UNIVERSITÀ DEGLI STUDI DI PADOVA

LIST OF DOCTORAL SCHOOLS AND INTERNATIONAL DOCTORAL COURSES – 28th SERIES Academic Year 2012/2013

Please note that, at the time of the publication of the call, the list of the Doctoral Schools/Courses has not been definitely approved by the Academic Bodies of the University yet.

DOCTORAL SCHOOLS

1. ASTRONOMY
2. BIOMEDICINE
I. *Curriculum:* MOLECULAR MEDICINE
II. *Curriculum:* REGENERATIVE MEDICINE
3. BIOSCIENCES AND BIOTECHNOLOGY
I. *Curriculum:* BIOCHEMISTRY AND BIOPHYSICS
II. *Curriculum:* BIOTECHNOLOGY
III. *Curriculum:* CELL BIOLOGY
IV. *Curriculum*: EVOLUTIONARY BIOLOGY
V. *Curriculum:* GENETICS AND MOLECULAR BIOLOGY OF DEVELOPMENT
VI. *Curriculum:* NEUROBIOLOGY
4. INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW
5. PHILOSOPHY
6. PHYSICS
7. LAW
8. INFORMATION ENGINEERING
I. *Curriculum:* BIOENGINEERING
II. *Curriculum:* INFORMATION SCIENCE AND TECHNOLOGY
9. MANAGEMENT ENGINEERING AND REAL ESTATE APPRAISAL
10. INDUSTRIAL ENGINEERING
I. *Curriculum:* CHEMICAL, MATERIALS AND MECHANICAL ENGINEERING
II. *Curriculum:* ENERGY ENGINEERING
11. MECHATRONICS AND PRODUCT INNOVATION ENGINEERING
12. DEVELOPMENTAL MEDICINE AND HEALTH PLANNING SCIENCES
I. *Curriculum:* ONCOHEMATOLOGY AND HUMAN GENETICS, RARE DISEASES AND PREDICTIVE MEDICINE
II. *Curriculum:* HEALTH PLANNING MODELS/ SYSTEM PLANNING

13. ONCOLOGY AND SURGICAL ONCOLOGY
14. MATERIALS ENGINEERING AND SCIENCE
15. ANIMAL AND FOOD SCIENCE
I. *Curriculum:* ANIMAL SCIENCE
II. *Curriculum:* FOOD SCIENCE
16. CIVIL AND ENVIRONMENTAL ENGINEERING SCIENCES
17. EARTH SCIENCES
18. CROP SCIENCE
19. PHARMACOLOGICAL SCIENCES
I. *Curriculum:* MOLECULAR AND CELLULAR PHARMACOLOGY
II. *Curriculum:* PHARMACOLOGY, TOXICOLOGY AND THERAPEUTICS
20. LINGUISTIC, PHILOLOGICAL AND LITERARY SCIENCES
21. MATHEMATICAL SCIENCES
I. *Curriculum:* MATHEMATICS
II. *Curriculum:* COMPUTATIONAL MATHEMATICS
III. *Curriculum:* COMPUTER SCIENCES
22. MEDICAL, CLINICAL AND EXPERIMENTAL SCIENCES
I. *Curriculum:* HEPATHOLOGY AND HEPATOBILIARY AND TRANSPLANT SURGERY AND TRANSPLANTATION
II. *Curriculum:* CLINICAL METHODOLOGY, ENDOCRINOLOGICAL, DIABETOLOGICAL AND NEPHROLOGICAL SCIENCES
III. Curriculum: NEUROSCIENCES
IV. Curriculum: CARDIOVASCULAR SCIENCES
V. Curriculum: GERIATRIC, HAEMATOLOGICAL SCIENCES AND PHYSIOPATHOLOGY
VI. Curriculum: RHEUMATOLOGICAL SCIENCES
23. MOLECULAR SCIENCES
I. *Curriculum:* CHEMICAL SCIENCES
II. *Curriculum:* PHARMACEUTICAL SCIENCES
24. PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES
25. PSYCHOLOGICAL SCIENCES
26. SOCIAL SCIENCES: INTERACTIONS, COMMUNICATION, CULTURAL CONSTRUCTIONS
27. STATISTICAL SCIENCES

