoroalkyl radicals in irradiated PTFE and correlation with perfluorooctanoic acid (PFOA) formation
Supervisor	Alfonso Zoleo
Supervisor Email	alfonso.zoleo@unipd.it
Project description	PTFE irradiation is a common way to prepare PFTE with low DP for industrial applications (LMw-PTFE). However, PFTE irradiation results in the production of large amounts of primary and secondary perfluoroalkyl radicals (PFR), which combine quickly with oxygen in air to give fluoroalkyl peroxide radicals (FPR). Consensus exists that FPR quickly evolve to form unwanted by-products, especially PFOA (perfluorooctanoic acid): evidence has been provided that PFOA bioaccumulates in tissues, causing important pathologies. The best way to explore type and nature of PFR/FPR is Electron Paramagnetic Resonance (EPR), and related techniques (ENDOR, ESEEM), but very few EPR studies are present in literature, and no advanced EPR investigations (ENDOR, ESEEM, High Field EPR, etc.). In this project, advanced EPR techniques will be applied to the characterization of type, nature, environment of PFR/FPR, correlating the data to PFOA formation
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Guarniflon S.p.A, University of Saarlandes, chemical-physics group

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Green electrospinning for smart bio-functional materials, based on natural polysaccharides.
Supervisor	Peggion Cristina
Supervisor Email	cristina.peggion@unipd.it
Project description	Green electrospinning is a new promising technology in which a polymer can be spun from an aqueous dispersion rather than from organic solvents. Therefore, this is becoming a green, clean and safe technology. This project aims at exploiting this green process to produce innovative biomaterials, based on functionalized carbohydrate polymers, with an added value in terms of therapeutic and biomedical properties. Carbohydrates like cellulose and chitin are the most abundant biopolymers. It has been demonstrated that chemical modification may improve their dissolution in green solvents allowing electrospinning to create nanofibers. We aim at improving this general idea by conjugating active molecules (biocidal activity) able to give a specific functionality/property to get a smart biomaterial for therapeutic devices. The polymermolecule conjugation will be obtained selecting from the large number of chemoselective ligation techniques that employ water as the principal solvent.
Mandatory traineeship	n. 15 months
Company/ research centres/Public Administration	IRA Istituto Ricerche Applicate S.p.A.

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	New fluorohydrate systems for the development of innovative synthetic and production processes
Supervisor	Edmondo M. Benetti
Supervisor Email	edmondo.benetti@unipd.it
Project description	Fluorinated compounds are key products for existing applications as Energy storage systems, performance materials, Agro- and Pharma-API production. Despite industrial and academic research had provided several innovative fluorination techniques, their production remains environmentally and economically impacting. This project will focus on the design, synthesis, characterization, and application of innovative systems with the aim of providing competitive solutions for current key synthetic routes and strategic material production mainly in the field of electrolytes for Lithium-Ion Batteries and Pharmaceutical intermediates (through fluorination and deprotection reactions). Key drivers will be innovative process development, existing process simplification, energy consumption reduction, recycling or even elimination of solvents by guaranteeing a significant improvement on the operational safety.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	ALKEEMIA S.P.A.

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Bioinspired systems for Artificial Photosynthesis and Solar Fuels Production
Supervisor	Marcella Bonchio
Supervisor Email	marcella.bonchio@unipd.it
Project description	We envisions the fabrication of micro-compartmentalised photosynthetic structures integrating functional sub-domains with specific and complementary functions: (i) a photocatalytic core for water oxidation and a combined enzymatic reaction for CO2 reduction to formic acid (FA). In this scheme FA is produced from renewable sources, namely water and CO2 using solar irradiation and provides a liquid and safe green hydrogen vector. The envisaged technology builds on ground-breaking interdisciplinary achievements of the research group: (i) the identification of the first artificial quantasome as integrated antenna-oxygen evolving centre (Bonchio et al. Nature Chem. 2019); (ii) the assembly of oxygenic vescicles (Bonchio et al., Nature Commun. 2020); (iii) the quasi-reversible electrocatalytic reduction of CO2 to FA by nanostructured catalysts (Bonchio et al. Energy & Environmental Science 2018).
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	ENPHOS S.R.L.

