LIST OF DOCTORAL COURSES – 30th SERIES
Academic Year 2014/2015

Please note that, at the time of the publication of the call, the list of the Doctoral Courses has not been definitely approved by the Ministry yet (DM 45/13)

DOCTORAL COURSES

1. ANIMAL AND FOOD SCIENCE
I. *Curriculum:* ANIMAL SCIENCE
II. *Curriculum:* FOOD SCIENCE
2. ASTRONOMY
3. BIOMEDICAL SCIENCES
4. BIOSCIENCES
I. *Curriculum:* BIOCHEMISTRY AND BIOTECHNOLOGY
II. *Curriculum:* CELL BIOLOGY AND PHYSIOLOGY
III. *Curriculum:* EVOLUTION, ECOLOGY AND CONSERVATION
IV. *Curriculum:* GENETICS, GENOMICS AND BIOINFORMATICS
5. BRAIN, MIND AND COMPUTER SCIENCE
I. *Curriculum:* NEUROSCIENCE, TECHNOLOGY, AND SOCIETY
II. *Curriculum:* COMPUTER SCIENCE FOR SOCIETAL CHALLENGES AND INNOVATION
6. CIVIL AND ENVIRONMENTAL ENGINEERING SCIENCES
7. CLINICAL AND EXPERIMENTAL ONCOLOGY AND IMMUNOLOGY
8. CLINICAL AND EXPERIMENTAL SCIENCES
I. *Curriculum:* CLINICAL METHODOLOGY AND MEDICINE OF PHYSICAL EXERCISE. DIABETIC , ENDOCRINOLOGICAL AND NEPHROLOGICAL SCIENCES
II. *Curriculum:* HEMATOLOGICAL AND GERIATRIC SCIENCES
III. *Curriculum:* HEPATOLOGY AND TRANSPLANTATION SCIENCES
IV. *Curriculum:* RHEUMATOLOGICAL AND LABORATORY SCIENCES
9. CROP SCIENCE
10. DEVELOPMENTAL MEDICINE AND HEALTH PLANNING SCIENCES
I. *Curriculum:* ONCOHEMATOLOGY AND HUMAN GENETICS, RARE DISEASES AND PREDICTIVE MEDICINE
II. *Curriculum:* HEALTH PLANNING MODELS/ SYSTEM PLANNING

11. EARTH SCIENCES
12. ECONOMICS AND MANAGEMENT
I. *Curriculum:* ECONOMICS
II. *Curriculum:* MANAGEMENT
13. FUSION SCIENCE AND ENGINEERING
14. HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES (UNIVERSITY OF PADUA, CA' FOSCARI VENICE, UNIVERSITY OF VERONA)
I. *Curriculum:* GEOGRAPHICAL STUDIES
II. *Curriculum:* HISTORIC-RELIGIOUS AND ANTHROPOLOGICAL STUDIES
III. *Curriculum:* HISTORICAL STUDIES (FROM ANCIENT TO CONTEMPORARY HISTORY)
15. HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE
16. INDUSTRIAL ENGINEERING
I. *Curriculum:* ENERGY ENGINEERING
II. *Curriculum:* ELECTRICAL ENERGY ENGINEERING
III. *Curriculum:* CHEMICAL AND ENVIRONMENTAL ENGINEERING
IV. *Curriculum:* MATERIALS ENGINEERING
V. *Curriculum:* MECHANICAL ENGINEERING
17. INFORMATION ENGINEERING
I. *Curriculum:* BIOENGINEERING
II. *Curriculum:* INFORMATION SCIENCE AND TECHNOLOGY
18. INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW
19. LAND, ENVIRONMENT, RESOURCES AND HEALTH
20. LINGUISTIC, PHILOLOGICAL AND LITERARY SCIENCES
21. MANAGEMENT ENGINEERING AND REAL ESTATE ECONOMICS
22. MATHEMATICAL SCIENCES
I. *Curriculum:* MATHEMATICS
II. *Curriculum:* COMPUTATIONAL MATHEMATICS
23. MECHATRONICS AND PRODUCT INNOVATION ENGINEERING
24. MOLECULAR MEDICINE
I. *Curriculum:* BIOMEDICINE
II. *Curriculum:* REGENERATIVE MEDICINE

25. MOLECULAR SCIENCES
I. *Curriculum:* CHEMICAL SCIENCES
II. *Curriculum:* PHARMACEUTICAL SCIENCES
26. PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES
27. PHARMACOLOGICAL SCIENCES
I. *Curriculum:* MOLECULAR AND CELLULAR PHARMACOLOGY
II. *Curriculum:* PHARMACOLOGY, TOXICOLOGY AND THERAPEUTICS
28. PHILOSOPHY
29. PHYSICS
30. PSYCHOLOGICAL SCIENCES
31. SCIENCE AND TECHNOLOGY OF NANOSTRUCTURED MATERIALS
32. SOCIAL SCIENCES: INTERACTIONS, COMMUNICATION, CULTURAL CONSTRUCTIONS
33. SPACE SCIENCES, TECHNOLOGIES AND MEASUREMENTS
I. *Curriculum:* SCIENCES AND TECHNOLOGIES FOR AERONAUTICS AND SATELLITE APPLICATIONS (STASA)
II. *Curriculum:* MECHANICAL MEASUREMENTS FOR ENGINEERING AND SPACE (MMIS)
34. SPECIALISTIC MEDICINE G.B. MORGAGNI
I. *Curriculum:* NEUROSCIENCES
II. *Curriculum:* CARDIOTHORACIC AND VASCULAR SCIENCES
III. *Curriculum:* ENDOCRINE AND METABOLIC SCIENCES
35. STATISTICAL SCIENCES
36. VETERINARY SCIENCES

GUIDELINES
30TH SERIES - ACADEMIC YEAR 2014/2015

ANIMAL AND FOOD SCIENCE

website: http://www.dsa.unipd.it/dottorato/index_en.html
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language/s: English/ Italian

The PhD School in "Animal and Food Science" is organized in two curricula: Animal and Food.

Research lines – Animal Science:

- Husbandry, feeding, conservation and genetic improvement of livestock, pet, wild and game species-populations;
- Biotechnology applied to selection, breeds conservation, animal feeding and husbandry and to traceability of animal products;
- Biostatistics and computer science applied to animal breeding and food science;
- Procedures and systems for genetic evaluation, selection, crossbreeding and inbreeding in animal science;
- Animal nutrition and feeding in livestock;
- Environmental impact of herds, feeding and management strategies aimed to decrease pollutants of farm origin;
- Animal welfare;
- Quality of animal products and food safety;

Research lines – Food Science:

FOOD QUALITY

- Detection of chemical, physical and microbiological characteristics of foods of animal and plant origin;
- Evaluation of food properties in relation to the technological process of production and to the characteristics of the raw material;
- Evaluation of soil composition and growth conditions of crops to improve quality of food of plant origin;

- Investigation of antimicrobial activities of natural and synthetic compounds added to foods or produced by microorganisms during the fermentation process;
- Development of low-risk food processing;
- Chemical, physical, microbiological and sensory characterization of “regional” foods;
- Evaluation and improvement of organoleptic characteristics of foods and study of their impact on consumers by food sensory analysis.

FOOD SAFETY

- Assessment of new technological processes to improve preservation of foods;
- Exploitation of innovative technological and microbiological methods to increase food products shelf life and food safety.

FOOD TECHNOLOGY

- Assessment of new technological and microbiological processes for food production;
- Identification of chemical, physical and biochemical conditions for the optimization of food manufacturing processes.

FOOD ENZYMOLOGY

- Approaches for controlling or preventing the activity of indigenous food enzymes;
- Modification of food constituents by added enzymes;
- Immobilized enzymes for food and bioprocessing applications;
- Enzyme-based biosensors for food analysis.

WINE, ALCOHOLIC BEVERAGES AND DISTILLATES TECHNOLOGY AND QUALITY

- Assessment of grapevine cultivation conditions in relation to wine quality;
- Investigation and improvement of technological and microbiological processes in alcoholic beverage and distillates production.

NOVEL FOOD AND FUNCTIONAL FOOD

- Development of novel foods, new food ingredients and foods with health-promoting or disease-preventing properties by means of technological processes and/or microbial transformations.

FOOD SERVICE

- Development of multidisciplinary approaches to improve technological, microbiological and nutritional aspects related to food and meal preparation and distribution.

FOOD INDUSTRY BYPRODUCTS

- Valorisation of byproducts from farm and from food industry by technological and microbiological approaches aimed at extracting bioactive compounds or transforming waste products into value-added substrates and food ingredients.