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Method development for assessing human exposure to ingested and inhaled microplastics
Supervisor	Luca Cappellin
Supervisor Email	luca.cappellin@unipd.it
Project description	Literature studies indicate that ingestion and inhalation are probably the most important sources for human exposure to microplastics. Design and application of suitable measurement strategies for the detection, identification and quantification of exposure levels of microplastics will be applied to complex matrices such as food, personal care products and inhaled air. The project aims to develop and validate methods to collect and analyze microplastics in those matrices and evaluate their interactions with matrix-environment. Different sampling procedures and preparation processes will be tested, and particles will be analyzed by FTIR coupled with optical microscopy (μ-FTIR) developing automated data acquisition and analysis by chemical imaging mode to achieve high-throughput analyses. Method capabilities will be compared to other approaches (e.g., manual acquisition) and other analytical techniques such as μ-Raman to assess and validate the performance of the method.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	Ecamricert srl

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Bypassing PEG Immunogenicity: cyclic polyoxazolines as non-immunogenic alternatives to PEG for mRNA therapies
Supervisor	Edmondo M. Benetti
Supervisor Email	edmondo.benetti@unipd.it
Project description	mRNA immunotherapies based on lipid nanoparticles (LNPs) have been recently emerging in the development of vaccines for infectious diseases and as treatment for cancer, and they are of particular interest within the "PNRR National Centre for mRNA Gene Therapies" coordinated by UNIPD. Within mRNA-LNPs, lipids bearing poly(ethylene glycol) (PEG) chains generate a polymer shell that increases the stability of LNPs and their availability. However, a detrimental effect on the therapeutic efficacy of mRNA-LNPs is believed to be due to the presence of anti-PEG antibodies in many humans, which are either pre-existing form prior exposure to PEG (other drugs and cosmetics) or induced by a first administration. Seeking for alternatives to PEG we will develop new polymer-lipids based on biocompatible poly(2-oxazoline)s, and we will determine how polymer composition and topology can be varied in order to modulate pharmacokinetics of mRNA-LNPs and mRNA translation, in vitro and in vivo.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	eTheRNA immunotherapies NV

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**CHEMICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of innovative and greener industrial processes for the manufacturing of Peptides Active Pharmaceutical Ingredients (API)
Supervisor	Fernando Formaggio
Supervisor Email	fernando.formaggio@unipd.it
Project description	This project involves the collaboration between a UniPD team and Fresenius Kabi iPSUM (Villadose, Rovigo), a company currently active in the industrial production of peptides. Indeed, there is a fast growing market for peptide drugs. We aim at: (i) replacing the polystyrene supports, commonly used in the industrial synthesis of peptides, with soluble and biodegradable supports; (ii) developing "nanofiltration" methods to facilitate removal of byproducts and excess of reagents. Our new, biodegradable supports, based on lysine dendrimers, allow to carry out the reactions in a homogeneous phase. Thus, lower amounts of solvents and reagents are required, with benefits for the production costs and the environment. This innovative "synthesis on dendrimers" requires the set-up of an appropriate "nanofiltration" method. Luckily, filtration membranes resistant to organic solvents and with nanometric porosities (even pores as small as 0.9 nm) are currently commercially available.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Fresenius Kabi iPSUM

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**PHARMACEUTICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Development of new food supplements and cosmeceuticals to mitigate and prevent age-related disorders.
Supervisor	Gandin Valentina
Supervisor Email	valentina.gandin@unipd.it
Project description	In Italy, the oldest EU country, population aging is currently a major challenge facing society and economy. Aging is the main risk factor for a multitude of disorders contributing to healthspan decline and morbidity increase. Recently, the rapid improvement in the discovery of aging hallmarks laid the foundation for the recognition of new strategies useful for supporting healthy aging and mitigating age-related disorders. In this frame, coherently with PNRR and with the needs of Veneto Region labour market, this project aims to develop innovative eco-friendly and sustainable food supplements and cosmeceuticals acting as geroprotectives. The project will benefit of a cooperative synergism between Labomar, a research-driven CDMO recognized as global leader in dietary supplements and cosmetics, the project PI, having a consolidated expertise in the development of in vitro and in vivo models relevant to R&D of health products, and Karolinska Institutet, were the PhD will spend 6 months.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	LABOMAR S.p.a.