ASTRONOMY

website: http://www.dfa.unipd.it/index.php?id=403
contact person: giampaolo.piotto@unipd.it
language/s: English

Padova hosts Italy's largest Astronomical research community. Between the Department of Physics and Astronomy “Galileo Galilei” and the nearby Astronomical Observatory there are more than 60 staff astronomers, well known at an international level, and about 25 postdocs. In Padova there are research groups actively working on observational and theoretical astrophysics, on topics ranging from the solar system, the extrasolar planets, stellar evolution, supernovae, star clusters, galaxies, galactic nuclei (active and not), to observational and theoretical cosmology. Research groups develop advanced astronomical instruments, and are involved in international collaborations for new instruments, both ground-based and in space. The Department of Astronomy is a member of the European Association for Research in Astronomy (EARA: http://www2.iap.fr/eara/EARA.html http://www2.iap.fr/eara/EARA.html%29, a collaboration involving six of the major European astronomical institutes, with the aim of fostering research training for young scientists, and the development of research in Astrophysics. Padova pays particular attention to education and training to research, as testified by the 30 doctoral students presently enrolled in our School, and by the high percentage (75%) of researchers who hold a permanent position at universities or research institutes in astronomy, in Italy or abroad, among those who obtained their doctoral (PhD) degree in Padova before 2003.

All activities are in English.

BIOMEDICAL SCIENCES

website: http://doctorate.biomed.unipd.it
contact person: Marta Martini (marta.martini@unipd.it) - Secretary
language: English

Research lines:

- Structural Biology and Bioinformatics

- **Signal Transduction**
  - cAMP and Ca2+
  - kinases and phosphatases

- **Mitochondrial Pathophysiology**
  - Molecular mechanisms of Ca2+ transport
  - Molecular nature of the permeability transition pore
  - Metabolic changes in cancer
  - Diabetes and obesity
  - Mitochondriotropic drugs
  - Oxidative stress

- **Heart and Skeletal Muscle Pathophysiology**
  - Heart failure and ischemia-reperfusion injury
  - Autonomic control of cardiac function
  - Molecular mechanisms of autophagy in muscle
  - Regulation of muscle mass and strength
  - Pathogenesis of muscular dystrophies

- **Pathophysiology of the Nervous System**
  - Mechanisms of migraine
  - Neuron-glia interactions
  - Alzheimer's, Parkinson's and prion diseases
  - Mechanism of action of neurotoxins
  - Peripheral neurodegeneration and regeneration

BIOSCIENCES

website : http://dottorato.biologia.unipd.it/
contact person: Andrea Pilastro (andrea.pilastro@unipd.it)
language/s: English

The PhD Course in "Biosciences" is organized in four curricula: 1) Biochemistry and Biotechnology (BB); 2) Cell Biology and Physiology (CBP); 3) Evolution, Ecology and Conservation (EEC); 4) Genetics, Genomics and Bioinformatics (GGB).

- The curriculum in Biochemistry and Biotechnology focuses on: Ca2+ homeostasis; structural biology; biochemistry and biophysics of energy transducing membranes. Reflecting its interdisciplinary character, the Biochemistry and Biotechnology curriculum includes animal, vegetal, microbial and agro-alimentary biotechnologies, pharmaceutical and protein biotechnology, molecular physiology, structural and computational biology.
- Main topics of the Cell Biology and Physiology curriculum are: regulation of DNA precursors, modulation of gene expression and function; cell differentiation; mechanisms of signal transduction; membrane trafficking; structure and function of intracellular organelles; mitochondrial physiopathology; apoptosis and autophagy; host-pathogen interactions.
- The curriculum Evolution, Ecology and Conservation includes evolutionary ecology (including animal behavior); plant and animal functional ecology; evo-devo, molecular evolution, sexual selection and sperm competition, population genetics and molecular systematics and phylogeny. Evolutionary approaches to conservation biology, ranging from genetic-planned breeding plans for endangered species to biomonitoring of protected areas and fish-stock management.
- The curriculum Genetics, Genomics and Bioinformatics focuses on the study of the genetic and molecular mechanisms of embryonic development and cell differentiation in normal and pathological conditions; genetic human diseases; circadian biological clocks. The studies employ different in vitro and in vivo systems, including Drosophila, zebrafish and mouse. Transcriptomic and genomic analyses of both model and non model species, ranging from crop plants to humans are also performed.

A complete list of the potential supervisors and their research projects is available at the course website (http://dottorato.biologia.unipd.it/) or from the course director (andrea.pilastro@unipd.it).

Our PhD students have access to first-class facilities (see also below) at the Biology Department (http://www.biologia.unipd.it/) and work within a friendly and vibrant international research community under the supervision of experts of the field. Research opportunities are multi-disciplinary, spanning the whole range of biological research, from the protein, cellular and molecular level to organisms and populations. Interdisciplinary approaches are encouraged as well as the interaction among PhD students (approx. PhD 60 students are enrolled at the Biology department), post-docs and the approx. 70 faculty members of the Department. Students have

access to the funds of the PhD Course and to internal research grants to cover travel and other research expenses (e.g. conferences, consumables, microscopy and DNA sequencing services).

Certain lines of research will be carried out at the Centre for Innovative Biotechnologies (CRIBI, http://www.cribi.unipd.it), the Botanical Garden of the University of Padua (http://www.ortobotanico.unipd.it/en/), the Venetian Institute of Molecular Medicine in Padua (www.vimm.it) the Marine Station of the Department of Biology, Chioggia, Italy (http://chioggia.scienze.unipd.it/Inglese/indexEnglish.html).

Facilities at the Department of Biology include: Electron and confocal microscopy; Electron Magnetic Resonance Spectroscopy; Ultracentrifuges; Cell culture facilities; the Unipd Zebrafish Facility (Zebrafish line maintenance and acquisition, transient lines from DNA injection, mutant, stable transgenes, whole mount in situ hybridization, morpholino technology, microinjection, germ line transformation, mRNA injection); aquaria facilities for breeding tropical fish and Xenopus; plant growth facilities (including a T/Light-controlled greenhouse); barrier and conventional mouse facility (with more than 2000 cages); flow cytometry facility (FacsCanto and FacsCalibur); P2 viral and bacterial vector facility; Next Generation High Throughput DNA Sequencing, Gene Expression Analysis, Peptide Facility; Cluster of High Performance Computers for scientific calculus and bioinformatic analysis of Next Generation Sequencing and protein analyses and dedicated software (http://genomics.cribi.unipd.it/main/category/bioinformatics/). A library with more than 40,000 volumes is permanently (24h) accessible to PhD students and provide online access to scientific bibliographic databases (WoS, Scopus) and thousands of scientific journals.

BRAIN, MIND AND COMPUTER SCIENCE

website: hit.unipd.it/bmcs (UNDER CONSTRUCTION)
contact person: luciano.gamberini@unipd.it
language/s: English

Research Lines

-- Abstract interpretation and program analysis
-- Advanced Data Analysis and Big Data
-- Ambient Assisted Living and Domotics
-- Applied Cognitive Sciences
-- Artificial Intelligence & Machine Learning
-- Cloud Computing
-- Cognitive Ergonomics and Human Factors
-- Cognitive Systems and Robotics
-- Constraint reasoning
-- Embedded and Distributed Systems
-- Formal Methods
-- Future Internet and Internet of Things
-- Human Computer Interaction
-- ICT Security
-- Multi-agent systems
-- Multimedia and 3D Data Processing
-- Neuroscience and Neuropsychology
-- Persuasive Technologies
-- Qualitative Methods for User Studies
-- Sensory and Perceptual Processing
-- Smart City and Smart Communities
-- Social Ergonomics
-- Symbiotic Interaction
-- Videogames Usability and User Experience (including serious games, edugames, advergames)
-- Virtual, Mixed and Augmented Reality
-- Sensors and Wireless networks

CIVIL AND ENVIRONMENTAL ENGINEERING SCIENCES

website: http://www.dicea.unipd.it/ricerca/scuola-di-dottorato
contact person: stefano.lanzoni@unipd.it
language/s: English

The research topics active within the framework of the PhD School are reported below. Between round bracket the names of the *professors that can be referred to for information of the research topic*:

- Fluid Mechanics and Hydrodynamics (Proff. Lanzoni, Defina)
- Fluvial and Lagoonal Morphodynamics (Proff. Lanzoni, Defina, Carniello)
- Ecogeomorphology (Proff. Marani, Lanzoni, Defina,)
- Dynamics of water-limited vegetation (Proff. Marani, Botter, Ursino)
- Limnology (Prof. Lanzoni)
- Biofluidodynamics (Prof. Susin)
- Geophysical fluid dynamics (Prof. Lanzoni)
- Surface hydrology (Proff. Rinaldo, Marani, Botter)
- Subsurface hydrology (Proff. Salandin, Camporese, Putti)
- Statistical hydrology and mechanics (Prof. Rinaldo, Maritan, Botter)
- Transport of pollutants within surface and subsurface water bodies (Prof. Lanzoni, Putti, Salandin, Camporese)
- Reclamation of contaminated sites. Solid waste management (Proff. Cossu, Lavagnolo, Raga)
- Slope stability (Proff. Simonini, Cola, Carrubba)
- Environmental geomechanics (Proff. Simonini, Cola, Carrubba)
- Structural mechanics and engineering (Proff. Maiorana, Schrelfler, Boso, Pesavento, Sanavia, Salomoni, Modena, Vitaliani, Pellegrino, Scotta)
- Computational mechanics (Proff. Gambolati, Maiorana, Schrelfler)
- Self-organizatrion and networks in nature (Proff. Rinaldo, Maritan)
- Advanced numerical methods (Proff. Gambolati, Putti)
- Theory and applications of finite-element methods (Proff. Gambolati, Putti)

CLINICAL AND EXPERIMENTAL ONCOLOGY AND IMMUNOLOGY

website: http://www.discog.unipd.it/corsi/dottorati-di-ricerca/dottorato-di-ricerca-oncologia-e-oncologia-chirurgica
contact person: paola.zanovello@unipd.it
dm.dagostino@unipd.it

language/s: English

Research lines:

- Innovative therapeutic approaches in solid tumors
- Application of biotechnology and nanotechnology to the study of tumors
- Application of bioinformatics to the study of tumors
- Molecular markers that predict therapeutic response in patients with solid tumors
- Tumor immunology and Study in animal models of tumors
- Hematological tumors
- Cyto-Histopathology and molecular pathology in oncology
- Genetic predisposition to cancer
- Locoregional treatment of tumors
- Tumors of the urogenital tract
- Viral oncology

CLINICAL AND EXPERIMENTAL SCIENCES

contact person: amelia.ruffatti@unipd.it
language/s: English/ Italian

Research lines:

The Clinical and Experimental Sciences Doctoral Course aims to train Research Doctors in the biomedical field. The doctoral students are required to possess knowledge concerning basic sciences and molecular medicine, to accrue technical laboratory skills, and to acquire a research method in Medicine and in the different subspecialties to be applied in the prevention, diagnosis and therapy of human diseases. Using a multidisciplinary approach to biomedical sciences, competences in epidemiology, genetics, biology and molecular pathology, regenerative medicine, physiopathology, diagnostics and therapy are integrated.

At the end of their research program the Ph. Doctors will gain skills for designing experimental protocols, for directing research projects and for managing patients.

The Ph.D. Course in Clinical and Experimental Sciences is organized in 4 curricula:
§ Clinical methodology and Medicine of Physical exercise. Diabetic, Endocrinological and Nephrological Sciences;

§ Hematological and Geriatric Sciences;

§ Hepatology and Transplantation Sciences;

§ Rheumatological and Laboratory Sciences.

CROP SCIENCE

website: http://www.sciproveg.com/eng/
contact person: antonio.berti@unipd.it
language/s: English/ Italian

Research lines:

- Plant genetics, genomics and proteomics
- Dynamics of epigenetic states
- Genetic improvement of traits influencing yield
- Resistance to biotic and abiotic stress
- Alteration of plant architecture and control of flowering
- Genetic determinants of apomixis
- Plant-environment interaction
- Interactions between crop production and agronomic techniques
- Crop rotation
- Potential productivity and soil fertility
- Root systems and microbial symbionts
- Ecophysiology and productivity of agricultural and forest plants
- Biochemical, physiological and molecular responses of plants to pathogens
- Insect-plant relationships in agricultural and forest ecosystems
- Plant protection from pests and diseases
- Ecological and molecular analysis of pest and disease populations
- Regulation of fruit development and ripening
- Fruit post-harvest physiology
- Fruit allergenicity
- Molecular basis of fruitlet abscission

DEVELOPMENTAL MEDICINE AND HEALTH PLANNING SCIENCES

website: http://www.sdb.unipd.it
contact person: carlo.giaquinto@unipd.it **Coordinator**
giovanni.dagata@unipd.it **Administrative Contact**

language/s: English/ Italian

Curriculum: **ONCOHEMATOLOGY AND HUMAN GENETICS, RARE DISEASES AND PREDICTIVE MEDICINE**

Research lines:

- Oncohematology and Human Genetics

  The main focus and research themes in the areas of Oncohematology, Immunology and Genetics presently include:

  Morphological, immunological, histochemical and molecular evaluations for the diagnoses of oncohematological, and genetically based diseases. Characterization and manipulation of stem cells and modification of cell lines for in vivo and in vitro research purposes.

  Clinical trials and epidemiological studies in the areas of oncohematological and genetic diseases, of congenital and acquired immune deficits, and of pediatric autoimmune diseases.

  Epidemiological studies of infantile tumours.

  Support therapy

- Rare Diseases: Epidemiology and Genetics

  The research focus in this sector is on rare diseases. Rare diseases are of particular interest in the medical scientific field since these disease, although little known and often of less interest due to the few number of cases, are often unique scientific “models” to study biological phenomenon of interest to healthy individuals as well. More specifically both basic and clinical research are carried out to understand and outline the specific genetic, biochemical and biological aspects of rare pediatric diseases. The valorization of basic research is needed to increase the underlying knowledge of the biological basis for conditions that can contribute to the discovery of the fundamentally important molecular mechanisms involved and at the same time gain new tools to allow for precocious eziological diagnosis and for specific genetic counseling as well as for development of new therapeutic strategies.

- Prenatal diagnosis of fetal abnormalities and high risk pregnancies as well as neonatology follow up.

Curriculum: **HEALTH PLANNING MODELS/ SYSTEM PLANNING**

As a priority this area develops applied research themes in the areas of environmental and psychosocial factors concerned with family and community health, with the evaluation of actions to promote health and planning of interventions in favour of the weak, segregated, disadvantaged and/or special needs individuals. Additionally, sanitary programming and planning is carried out with local and national insitutions and progammes of international cooperation are developed as well. Studies are also carried out in the areas of analytical and evacuative epidemiology, operational research using stochastic and linear methods as well as graphing and simulation.

EARTH SCIENCES

website: http://www.geoscienze.unipd.it/corsi/scuola-dottorato
contact person: massimiliano.zattin@unipd.it
language/s: English

The School focuses on the following fields of research:

- Programme 1: Deep Earth
- Programme 2: Sediment systems, past life and deep time
- Programme 3: Mineralogy, petrography and geophysics applied to cultural heritage
- Programme 4: Geological and hydrogeological hazards

Applicants are advised to consult the web pages of the different research teams of the Department of Geosciences in order to find the contact person of each group (http://www.geoscienze.unipd.it/ricerca/programmi) .

Moreover, applicants should make preliminary contacts with possible Tutors or with the Director of the School, in order to check interest on specific topics and discuss the details of application and research project.

ECONOMICS AND MANAGEMENT

website: http://www.decon.unipd.it/eng/dottorato/index.html
contact person: giorgio.brunello@unipd.it
language/s: English

The areas of research within the reach of the doctoral program include microeconomics, macroeconomics and finance, applied econometrics, public economics, industrial economics, behavioural economics and labour economics in the area of economics, and control and measurement theory, organization, logistics, marketing, business finance, corporate strategy and accounting in the area of business studies.

These topics are covered in several courses held during the first academic year and the first quarter of the second year. Students research in any of these areas under the guidance of a local supervisor.

FUSION SCIENCE AND ENGINEERING

website: https://www.igi.cnr.it/education/
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language/s: English

Background and aims of the Ph.D. course

Europe has a strong need to attract and educate young people in fusion science and engineering. With the start of ITER construction the field of magnetically confined fusion is undergoing an impressive acceleration. ITER will be the largest magnetic fusion device ever built ITER is a 17 meters high, 1000 cubic meter plasma volume device, which is under construction in France as a result of a joint project between China, India, Korea, Japan, European Union, Russia and USA. Its goal is to demonstrate the scientific and technological feasibility of fusion by producing 500 MW of fusion power.

Due also to the growing energy demand, and to the consequent big environmental, ethical and political issues, there is a strong and growing expectation on fusion as a sustainable energy source. Fusion needs therefore to be a success, and Europe has a key role in this challenge. Europe has in fact the largest share (40%) in the ITER project, and therefore the main responsibility to make it a success and to develop in parallel credible plans for proto-reactors (the so called DEMO devices).

As the start of the ITER operation is approaching, and fusion is expected to be a growing field, an increasing number of fusion scientists will be needed, both physicists and engineers.

For this reason we have set up a Doctoral Network, among a group of European Universities. They are all already actively and officially linked with their respective national EURATOM Fusion Laboratories and have a solid scientific and research background in the field of fusion science and engineering. In this way we exploit both the best scientific competences and skills from the university side and the best and more effective support from EURATOM Institutions, in particular as far as the availability of state-of-the-art experimental tools and devices is concerned.