PhD Programme	**MOLECULAR SCIENCES**
Curriculum (if foreseen)	**PHARMACEUTICAL SCIENCES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Rheology modifiers from natural origin. Study and development of new suspending and stabilising systems for topical formulations
Supervisor	Francesca Mastrotto
Supervisor Email	francesca.mastrotto@unipd.it
Project description	The development of innovative rheology modifiers (RM) of natural and sustainable origin, to replace existing synthetic non biodegradable materials that lead to waste accumulation and pollution, is a major challenge in personal care. With this project, our goal is to generate suitable natural RM starting from sustainable raw materials. These will include renewable natural gums, ingredients from fermentation processes, and their derivatives, that will be obtained via green chemistry processes thus maintaining 100% naturality (High Natural Origin Index according to ISO 16128) and biodegradability. The generated materials will be tested for their applicative performances, including suspending and stabilizing properties in topical formulations (physico-chemical characterization and rheological properties analysis). Importantly, RM biodegradability will be tested according to official OECD methods, as requested by the cosmetic standards, and will not be affected by microplastic restrictions.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Lamberti S.p.A.

PhD Programme	**PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES**
Curriculum (if foreseen)	**RESEARCH ON INCLUSION, WELL-BEING, SUSTAINABILITY IN EDUCATION**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Jazz'in School
Supervisor	Marina Santi
Supervisor Email	marina.santi@unipd.it
Project description	Inedited PhD on teaching of performative arts and music, focused on the enhancement of Jazz at school, which captures emerging requests matured on a cultural and political levels, translating into research and school innovation. Jazz is considered not only as human heritage to be preserved, but as a new paradigm for human development and education to be explored. In particular, the Jazz improvisational nature and practices will be studied and operationalized, as powerful educational capability for the new generations and transformative teaching professionalism. Starting from the meaningful experiences the existing networks of schools on a national level, the PhD research program involves, the study and evaluation of different approaches, methodologies, and models of jazz promotion, with the direct partnership of the Italian Jazz Federation, IJVAS, MIDJ, in collaboration with AFAM and MiBAC, interested in experimenting and implementing a Jazz culture in the communities. Phases: 1) Critical review and state of the performative art and Jazz didactic; 2) Research framework and methodologically controlled start-up of experiments in school networks; 3) Analysis and discussion of the emerging outcomes, from an operational and comparative point of view, also at international level.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	FEDERAZIONE IJI; IJVAS, MIDJ, AFAM, RETI ACCREDITATE SCUOLE DEL TERRITORIO NAZIONALE: Capofila rete "L'ORCHESTRA CHE VORREI", con sostegno di Comune de L'Aquila e MIC, MI; in collaborazione con Institute for Critical Studies on Improvisation – ICSI, Guelp

PhD Programme	**PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES**
Curriculum (if foreseen)	**PEDAGOGICAL SCIENCES**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	The evaluation of individual and contextual educational processes in the Milla Baldo Ceolin University nursery from the perspective of the co-construction of pedagogical quality
Supervisor	Emilia Restiglian
Supervisor Email	emilia.restiglian@unipd.it
Project description	Recognizing childcare as a maximally effective investment in the well-being of children and their families, UNIPD opened the Milla Baldo Ceolin company nursery in September 2021. The Pedagogical Project is based on European documents outlining a framework for the quality of educational services, including the Proposal for Key Principles of a Quality Framework for Early Childhood Education and Care (2014), which is divided into 5 key dimensions, among which monitoring and evaluation are crucial. This research project proposes to develop innovative methodologies for the evaluation of educational interventions aimed at children and of all the educational processes implemented in the context, in order to co-construct, through a participatory research project with all the actors (educational team, families, and children), a model of pedagogical quality that is sustainable over time, consistent with Mission M4C1, Investment 1.1.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	S.P.E.S. Servizi alla Persona Educativi e Sociali

PhD Programme	**PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES**
Curriculum (if foreseen)	**PEDAGOGICAL SCIENCES**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	The implementation of P.I.P.P.I. in the family reunification's area. Development of innovative methodologies with families with children out of home, involved in the implementation of P.I.P.P.I. on funds received from PNRR in ULSS 6 Euganea.
Supervisor	Paola Milani
Supervisor Email	paola.milani@unipd.it
Project description	The project is set in the context of research on family vulnerability and the organisation and innovation of welfare services for children and families. The PNRR highlights the urgency of working with this target group of families to limit the conditions of social inequality caused by neglect, poverty and disadvantage that undermine the development of children, recognising the Programme of Intervention for the Prevention of Institutionalisation (P.I.P.P.I.) as an important funding, consequent to the definition, in 2021, of P.I.P.P.I. as the Essential Level of Social Benefits (LEPS). This project intends to represent a new development of P.I.P.P.I. in the area of protection by proposing to a population of families who have experienced the removal of a child, involved in P.I.P.P.I. by the Azienda ULSS 6 child protection services, a path oriented towards family reunification through an innovative methodology of use of visits and Spazio Neutro services.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	ULSS 6 Euganea (Padova)