The main goal of this doctoral project is to improve the present educational system in the area of fusion. The present education system does not seem adequate to provide the necessary number of graduates nor to provide them with the proper preparation. With this doctoral course we aim at providing the European community with new young scientists, capable to cope with the activities on physics and engineering necessary to realize ITER, the subsequent demonstrative reactor(s), DEMO(S), and, at the end, the commercial thermonuclear reactors. This scientist should also have a background broad enough to be able to interact with companies and energy utility sector. High-tech companies will be in fact deeply involved in ITER construction and in subsequent fusion development. It is therefore extremely important that young researcher are trained on technological and industrial matters.

In this context the programme aims at preparing doctoral graduates, able to give an original contribution to the development of thermonuclear fusion research in a highly interdisciplinary context, where the needed engineering and physics competences complement each other. The availability of the Fusion Laboratories in the network, which offer a wide range of specializations, will allow the candidates, together with the Academic Council, to tailor their own educational path and research activity, balancing competences both in engineering and in physics.

On the basis of this deep culture in the subject, of the proactive environment and of the daily research work in interdisciplinary teams, the graduates should be able to plan new experiments and design and implement the corresponding hardware. Moreover they should be prepared to interact with industry to design and realize key ITER and DEMO components. In this context particular attention will be paid to the problems connected to the design of the thermonuclear reactor.

Main topics of the training and of the research experience

The PhD course addresses the subject of controlled thermonuclear fusion in magnetically confined plasmas. Both fusion science and technology topics are taught. The goal of controlled thermonuclear fusion is to bring on Earth the energy, which powers the Sun: an inexhaustible and environmentally sustainable source, to contribute to the solution of the world energy issue.

To reach this goal a number of problems need to be solved, both theoretically and experimentally. This course aim at giving its students the scientific and technological basis to became key players in this important research task. The course covers 3 main areas: Physics of Controlled Thermonuclear Fusion, Engineering of a Magnetically Confined Fusion Reactor, Experimental tools for diagnosing and controlling in real-time fusion relevant plasmas.

Students will be guided from the basics to state-of-the-art problems and solutions. Strong links with the European Fusion program and the ITER project are in place.

*IT*ER will be the largest magnetic fusion device ever built. ITER is a 17 meters high, 1000 cubic meter plasma volume device, which is under construction in France as a result of a joint project between China, India, Korea, Japan, European Union, Russia and USA. Its goal is to demonstrate the scientific and technological feasibility of fusion by producing 500 MW of fusion power. ITER will start its operation in 2019. To be a success and a key step in the achievement of fusion, ITER need a strong support from the scientific community and a large basis of scientists, who could build it and later exploit it. ITER will need a broad range of expertise, in physics and engineering, also on developing areas like material science and plasma control. This PhD course works in tight contact with ITER and aims at educating new generations of future ITER scientists. To this extent, the topics of the classes are selected among those mostly relevant.

The PhD course is supported by experimental activity in three important European devices: the ASDEX Upgrade tokamak in Garching by Muenchen, the RFX-mod reversed field pinch in Padova and the ISSTOK tokamak in Lisbon. The course will use experiments and tools of these three

devices for a modern, experiment based, education. The PhD course at University of Padova will in particular benefit from direct training experience in RFX-mod, which is one of the leading experiments in the world in the field of active feedback control of plasma stability.

HISTORICAL, GEOGRAPHICAL AND ANTHROPOLOGICAL STUDIES (University of Padua, Ca' Foscari Venice, University Of Verona)

website: http:// gesta.scuoladottorato.it
contact person: mariacristina.larocca@unipd.it, delia.legittimo@unipd.it
language/s: Italian, English

The PhD program is the first experiment in Italy of a regional doctoral school in historical, geographical and anthropological studies, that coordinate the skills and areas of research developed in the three Universities of Padua, Venice and Verona, increasing the opportunities for dialogue and scholarly debate among teachers and doctoral students. The union emerges from the strong academic links which already unite the three Universities at an individual level, and from numerous joint activities (seminars, research, tutorials) established in the past in the three doctoral schools of the Veneto in the disciplines of History, Geography, Anthropology and Historical Religious Studies**.** The School aims to establish itself as a landmark, at a national and international level, for the training of young researchers and of teachers of those disciplines. The presence within the PhD Programme of history, physical and human geography, and cultural anthropology seeks to stimulate, in the research of its doctoral students, the learning of specific methodologies and the habit of posing open questions about the potential for cross-links both among the disciplines related to humanities research, and between the humanities and the sciences. The PhD Programme can assure the doctoral students of a comprehensive training which each institution would find it difficult to offer independently.

The doctoral programme in Historical, geographical and anthropological studies is structured on three didactic paths (curricola):

- **Historical studies (from ancient to contemporary history);**
- **Geographical studies;**
- **Historic- religious history and anthropology.**

Areas of Research

1. Society and cultural representations: the study of identity and identity construction (national and international, professional, religious, racial, family, intergenerational), rules and law, public and private sociability. Ritual and religious practices. The history of spirituality.

2. Politics and its functioning: institutions (civil and ecclesiastical), the history of communication, of public opinion, military history, colonialism and post-colonialism.

3. The economic and social history and anthropology of the material and immaterial patrimony: ethnographic museums, understanding the natural environment, the history and anthropology of the countryside (natural and semi-natural), the history of business and of industrial heritage, cultural and religious transformation, the history and anthropology of cities, of migration and of the workforce.

4. Analysis of spatial and territorial processes: the dynamics of the physical environment; the impact of man on the physical environment, (climatic variations, geomorphologic processes, and population), the development and sustainability of projects within the country; studies and presentations of the countryside; the produce of a locality. The historical, geographical and anthropological problems of globalisation: technology, politics, ethics.

Teaching Organisation

Teaching will extend to at least 120 hours of lectures for each doctoral student over the three year period, provided by internal and external teachers from Italian and foreign universities. The lectures will mainly be addressed to participants in the first and second years of the course, in order to leave maximum freedom for those in the third year, who are more involved in the drafting of their thesis. PhD students will take active part in the Seminaries.

Teaching activity

- a small group of lectures and seminars of a general character on a common theme:
- lectures on bibliographical and electronic resources, on techniques of presentation and exposition of research, on the policies of Italian and European universities and on employment opportunities in research and in the professions. There are also School-wide seminars relevant to all the doctoral students, which seek to address academic issues relating to the use of historical sources, to the development of methodological and historiographic interpretation, and to the interrelationship of natural processes and human actions;
- specialist seminars, relevant in terms of theme to groups of students with similar chronological interests
- seminar activities directed to shared themes of research of the doctoral students who need to accustom themselves to the presentation and public discussion of their arguments in front of colleagues and teachers of the school.

HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE

website: http://www.beniculturali.unipd.it/www/corsi/dottorati-di-ricerca/presentazione/
contact person: francesca.ghedini@unipd.it **;** vittoria.romani@unipd.it**;** attilio.fortunato@unipd.it
language/s: Italian; lessons also in English and French.

The PhD school carries out research work in the following fields:

• Antiquities, Philological, Literary, Historical and Artistic studies
• Earth sciences
• Civil Engineering and Architecture
• Chemical sciences
• Information engineering

Archaeology

Reconstruction of population development, settlement strategies and territorial organization from Late Prehistory to the Classical World and the Middle Age; reconstruction of social structure in Recent Prehistory and Late Antiquity-Middle Age through the integration of archaeological data with anthropological and paleopathological ones; study of ancient, production through the integration of archaeological and archaeometric data to reconstruct production processes, know-how transmission across time and space and potential trade networks; study of building techniques in Classical and Middle Age cities by analysis (including archaeometric ones) on building materials and elevation stratigraphy; survey and technical-stylistic analysis of paintings and mosaics in the Roman world in order to reconstruct craftsmanship and craftsmen - commissioners relationship; studies of History of greek and roman art.

Topics: Prehistory; Archaeology of greek and roman world; History of greek and roman art; Archaelogy of the Middle Ages; Management of Cultural Heritage L-ANT/01; L-ANT/O6; L-ANT/07; L-ANT/08; L-ANT/09; L-ANT/10 TOPICS

Archaeometry

Compositional and structural characterization of cultural assets to reconstruct production techniques and to identify raw materials provenance; study of alteration process and methods for the control of archaeological and artistic artefacts deterioration, analysis of deterioration causes and effects; validation of materials for restauration, analysis and interpretation of the structural behaviuor of historic buildings by experimental diagnostics and monitorig techniques and numerical modeling;materials and techniques for the static improvement and adjustment and control methods for their efficiency; 3D metric survey methodologies at small, medium, large scale for Cultural Heritage; integration of geo-referenced data acquisition; techniques for storage and management in the framework of Cultural Heritage; techniques for virtual restoration and analysis of chromatic sequence on artistic artifacts.