PhD Programme	**STATISTICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Strategie Foresight and Futures Scenarios to support to Public Policies
Supervisor	Mario Bolzan
Supervisor Email	mario.bolzan@unipd.it
Project description	Social changes increasingly push public policies to adapt to the future needs of the community, strengthening the culture of anticipation. Strategic forecasting, in the context of Futures Studies, is the discipline that guides the future of an organization to set the best policies. Through the construction of future scenarios, the futures (plausible, possible and desirable) are analyzed in a structured way and on the basis of qualitative and quantitative data, so as to systemically orient the policies to be implemented in the present. The aim is to explore and build future scenarios - think of the family, work, the world of youth - together with the trajectories that lead to them. Anticipating trends and risks becomes crucial in guiding planning and policymaking in the present. Statistical methods are fundamental for the process of constructing future scenarios and therefore for objectively evaluating the range of policies deriving from them and generating priority scales.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Regione Autonoma Friuli Venezia Giulia Direzione centrale lavoro, formazione, istruzione e famiglia

PhD Programme	**STATISTICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Advanced statistical methods and models for monitoring drug safety
Supervisor	Alessandra Rosalba Brazzale
Supervisor Email	alessandra.brazzale@unipd.it
Project description	This project aims at developing advanced statistical methods and models to help decision makers with supporting risk assessment of the use of medical products and vaccines. Adverse reactions are recorded and analysed by the Italian National Pharmacovigilance Network, implemented through the establishment of Regional Pharmacovigilance Centers. In addition, signal detection and risk estimation are also based on epidemiological studies, which are carried out on the large healthcare databases to which the Regional Centers have access to. The most recent COVID-19 epidemic has unveiled the large potential of networks of administrative databases to generate real-time evidence. Examples of such types of distributed networks are the VALORE project and the multi-regional network ITA-COVID19 (Trifirò 2021, 2020). To efficiently and effectively exploit the available information we must be able to rely upon a suitable statistical toolbox, which includes modern data science and machine learning techniques.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Centro Regionale di FarmacoVigilanza del Veneto

PhD Programme	**STATISTICAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Statistical analysis of shared mobility services in the city of Venice
Supervisor	Stefano Mazzuco
Supervisor Email	stefano.mazzuco@unipd.it
Project description	The research projects aims at analyzing data on shared mobility services (bikes, electric bikes, electric scooters) use in the municipality of Venice, in the last two years of experimentation. Data are of functional nature, since all the daily trajectories of bikes and scooters will be available, and they can be linked with some characteristics of users (age and sex) and rental type (daily, weekly, …). Moreover, the project is also aimed at evaluating the impact and the consequences of shared mobility services on climate data (e.g. rainfalls) and fine particular matter emissions. The overall target is to evaluate the service effectiveness in terms of both usage and environmental impact and to support the administrations in proposing improvements and changes in the services. Part of the Phd period will be carried out in the municipality of Venice, also to guarantee data confidentiality.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Comune di Venezia

PhD Programme	**SOCIAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	THIRD SECTOR ORGANISATIONS: INTERVENTIONS OF THE SOCIAL COOPERATIVES TO CARRY OUT ACTIVITIES OF GENERAL INTEREST
Supervisor	Omar Paccagnella
Supervisor Email	omar.paccagnella@unipd.it
Project description	The recent reform of the Third Sector in Italy has defined Third Sector entities as "private entities that promote and carry out activities of general interest"; consequently, they show similar purposes to that of the Public Administration. Public bodies and third sector entities are therefore united by the same intent to achieve the general interest, jointly committed to examining suitable ways to do so in the best possible way and, consequently, the strategies for finding and allocating the necessary resources. This research project aims to study the experiences of a particular group of third sector entities (linked to the world of social cooperatives) in the design of interventions and identification of ways to ensure rights and address the needs of the citizens in areas with a social connotation, such as development cooperation, social housing, social agriculture or job placement.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Confcooperative Federsolidarietà Friuli-Venezia Giulia

PhD Programme	**SOCIAL SCIENCES**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Adapting to Climate Change: New Integrative Modalities for Connecting the Local Civil Protection Service and the Citizen Science
Supervisor	Adriano Zamperini
Supervisor Email	adriano.zamperini@unipd.it
Project description	Climate adaptation is one of the sustainable development goals of the United Nations and of the EU agenda. Its guiding principles are an effective governance, strong institutions, acceptance of uncertainty, public participation, disaster preparation and management, justice, and social values. In this context, local authorities have a key-role in achieving the community by virtue of the close connection between these public administrations (PAs), citizens and stakeholders. Public administrations, for playing their role, must face epistemological challenges and requests of co-production of knowledge by citizens. This PhD project aim to assess to what extend and how, Citizen Science can contribute to the governance capacity for climate adaptation. The ultimate goal is to develop a participatory model to assist the public administrations (in this case study the Province of Padua and the Provincial Civil Protection Service) in forecasting and preventing environmental risks.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Provincia di Padova – Servizio di Protezione Civile Provinciale

PhD Programme	**HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Gamification techiniques for the autonomous development of digitai competences
Supervisor	Nicola Orio
Supervisor Email	nicola.orio@unipd.it
Project description	Digital transition requires an improvement, at any level, of employees' competences in the correct use of office automation software. To this end, the research aims at the design, development and test of a digital platform for self-training, which shall automatically manage the assignment and the real-time correction of practical activities in word-processing, usage of spread-sheets and creation of presentations. A number of gamification techniques shall be exploited: scaffolding and increasing difficulty, player control, immediate feedback, narratives and storytelling. The research approach is based on the results of a similar project that successfully involved more than 5000 students. Activities will be based on LibreOffice, which has a fully documented format and that shall allow to reduce the cost of licences for public administrations, assuming that the knowledge of open source software can improve its usage at all levels of the public administration.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Ufficio Direzione Turismo - Regione del Veneto

PhD Programme	**HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	From Museum to Territory: investigations on Venetian Renaissance painting in the Gallerie dell'Accademia, restitution and recontextualizing strategies
Supervisor	Barbara Maria Savy
Supervisor Email	barbara.savy@unipd.it
Project description	In accordance with the principles established by the D.M. 113/2018, the research aims to reconnect a group of works included in the rich Renaissance collection of the Gallerie dell'Accademia of Venice (a), with the specific contexts (material, socio-cultural) of their respective provenances. The study will focus on those cases that appear to have been strongly modified or no longer existing, with reference both to the lagoon and the mainland area. Starting from the revision of a core of OA entries, the PHD student will be able to integrate the database with documentation dossier on exhibitions, restorations, bibliography, retrieving related data to origins, thinking about functions, meanings, technical and style analyzes. In this activity, also essential in view of an updated scientific catalog (the last, Moschini Marconi, is from 1955/70), research will be conducted using archive materials (c, e) preserved both inside the museum and outside, in Italy (Acc. Fine Arts, State Arch.) and (d) abroad (Getty Research Institute). Innovative ICT and VR strategies will ensure full respect for cultural contents (f, g) and accessibility inside the museum and outside, on the web and with itineraries spread over the territory.#N/D
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Gallerie dell'Accademia di Venezia, Getty Research Institute

PhD Programme	**HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE**
Curriculum (if foreseen)	****
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Villa's Landscapes in the Po Delta: Mapping the Built Heritage of Reclaimed Lands
Supervisor	Elena Svalduz
Supervisor Email	elena.svalduz@unipd.it
Project description	The Po Delta, one of the largest wetlands in Europe recognized in 2015 by the UNESCO as a "Biosphere Reserve", is an exceptional naturalistic and environmental heritage. This aspect has overshadowed its peculiarity of being the most natural of the artificial environments, the result of a continuous transformation. From the early sixteenth century to latest main land reclamations, the houses built by Venetian owners who bought out the new plots become the landmark of the Delta landscape. So far, about thirty buildings are listed in the website www.cadelta.it for the solely Province of Rovigo, a fairly limited selection within this extraordinary widespread heritage. Despite recent new multimedia and scholar contributions, Delta villas appear to be a system still little explored in its architectural and territorial aspects. This research project, in synergy with Ce.Ri.Do, aims to broaden this recognition to the wide setting of the Delta (including areas in Ferrara) with the intent of promoting, through the digitization of the built heritage, also the protection and enhancement of a landscape constantly changing.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Ce.Ri.Do Centro di ricerca e documentazione del Delta