Topics: ICAR/06; ICAR/09; ICAR/19; GEO/07; GEO/09; GEO/11

Art history

Art History domain will promote aptitude for research and understanding of figurative materials and artistic sources, refining the capacity to combine the most diverse methodologies and a conscious use of investigation tools, such as sources, archival documents, historical and cultural contexts, technical data, so as to penetrate the significance of the disciplines.

Topics : Architecture, liturgy, plastic and pictorial decoration in Medieval Europe; Art History in Italy in the Medieval and Modern age; Renaissance Painting in Northern Italy; Relations between Italian and European art in the Renaissance; History of Drawing and Prints; History of Collecting, Iconography and Iconology, History of Medieval and Renaissance Illumination; History of Goldsmith's Art, History of Applied Arts, Art History in the 19th and 20th centuries; Methodologies for the criticism and conservation of artistic heritage, Analysis of artistic sources

Musicology

The field of musicology is inquired from both a theoretical - systematic and historical point of view, with a particular attention to the issues of criticism, preservation and valorisation of musical Heritage. From the historical perspective the main fields are: monophonic and polyphonic repertoires in the West, with a particular focus on the liturgical ones; musical features of the

Medieval Age; European modern music (with particular attention to electro-acoustic music), including popular music. From the methodological point of view, the disciplines treated with more attention are: musical theory, musical analysis, analysis of the relationship between poetry and music, dramatic and musical analysis

Cinema Photography, Audiovisual

Cinema, photography and audiovisual are inquired from both a theoretical and historical point of view, with a particular attention to the issues of criticism. Specific attention is also paid to the relationships between cinema and the other arts, cinema and the cultural processes.

Specific areas: pre-cinema and italian silent-cinema studies, history of italian cinema; history of francophone cinema; history and technique of photography;history of cinema theories; history of film studies; non-fictions film studies, theory and technique of film language;film criticism; film-genres; media and cinema literacy; theories of film preservation and museology of cinema; tools for the automatic analysis of audio/visual content. For the relationships between cinema and cultural processes: representation of war; cinema and psychoanalysis; cinema and cultural studies; cinema and postcolonial studies; autobiography in film and audiovisual

Theatre

Theatre theory and praxis at the beginning of the modern Age (Renaissance and Baroque theoretical essays; stage design; stagers and settings; performance places, forms and genres between the 16th and 17th century). Festive events and cerimonial settings from 15th to 18th Century; the fortune and influence of the Renaissance and Baroque theatre in 19th and 20th Century; History of ballet from 16th to 19th Century; History of modern dance; History of theatrical lighting: theory and practice; Theatre and pedagogy from the 16th Century to the contemporary Era; Iconographic sources for the history of the performing arts; History of drama; History of stage-direction and staging; Theory and practice of acting; History of paratheatrical genres.

INDUSTRIAL ENGINEERING

website: http://www.sdii.dii.unipd.it/index.php?lang=english
contact person: paolo.colombo@unipd.it
language/s: English

Doctoral candidates are recruited into one of the Curricula that offer them a wide range of advanced courses and PhD research activities and projects. The research deals with engineering science and technology aimed at designing, developing and sustaining technologies, products, processes and systems in the following domains:

Curriculum in Chemical and Environmental Engineering:

- Chemical reaction engineering
- Engineering systems and processes
- Processes and industrial plants for the production of alternative fuels
- Analysis of the safety and risk in manufacturing and transport
- Biological chemical engineering, particle technology
- Special chemical synthesis, with particular reference to fluorinated compounds
- Environmental chemistry engineering
- Chemical engineering of polymers
- Environmental impact of industrial activities
- Environmental fluid dynamics

Curriculum in Materials Engineering:

- Metallurgical engineering
- Advanced ceramic components for engineering applications
- Development and production of multifunctional porous ceramics
- Development and production of ecosustainable ceramics
- Biological tissue engineering
- Biomedical research and production systems
- Molecular and chemical systems for technologies

Curriculum in Mechanical Engineering:

- Industrial product development, modeling and prototyping
- Modeling and optimization of processes
- Micro/nano manufacturing
- Geometric industrial metrology
- Mechanics of a two-wheeled vehicles
- Simulators of motorcycle guide
- Structural integrity
- Identification and measurement of mechanical systems
- Light vehicles for the development of sustainable mobility

Curriculum in Energy Engineering:

- Thermal fluid dynamics of single and two-phase systems
- The technology of heat exchangers
- Energy savings in refrigeration equipment and in industrial processes
- Environmental control techniques and building physics
- Environmental control techniques
- Physics and energy balance of buildings
- Modeling of the thermodynamic properties and transport of pure fluids and mixtures
- Conversion of solar energy
- Fluid machinery
- Internal combustion engines
- Aeronautical propulsion
- Development of heuristic optimization techniques
- Microgeneration
- Energy saving

Curriculum in Electrical Energy Engineering:

- Electric machines and drives
- Electric equipment and electrical systems
- Electrothermics
- Electromagnetic compatibility
- Computational electrical engineering
- High voltages
- Industrial automation
- Photometry and lighting
- Controlled thermonuclear fusion
- Analysis and optimization of complex systems
- Conversion of solar energy

INFORMATION ENGINEERING

website: http://www.dei.unipd.it/phd
contact person: phdschool@dei.unipd.it
language/s: English

Research lines:

- Control and system theory and applications
- Operations research
- Electromagnetic radiation, instrumentations, measurement procedures and reduction of the radiated em field
- Use of engineering methodologies and techniques to solve medicine and biology problems: Modeling and Control of Biological Systems; Computational Genomics and Proteomics; Systems Biology; Bioinformatics; Bioelectronics; Bioimaging; Processing of Biomedical Data and Signals; Computational Neurosciences; Biomaterials; Biomechanics; Bioengineering of Physical Activity; Rehabilitation Engineering; Telemedicine, Medical Informatics.
- Computer engineering: Software engineering, Information management systems, Computer networks, Computer music, Computation theory and applications
- Study, design and test of microelectronic systems and apparata (design of low power CMOS circuits for telecommunications and biomedical applications, statistical modelling of integrated circuits, fabrication processes of VLSI devices) and of industrial electronics
- Transmission of information and signal processing: Wideband mobile communication systems (UMTS and B3G); WLAN and ad hoc networks; sensor networks; voice, moving and still images processing; multimedia systems over fixed and mobile networks; fiber optic transmission systems; design of optic instruments; quantum communication; measurement techniques for telecommunication systems, ultrashort laser pulses generation.

For further references concerning research activities, please see following web pages:

http://www.dei.unipd.it/node/193

http://www.dei.unipd.it/dottorato

INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW

website: http://www.dircomp.unipd.it/scuole_dottorato.htm
contact person: manuela.mantovani@unipd.it
language/s: Italian

Background and aims of the Ph.D. course

The Course offers interdisciplinary training by integrating the perspectives of International Law, European and Italian Private and Comparative Law and Labour Law, which provide the groundings for competency in one of the following domains:

- qualifying doctoral graduates for research in the field of Private Law, which is no longer considered only from the point of view of the Italian legal system but also from the perspective of comparison with other European legal systems and within the dynamics of their harmonization;
- Labour Law and Trade Union Law from the perspectives of the national legal system, in comparison with the legal systems of the other EU member States, and International Law;
- Public and Private International Law and European Union Law, also from the perspective of their historical background and development.

LAND, ENVIRONMENT, RESOURCES AND HEALTH (L.E.R.H.)

website: http://www.tesaf.unipd.it/school/lerh.asp
contact person: marioaristide.lenzi@unipd.it;
language/s: English

Research lines:

- Ectomycorrhizal dynamics in the forest expansion on sandy soils
- Short-term effects of thinning on forest decline
- Carbon balance of forest ecosystems
- Global determinants of treeline
- Landscape ecology
- Forest dynamics and Tree water relations
- Hydrological processes and flash-flood
- Fluvial morphology, sediment transport, mountain rivers
- River and streams dynamics and restoration
- Erosion processes, torrent control, check dams
- Forest hydrology, water cycle, GIS and Geomatic
- Effects of climate change on hydrological cycle and sediment transport regime
- Soil, water and air pollution
- Phytoremediation, water and soils phytodepuration
- Wetlands, constructed wetland and phytodepuration facilities
- Water and fertilization management with precision agriculture
- Technologies and machineries for reduction environmental impacts and conservation of natural resources
- Technologies in precision agriculture and forestry
- Energy supply in agriculture and forestry, energy saving and by-product retrieval
- Bioenergy and forests
- Agrifood sector competitiveness

- European agricultural policy and European rural development
- Food quality, made in Italy, geographical indications, organic products
- Marketing of agrifood products
- Economics of bio-energy
- Economics of food science and technology
- Food quality and safety

LINGUISTIC, PHILOLOGICAL AND LITERARY SCIENCES

website: http://www.maldura.unipd.it/dottorato/
contact person: rosanna.benacchio@unipd.it (Director of the School)
filomena.soriano@unipd.it (Secretary of the School)

language/s: Italian

The School is divided in the following six curricula:

- Anglo-German Linguistics, Philology and Literature:;
- Classical Philology
- Italian Studies
- Linguistics
- Romance Philology
- Slavic Studies

The research lines can be found at the respective websites, linked to the website of the School.