PhD Programme	**HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE**
Curriculum (if foreseen)	****
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	ISISE - Innovative Systems for Integrated interventions of Seismic improvement and Energy efficiency of existing buildings
Supervisor	Maria Rosa Valluzzi
Supervisor Email	mariarosa.valluzzi@unipd.it
Project description	The requalification of existing buildings is increasingly affecting a country's economy. Current choices on materials and intervention techniques aim at optimizing resources and reducing consumption by combining structural improvement and energy efficiency. Intervention solutions mostly consist in the superimposition of techniques available in the two fields, with a consequent decrease in the effectiveness of the single performances. The project aims at developing an innovative intervention system for the integration of seismic improvement and energy efficiency of buildings by optimizing all aspects involved, i.e. design, production, execution and control. The implementation of the solutions in virtual models will provide a global resilience indicator of the required performances to be used for management and maintenance actions. The research will be based on a multi-disciplinary approach supported by experimental tests and advanced models, and the industrial and academic cooperation.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	EDILVI SPA

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**GEOGRAPHICAL STUDIES**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Ecomuseums in the Veneto region as tools for local sustainable development: practices, tools and policies for the co-ordination at regional level (analysis, monitoring, implementation)
Supervisor	Benedetta Castiglioni
Supervisor Email	etta.castiglioni@unipd.it
Project description	The Veneto Region promotes Ecomuseums through the Regional Law 30/2012, in order to "reconstruct, testify and enhance the local tangible and intangible territorial heritage with the active involvement of the inhabitants". Thanks to the current Regulations, 3 regional ecomuseums have been recognized to date. This project - through the construction of the state of the art of the literature on ecomuseums, the comparative analysis of national and international cases and the active involvement in the ongoing processes - aims to: i) understand the phenomenology of ecomuseums and propose a typification, also in relation to other tools for the enhancement of local heritage resources; ii) specify the potential of this tool for sustainable development at the micro-local scale and identify appropriate indicators for evaluating their effectiveness to be applied during monitoring; iii) promote the creation of a network between ecomuseums and enhance visibility thanks also to the use of ICT.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Regione del Veneto, Direzione Beni Attività culturali e Sport

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**GEOGRAPHICAL STUDIES**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	Padua City of Science
Supervisor	Mauro Varotto
Supervisor Email	mauro.varotto@unipd.it
Project description	The University of Padua has a huge heritage, which is the result of researches conducted over eight centuries of history, over a million finds preserved and distributed in 13 museums and 16 collections. The knowledge and awareness of this heritage, as "public" patrimony and not only as property of the University, needs to be extended to citizenship and the territory. The project aims to plan - in close collaboration with the municipality of Padua - an integrated system of access to museums focused on the history of science in Padua, designed for specific target audiences (schools, tourists, seniors, foreigners etc.) and involving in a network all the scientific museums of the city. The project will help to promote a new urban vibrancy and a lively relationship between heritage and citizenship, favoring the creation of a "heritage community" (as established by Faro Convention) and contributing to the city's candidacy as Italian Capital of Culture.
Mandatory traineeship	n. 6 months
Company/ research centres/Public Administration	Comune di Padova – Settore Cultura

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**HISTORICAL STUDIES**
Ministerial Decree	351
Action Line	C. Research in the frame of Public Administration
Project title	The Italian Scientific Heritage: History, Rules, Management
Supervisor	Elena Canadelli
Supervisor Email	elena.canadelli@unipd.it
Project description	This PhD position aims at studying the regulatory framework – also from a historical point of view – regarding the documentation, management and public accessibility of the Italian scientific heritage, in relation to the international context. Recognized by the Italian legislation as a cultural heritage of the State only recently, thanks to the Codice Urbani (2004), the study of the Italian historical-scientific heritage still deserved attention: on the one hand, with regard to its history and legislation, on the other hand, with regard to skills of management, communication and digital knowledge. Hard and soft skills will be developed for the design, management and monitoring of solutions based on conservation and public accessibility of the collections in terms of sharing, use and reuse by the audience (Open Access), in collaboration with two museums of national and international importance: the Museo Nazionale Scienza e Tecnologia Leonardo da Vinci, Milano and the Museo Galileo, Firenze.
Mandatory traineeship	n. 0 months
Company/ research centres/Public Administration	Fondazione Museo Nazionale della Scienza e della Tecnologia Leonardo da Vinci, Museo Galileo - Istituto e Museo di Storia della Scienza

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**HISTORICAL STUDIES**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	Objects of the Empire. From acquisition to restitution of national-imperial heritage materials
Supervisor	Carlotta Sorba Simona Troilo
Supervisor Email	carlotta.sorba@unipd.it
Project description	The project will explore the way in which in Italy the national-imperial heritage, built up since the end of the 19th century thanks to the acquisition of archaeological finds and ethnographic objects from the colonies, has been managed and understood over time, until it assumed a specific role in the identity processes connected to Italian-ness. The research will be carried out in collaboration with three Italian museums (Museo Egizio, Turin; Museo delle Civiltà, Rome; Museo di Antropologia, Unipd) and will reconstruct the histories of some of the numerous materials transferred and exhibited here. At the same time, it will analyse their return to their countries of origin, when it occured after World War II. The aim is to investigate the Italian "colonial archive" as it emerges in the processes of decontextualisation and recontextualisation of these materials; and to include the Italian case in the international debate on restitutions, which for years has been promoting the decolonisation of Eurocentric heritages and their new fruition under the banner of inclusiveness.
Mandatory traineeship	n. 9 months
Company/ research centres/Public Administration	Museo Egizio, Torino (ME) Museo delle Civiltà, Roma (MuCiv) Museo di antropologia dell'Università degli studi di Padova (MAUnipd)

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**HISTORICAL STUDIES**
Ministerial Decree	351
Action Line	D. Research in the frame of the cultural heritage
Project title	The afterlife of cultural artifacts: fragility, durability, mobility from manuscripts to digital objects
Supervisor	Paola Molino Flavia de Rubeis
Supervisor Email	paola.molino@unipd.it
Project description	PhD projects within "The afterlife of cultural artifacts: fragility, durability, mobility from manuscripts to digital objects" shall aim at recapturing the mobility in space and across time of handwritten and printed books (in Greek, Latin, Arabic or vernacular languages), of geographical maps or scientific objects, their preservation in specific places (libraries, museums, archives, web archives) and the devices conceived and used to make this knowledge accessible (catalogs, metadata, linked data), in the past and in the present. The doctoral projects included in this program must therefore focus, on the one hand, on the digital recomposition of dispersed archives and collections, and on the other, on the implications of the complex process of material transformation of objects of knowledge, on the possibility of reception by different audiences, and on those of preservation and use triggered by new technologies. PhD students will have the opportunity to work with specialized personnel at the libraries involved in the CERL consortium.
Mandatory traineeship	n. 12 months
Company/ research centres/Public Administration	Consortium of European Research Libraries

PhD Programme	**HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES**
Curriculum (if foreseen)	**HISTORICAL STUDIES**
Ministerial Decree	352
Action Line	Scholarships co-funded by companies
Project title	Territorial analysis, remote sensing and historical GIS of the central Veneto plain and the Asiago Plateau in the Etra spa district
Supervisor	Aldino Bondesan
Supervisor Email	aldino.bondesan@unipd.it
Project description	The project is aimed to the historical evolution of the territorial settings through a multidisciplinary approach by use of field survey, remote sensing (airborne, drone and satellite, panchromatic and hyperspectral images, historical aerial photos), historical cartography and archive data (state archives, geoportals, planning studies, thematic cartography). The set of information, georeferenced and processed, will be conveyed into a Geographic Information System (also in terms of historical GIS) linked to the SIT of Etra spa which collects and coordinates the geo-cartographic information of a territory of almost 100 municipalities. The study will find application in the VRB research project for the assessment of bomb risk (currently active at DiSSGeA) and in soil analyses with innovative implications in territorial planning and in the management of excavation sites. The results will be shared through WEB-GIS platforms, scientific papers, survey protocols and Third Mission activities.
Mandatory traineeship	n. 18 months
Company/ research centres/Public Administration	ETRA S.p.A