MANAGEMENT ENGINEERING AND REAL ESTATE ECONOMICS

website: http://www.gest.unipd.it/en/scuole-di-dottorato/ingegneria-gestionale
contact person: cipriano.forza@unipd.it
language/s:English

The PhD course in Management Engineering and Real Estate Economics includes two PhD specializations: “Management and Engineering” and “Real Estate Economics”. The educational programme of the School covers three years and includes both compulsory and optional training activities. The first year is mostly devoted to taking courses and seminars, whilst the second and the third are focused on research activities, particularly those related to the writing of the dissertation, under the supervision of a member of the School faculty.

- “Management and Engineering” specialization. Main research lines:
    1. Innovation management and economics
    2. Technology management
    3. Management of new products development
    4. Project management
    5. Operations & supply chain management
    6. Quality management
    7. Service management
    8. Organisation theory
    9. Strategy
    10. Complexity management
    11. Mass customisation
    12. Risk management.
- “Real Estate Economics” specialization. Main research lines:
    1. Valuation theory and methodology
    2. Valuation and valorisation of urban real estate
    3. Valuation and management of historical architectonic goods
    4. Land economics
    5. Valuation of the economy of mountain territories
    6. Valuation and management of environmental goods

MATHEMATICAL SCIENCES

website: http://dottorato.math.unipd.it/
contact person: pierpaolo.soravia@unipd.it
language/s: English

The School focuses on the following fields of research:

- Algebra
- Analysis
- Geometry
- Logic
- Mathematical physics,
- Number theory
- Numerical Analysis
- Operations research-optimization
- Probability-stochastic process

MECHATRONICS AND PRODUCT INNOVATION ENGINEERING

website: www.gest.unipd.it/it/dottorati/sdimip
contact person: alessandro.persona@unipd.it
alberto.trevisani@unipd.it
language/s: English

1. Fatigue assessment of structural components in automatic machines and plants for the manufacturing mechanical industry
2. Fracture Mechanics and analysis of fracture surfaces
3. Structural analysis of mechanical components
4. Design and testing of mechanical components made of polymer matrix composite and nanocomposite
5. Analysis of manufacturing defects and of damage processes
6. Numerical simulation of welding processes
7. Magnetic levitation casting
8. Innovative metallic and composite materials
9. Functional design of mechanical and mechatronic
10. Automatic machines and industrial robots
11. Control techniques for mechatronic systems
12. Power electronics and power conversion
13. Electric, hydraulic and pneumatic actuators
14. Planning, design and simulation of industrial plants, industrial logistics and material
15. Logistic networks design
16. Automated logistic plants design (automated warehouses, automated material handling systems, packaging automated lines, picking shuttle, etc.)
17. Integrated design of the system "product-package-machine"
18. Transportation and person/asset info-mobility
19. Industrial plants maintenance, machines and plants reliability analysis, Reverse logistics and spare parts logistics
20. Food logistics

MOLECULAR MEDICINE

website : http://www.medicinamolecolare.unipd.it/ricerca/dottorati-di-ricerca
contact person: stefano.piccolo@unipd.it
mariateresa.conconi@unipd.it
language/s: English/ Italian

The School offers a strong interdisciplinary research program and is organized in two curricula: Biomedicine and Regenerative Medicine. The main objective of the Course is to form scientists with biological knowledge to apply to medicine with the final aim to understand the molecular bases of diseases and develop new diagnostic systems and new therapeutic and preventative tools. This knowledge in the fields of biochemistry, biophysics, histology, physiology, microbiology and biotechnology, will provide the student with a wide professionalism aimed to ideate and develop biomedical research projects both basic and translational.
The didactic program include practical activity in the laboratory under the guidance of a tutor, attendance to seminaries given monthly by external invited speakers, Summer Schools and preparation of seminars. Every 6 months a special seminar section (retreat) will be organized during which every student will expose the advancement of his/her data to the other students and to the Faculty members of the School. The students will be invited to attend national and international meetings of interest for their research and to participate to collaborate with other Italian and foreign research groups.

Specific research fields are as follows:

- Basic research are focused on the identification of molecular mechanisms driving cell differentiation, stemness, and involved in the pathogenesis of infectious, genetic, degenerative and neoplastic diseases. In particular: signal transduction mediated by growth factors and hormones; enzymes involved in the redox homeostasis of proteins involved in differentiation; genes involved in extracellular matrix biosynthesis; mechanical stimula and wound repair; physiopathological basis of reproduction; micronutrients and vegetal antioxidants in degenerative and neoplastic diseases and in the aging; hepatitis C pathogenesis and hepatic fibrosis mechanisms; alteration of liver function after liver transplantation; structure and function of viral genes; genetic and biochemical mechanisms of resistance to antiviral drugs; characterization of the bacterial pathogenetic mechanisms; molecular basis of the physiopathological mechanisms of the nervous system; development and characterization of murine models.

- Translational research aim to develop preventative agents (vaccines), diagnostic and therapeutic tools, including gene therapy, new anticancer drugs, and regenerative medicine. In particular: development of viral and bacterial vectors for gene therapy and vaccine delivery; development of new tools of molecular diagnostics based on "omic" sciences; bioelectronics and nano-biotechnologies: new materials at nanometric scale for

the development of biosensors; biomarkers and predictability of the response to the therapy of chronic inflammatory gut diseases; development of diagnostic approaches and sterility therapy; cell and gene therapy of infectious, degenerative and neoplastic diseases; stem cells from peripheral blood, adipose tissue, enteric nervous system, and IPS (induced pluripotent stem cells); metallic, polymeric, and biological biomimetic surfaces; design, synthesis, and delivery of cell adhesion, growth, pro- and anti-angiogenic factors; in vitro reconstruction of vascular, tracheal, esophageal, liver tisuue engineered substitutes; drug-target finding; drug delivery.

MOLECULAR SCIENCES

Website: http://www.chimica.unipd.it/sdsm
Contact person: antonino.polimeno@unipd.it
language/s: English/Italian

The Graduate School in Molecular Sciences (Corso di Dottorato in Scienze Molecolari, hereafter, CDSM) starts on January 2005, from the merge of the pre-existing Doctoral Courses of Chemical Sciences and Pharmaceutical Sciences, both active since 1984. The CDSM is strongly committed to excellence in education and research in chemistry, biochemistry, pharmaceutical chemistry and material sciences. In the period ranging from 2005 to 2012, 130 PhD students, uniformly distributed among the active research groups of the departments of Chemical Sciences and Pharmaceutical Sciences were enrolled at CDSM.

Due to the large number of very active research groups and dedicated teaching staff, the CDSM provides to each student a rich array of choices of research themes, widely classifiable within the standard areas of analytical chemistry, physical chemistry, organic chemistry, inorganic chemistry, industrial chemistry, pharmaceutical chemistry. A description of all research activities is presented in CDSM web site, http://www.chimica.unipd.it/sdsm. The main research topics available are:

1. Life chemistry
   - Synthesis and analysis of peptides and proteins
   - Studies of photosynthetic systems via optic and magnetic spectroscopies
2. Environment, energy and cultural heritage
   - Development and application of chemical methods to technologies for the production and storage of energy
   - Environment control
   - Cultural heritage conservation
3. Materials, nanomaterials and surfaces
   - Synthesis of functionalized organic, inorganic and hybrid materials
   - Development of functional materials with controlled chemical, optic, electric, magnetic properties
   - Studies of interfaces, films and supported nanoparticles
4. Supramolecular chemistry and nanochemistry
   - Supramolecular systems and colloidal chemistry

- Self assembly of nanostructures and nanoparticles

5. Synthesis, catalysis and reactivity
   - Synthesis and characterization of homogeneous/heterogeneous catalysts
   - Coordination chemistry
   - Organic synthesis, electrosynthesis
6. Theoretical and computational chemistry
   - Theoretical methods for molecular modeling
   - In silico characterization of molecular dynamics and reactivity via quantum and statistic methods
   - Development of computer methods in chemistry
7. Strategies for drug design
   - Bioinformatics for pharmaceutical chemistry and biorganic chemistry
8. Novel molecules with biological activity
   - Conventional and innovative synthesis methods
   - Chromatographic, spectroscopic methods and integrated methods
9. Molecular mechanisms of activation of pharmaceutical compounds
   - Studies of interaction with cells, tissues, receptors; molecular biology

PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES

website: http://www.educazione.unipd.it/web/?q=node/27
contact person: marina.santi@unipd.it
language/s: English/ Italian

Educational objectives for the 29th cycle of the Ph.D. School

The three following courses take into account the current groups and research projects undertaken in the undersigned department, together with other associated university departments.

FIRST COURSE: PEDAGOGICAL AND TRAINING SCIENCES

The current relevant demand for education and training outlines the following research areas: 1) the historical dimension of pedagogical research; 2) new educational and training processes; 3) the ways and means for developing a new pedagogical language; 4) the development of a 'practical' pedagogy, capable of translating theoretical stances into choices and operational procedures; 5) intercultural pedagogy; 6) social and family pedagogy; 7) the development of professionalism in education (for teachers, school managers/headmasters, educators, trainers), and direct impact methodologies, such as job analysis in business organizations, 8) professional ethics, for the qualification and the social recognition of education and training professions; 9) lifelong education.

SECOND COURSE: TEACHING AND COMMUNICATION TECHNOLOGIES

The second course covers two complementary, closely integrated research areas: Teaching and Communication Technologies.

The areas concerning teaching regard the following elements: 1) reflections on theoretical and operational aspects related to the definition of different curricular frameworks and their comparative analysis; 2) educational processes, starting from student-centered teaching and meaningful learning; 3) teaching methodologies, teaching disciplines methodologies and interdisciplinary approaches, 4) class and group dynamics, considering interactions, communication strategies and techniques involved in the creation and management of "learning communities" and collaborative/cooperative setting; 5) the study and definition of teaching methodologies, technologies, and tools suitable for a modular perspective, towards an integration of diversity/difference in its multiplicity of forms and features; 6) Disability, Special Pedagogy and Inclusive Education, differentiated didactics in intercultural setting and against marginalization and exclusion.

The areas related to communication technologies include the following themes: 1) the design and structure of educational sites and communication environments for the management of learning activities, shifting focus from a "machine-centered" to a "human-centered" technology; 2) the

representation of knowledge through ontologies, the shift from Web-archive documents to the Semantic Web and related network information research 3) the design of multimedia and interactive learning objects-materials, within the framework of integrated, blended on-site/on-line instruction and learning; 4) methodologies of social communication on the net, models of cooperative, situated learning designed to build competences and knowledge; 5) the assessment and evaluation of learning processes and an integrated technological system of instruction (on-site and on-line).

THIRD COURSE: EPISTEMOLOGY AND METHODOLOGY OF EDUCATIONAL RESEARCH

The third course covers new methods of research that are defined referring to processes, interactions and necessary integrations between educational systems. New approaches and complex processes of inquiry come to the fore, for the evaluation and assessment of learning, competences and systems.

The research areas proposed are as follows: 1) the epistemology and methodology of pedagogical research; 2) comparative methods of analysis; 3) the analysis and planning of research designs; 4) qualitative, quantitative and mixed research methods; 5) the history of education systems, 6) documentary methods in education; 7) the assessment and evaluation of learning and competences, as well as of educational systems; comparative assessment and evaluation ; 8) the ethnography of interacting systems; 9) computer-assisted research and evaluation procedures, data analysis software, and so on.

PhD students ought to find opportunities for learning to observe phenomena and events, to formulate and test hypotheses, experiment with investigation procedures, collect and analyse data and other research materials, acquire evaluation and assessment methods and techniques, interview and listen to those working in educational, school and training contexts, within communities, institutions and organizations.

PHARMACOLOGICAL SCIENCES

website: http://www.dsfarm.unipd.it/corsi/Dottorato-di-Ricerca
contact person: pietro.giusti@unipd.it
language/s: English

Research lines:

Pharmacology, Toxicology and Therapeutics:

- Pharmacology of the respiratory tract
- Gastrointestinal pharmacology
- Cardiovascular pharmacology
- Immunopharmacology
- Pharmacological modulation of inflammatory diseases
- Endocrine pharmacology
- Neuropsychopharmacology
- Antibacterial and antitumoral chemotherapy
- Pharmacogenomics
- Pharmacokinetics, toxicokinetics and xenobiotic risk management
- Ecotoxicology
- Mutagenesis and cytotoxicity
- Natural compound and plant extract treatment of aging-related diseases.
- Algorithms designed to personalize cardiovascular, neurological, oncology therapy by phenotyping, genotyping and TDM.
- Clinical pharmacology
- Therapeutic drug monitoring
- Clinical drug experimentation
- Pharmacoepidemiology
- Pharmacovigilance
- Pharmacoeconomics
- Neurological, respiratory, and cardiocirculatory intensive therapy
- Extrahepatic-renal dialysis
- Cell-based therapy

- Gene therapy

Molecular and cellular pharmacology:

- Molecular and cellular pharmacology of heart and vessels, with emphasis on signal transduction mechanisms
- Iatrogenic apoptosis and growth factors in the vascular endothelium
- Ouabain and Na/K-ATPase in cellular proliferation and survival
- Free radicals in central nervous system degenerative pathologies: purinergic receptors and nitric oxide synthase
- Identification and architecture of target genes
- Molecular and cellular mechanisms involved in stem cell therapy
- Role of microglia and astrocytes in inflammatory processes involving neurological and psychiatric disorders
- Neuropathic pain molecular targets: in vivo and in vitro models.
- Development of new environmentally friendly pesticides species-specific

PHILOSOPHY

website: https://elearning.unipd.it/scienzeumane/course/view.php?id=302
contact person: francesca.menegoni@unipd.it, postlauream.fisppa@unipd.it
language/s: Italian/English

The research areas of the PhD program in Philosophy include history of philosophy, political philosophy and the history of political thought, and the issues of theoretical and practical philosophy. Specific thematic areas include:

1. Philosophy and History of Ideas: History of ancient philosophy, History of medieval philosophy, History of modern philosophy, History of Philosophy of the XX Century, History of science, History of philosophical historiography.

2. Political Philosophy and History of Political Thought, with an emphasis on the genesis and the metamorphoses of the central modern political concepts and the issues concerning the modern political subjectivity.

3. Theoretical and Practical Philosophy: Theoretical philosophy, logic, philosophy of language and philosophy of science; Ethics and applied ethics; Aesthetics and philosophy of art; Themes and problems of the classical German philosophy.

The goal of the program is to provide the necessary skills for specialized research on the entire history of philosophy and competences in the interdisciplinary study, constantly updated on the international debate, of the philosophical problems related to the research themes.

PHYSICS

website: http://www.dfa.unipd.it/index.php?id=scuola-dottorato-fisica
contact person: cristina.mazzucco@unipd.it
language/s: English

Research lines:

- Theoretical particle physics (contact: Gianguido Dall'Agata, dallagata@pd.infn.it)
- Theoretical astrophysics (contact: Sabino Matarrese, matarrese@pd.infn.it)
- Nuclear physics (contact: Andrea Vitturi, vitturi@pd.infn.it)
- Subnuclear physics (contact: Ugo Gasparini, ugasparini@pd.infn.it)
- Astrorparticle physics (contact: Denis Bastieri, denis.bastieri@pd.infn.it, Mosé Mariotti, mariotti@pd.infn.it)
- Condensed matter (contact: Filippo Romanato, filippo.romanato@unipd.it)
- Biological physics (contact: Amos Maritan, maritan@pd.infn.it)
- Applied Physics (contact: Giuseppe Viesti, giuseppe.viesti@unipd.it)

For further details on the research lines at the Department of Physics cf. http://www.dfa.unipd.it/index.php?id=cetest_firstpage1&L=jvjkbmtbira

PSYCHOLOGICAL SCIENCES

website: http://scuoladott.psy.unipd.it/index.php?l=eng
contact person: giovanni.galfano@unipd.it
language/s: English

Research lines:

- Sensation (visual acuity, contrast sensitivity, visual search, adaptation, spatial and temporal summation, dynamic vision and stereopsis)
- Perception (visual perception, environmental perception, animal perception)
- Visual cognition (representation, visual memory, visual attention, perception and action, visuo-motor behaviour)
- Animal cognition
- Animal models of cerebral lateralization
- Gender identity and sexual orientation: genetic and evolutionary implication in humans
- Lifespan Cognitive Neuroscience
- Attentional and control deficits in patients with brain damage
- Psychobiology of language and language disorders (aphasia, dyslexia)
- Psychophysiology of emotion and anxiety
- Cardiovascular psychophysiology
- Cognitive deficits in sleep deprivation
- Biological basis of neural and psychiatric disorders
- Cognitive development in newborns and infants
- Cognitive and linguistic development
- Social, affective and emotional development
- Conceptual development and learning
- Literacy
- Learning and Instruction
- Psychodiagnosis in childhood and adolescence
- Community psychology and adolescence
- Attention, in relationship to other cognitive processes such as perception, memory, and emotion
- Psychology of language (word production and comprehension, control in language, sentence and text processing etc.)

- Social cognition (causal inferences, social categorization, automatic processes, stereotyping, and cultural differences in social cognition)
- Computer simulation of cognitive processes
- Cognitive neuropsychology related to pathological aspects of cognitive functions in adults
- Methodology of Social Psychology and Personality Research
- Data Analysis and Formal Modelling in Personality and Social Psychology
- Personal and Social Identity
- Interpersonal and Intergroup Conflict Resolution
- Processes of Acculturation
- Work and Organizational Psychology
- Outcome Assessment in Psychoterapy

SCIENCE AND TECHNOLOGY OF NANOSTRUCTURED MATERIALS

website: http://www.chimica.unipd.it/?context=946
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language/s: English

Research lines:

- Design of functional materials
- Advanced preparation methods (both bottom-up and top-down)
- Physico-chemical and functional characterization of innovative materials
- Surface properties of functional materials
- Preparation and characterization of thin films and functional coatings
- Preparation and characterization of nanodimensional and nanostructured materials
- Materials for energetics
- Advanced Ceramic Materials
- Modelization of nanostructured materials
- Chemistry and physics of graphene based materials
- Fuel cells and batteries

SOCIAL SCIENCES: INTERACTIONS, COMMUNICATION, CULTURAL CONSTRUCTIONS

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Research lines:

- Theories and research approaches for the analysis of cultural and communication processes and social reproduction;
- Theoretical models and analytical tools of interaction processes and cultural construction;
- World Migration and trans-cultural reconfiguration of European Social and Political Space;
- Religions and religious behaviours;
- Cultural pluralism: public sphere, religions, ethic social issues and mass-media;
- Cultures of citizenship and solidarity, social exclusion processes in the transformation of European social spaces;
- Gender studies in the international context;
- Conflicts and recognition of differences, pluralisation of identities, formation of shared memories at the local and European level;
- Inter-generational relations: social construction of childhood and under-age subjects;
- Social construction of normality and deviance;
- Cultural pluralism: sciences and public opinion;
- Communication and mass-media, social and public communication;
- Ethnography and Qualitative research methodologies;
- Statistic for Social Sciences and Quantitative research methodologies

SPACE SCIENCES, TECHNOLOGIES AND MEASUREMENTS

website: http://cisas.unipd.it/phd_course.php
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The main purpose of the Space Sciences, Technologies and Measurements PhD Course is the formation of Research Doctors able to realize research in disciplines connected with Sciences, Technologies and Measurements for Space with a broad vision of the respective problematic. The doctoral students usually operate within defined programs and experiments of interest for the School Curriculum research subjects, acquiring wide and interdisciplinary knowledge, learning methodologies and techniques.

The educational process shall enable students to acquire skills and credits toward a University career, and/or a position in other Research Institutes, or Industries. It should also stimulate the potential capabilities of the doctoral student to induce a fall-out of his/her knowledge in the territory, to stimulate the growth of high tech spin-offs, to improve local industry's ability to compete in the wider national and international scenario. A corollary of the above approach is the formation of Research Doctors capable to raise to leadership levels in scientific and/or industrial programs.

In order to provide not only a broad, interdisciplinary vision, but also a specific competence in particular fields, two main Curricula have been instituted in the STMS Course, each one with its own educational program:

- Mechanical Measurements for Engineering and Space (MMIS), whose research lines are: analysis and definition of measuring methodologies and data processing; functional analysis of instrumentation and representation through general theory; definition of methods to evaluate the uncertainty; innovative procedures for measuring by means of non conventional methods; measurements of time variable phenomena with on-line data processing and industrial process monitoring; methods to validate interpretative models in industrial and clinical diagnostics; industrial installation and equipment testing with the design of optimal measuring system; measuring techniques in clinical diagnostics; design and setup for laboratory experiments simulating harsh environmental conditions; mechanical system testing: development, acceptance and qualification tests; design and set up of measuring and testing devices for opto-mechanical and ultrasonic instrumentations
- Sciences and Technologies for Aeronautics and Satellite Applications (STASA), whose research lines are: system engineering and mission analysis; structural and thermal analysis of space systems; advanced robotics; mechanisms and tethers in space; dynamics of space flights and attitude control; space navigation; mechanics of composite materials; photon detectors from soft-X rays to near infrared; optics and scientific instruments for space; physics of planets, moons, comets, asteroids; mission analysis for universe and Earth observations; interaction between spacecraft and space environment; design, verification and test of

laboratory simulation in harsh environment; neurosciences and comparative psychology for space applications

SPECIALISTIC MEDICINE G.B. MORGAGNI

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Research lines:

The “Specialistic Medicine G.B. Morgagni” Ph.D. Course aims to train Research Doctors in the biomedical field with particular emphasis in Neurosciences, Cardiothoracic and Vascular Sciences and Endocrine and Metabolic Sciences. The doctoral students will acquired deep knowledge concerning basic sciences and molecular medicine, to accrue technical laboratory skills, and a research method in Medicine and Surgery and in the different subspecialties to be applied in the prevention, diagnosis and therapy of human diseases. Using a multidisciplinary approach to biomedical sciences from research laboratory to bedside, competences in epidemiology, genetics, biology and molecular pathology, regenerative medicine, physiopathology, diagnostics and therapy are integrated.

At the end of their research program the Ph. Doctors will gain skills for designing experimental protocols, for directing research projects and for treating patients with the power of the experimental scientific method.

The Ph.D. Course in Specialistic Medicine G.B. Morgagni is organized in 3 curricula:

- Neurosciences;
- Cardiothoracic and Vascular Sciences;
- Endocrine and Metabolic Sciences

STATISTICAL SCIENCES

website: http://www.stat.unipd.it/fare-ricerca/dottorato-di-ricerca
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piacent@stat.unipd.it
language/s: English

The doctoral programme in Statistical Sciences aims at developing a comprehensive expertise in statistics for students with a good background in mathematics, providing them with the tools to conduct research in a variety of theoretical and applied fields. Candidates will not only acquire the theoretical tools that underpin the methodology of the discipline, but will also gain substantive experience working on applications. Lectures in the first year courses are delivered in English by leading international researchers and experts. Doctoral candidates completing the programme will be well prepared either to pursue a career in research or to start a job as highly professional statisticians.

Research lines:

- Statistical methodology and its applications. Methodological aspects range from statistical models to inference and computational issues. Applications may concern a variety of fields such as environmental studies, technology, biology, medicine, finance.
- Statistical methods and applications in Economics. In particular: time series analysis, forecasting, statistical methods for labour economics and evaluation of public policies.
- Social Statistics and Demography. In particular, survey methodology, models for individual and aggregated data, segmentation techniques, multilevel models, population structure and dynamics, statistical analysis of demographic behaviours and policies.

VETERINARY SCIENCES

website: http://www.dottorato.veterinaria.unipd.it/index.php?lang=en
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The research is focused into five overlapping and inter-related themes and is sustained by a complementary mixture of clinical and non-clinical academic staff:

1. Veterinary basic sciences: research covers the bio-pathologic subjects related to animals of veterinary interest (mammals, birds and fish), including molecular and cell biology, stem cell technology, microbiology, anatomy, physiology and endocrinology, zoology, pathology, animal behavior and man-animal relationship, animal welfare and bioethics.
2. Veterinary epidemiology, hygiene and public health: research includes the study of the diffusion of animal infectious and parasitic diseases (including zoonosis and molecular epidemiology) and the development of advanced diagnostic techniques; the development and evaluation of methods for disease prevention plans and risk factor assessment; the development of screening methods for ecotoxicology.
3. Food safety and Food science: This is an important and peculiar research and professional field in the veterinary sector. Research is addressed to investigate the bond between animal husbandry and the production of healthy and safe foods and diets for all, the development of methods to detect xenobiotic residues and assess the microbiological risk in food and feed, and methods for food traceability. PhD candidates will have also the opportunity to follow research programs related to the impact of food and feed production on human health.
4. Animal models to study spontaneous and experimental human diseases: The research projects are usually conducted in association with research groups in the area of human medicine, and applicants are invited to contact the reference person for further information about the topics.
5. Animal diseases: Research projects deal with the development of diagnostic and therapeutic tools, the evaluation of veterinary drugs and (functional) feed. All the areas of veterinary medicine are covered: internal medicine, reproductive medicine, surgery. The PhD students with a degree in Veterinary medicine will have also the chance to follow the activities at the University Veterinary Hospital, and learn about the methodologies and the scientific principles necessary for research and study in different fields of clinical veterinary science.