28. 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)
29. VETERINARY SCIENCES
30. HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE
31. LAND, ENVIRONMENT, RESOURCES AND HEALTH

INTERNATIONAL DOCTORAL COURSES

1. ARTERIAL HYPERTENSION AND VASCULAR BIOLOGY
2. FUSION SCIENCE AND ENGINEERING

GUIDELINES ABOUT DOCTORAL SCHOOL AND INTERNATIONAL DOCTORAL COURSE 28TH SERIES - ACADEMIC YEAR 2012/2013

DOCTORAL SCHOOL: ASTRONOMY

website:http://dipastro.pd.astro.it/dottorandi/dottorandi.html
contact person: giampaolo.piotto@unipd.it

Padova hosts Italy's largest Astronomical research community. Between the Department of Astronomy and the nearby Astronomical Observatory there are more than 60 staff researchers, 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 (78%) 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.

DOCTORAL SCHOOL: BIOMEDICINE

website : http://www.imbm.unipd.it/on-line/Home/Offertadidattica/DottoratidiRicerca/articolo12001818.html
contact person: giorgio.palu@unipd.it

The School offers a strong interdisciplinary research program and is organized in two curricula: Molecular Medicine and Regenerative Medicine. 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

DOCTORAL SCHOOL: BIOSCIENCES AND BIOTECHNOLOGY

website : http://www.bbpd.eu
contact person: giuseppe.zanotti@unipd.it

The PhD School in "Biosciences and Biotechnology" is organized in six curricula: Biochemistry and Biophysics, Biotechnology, Cell Biology, Genetics and Molecular Biology of Development, Evolutionary Biology, Neurobiology.

- The curriculum in Biochemistry and Biophysics focuses on proteins, which are investigated in terms of structure, modulation of gene expression and function. In particular: signal transduction pathways; role of protein phosphorylation; homeostasis of intracellular Ca2+; mitochondrial dysfunction and myocardial ischemia; biochemistry and biophysics of photosynthetic processes; Bioinformatics.
- Reflecting its interdisciplinary character, the Biotechnology curriculum includes animal, vegetal, microbial and agro-alimentary biotechnologies; pharmaceutical and protein's biotechnology; molecular physiology, structural and computational biology.
- Main topics of the Cell Biology curriculum are: the mechanisms of signal transduction; membrane trafficking; structure and function of intracellular organelles; mitochondrial physiopathology and its influence on apoptosis; the host-pathogen interaction.
- The curriculum Genetics and Molecular Biology of Development focuses on the study of the genetic and molecular mechanisms of embryonic development and cell differentiation in normal and pathological conditions; mono- and multigenic human diseases; circadian biological clocks. These studies are carried out using different *in vitro* and *in vivo* systems, including drosophila, zebrafish and mouse.
- The curriculum Evolutionary Biology includes evolutionary ecology (including animal behavior); plant and animal physiology; evo-devo in invertebrates, molecular evolution of fruit development, sexual selection and sperm competition, population genetics and molecular systematics and phylogeny.
- The main topics of the Neurobiology curriculum are: the physiopathology of neuronal ion channels and of the interaction neuron-glia; the molecular mechanisms of migraine and epilepsy; the alterations of Ca2+ homeostasis in neurodegenerative diseases; the neurobiology of the auditory, vestibular and olfactory systems; the muscle physiopathology, in particular the nerve-muscle interactions and the signalling pathways controlling muscular mass.

Some of the researches are carried out in collaboration with the Venetian Institute of Molecular Medicine (VIMM, http://www.vimm.it), the Centre for Innovative Biotechnologies (CRIBI, http://www.cribi.unipd.it) and Novartis Vaccine, Siena, Italy

DOCTORAL SCHOOL: INTERNATIONAL LAW AND PRIVATE AND LABOUR LAW

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

The school embraces an interdisciplinary perspective, by integrating international law, private Italian and European law, as well as labour law and private comparative law. It aims at training researchers in the following domains:

- Private law, not only considered in the optical of the Italian legal system, but also in comparison with the other European legal systems and in the perspective of their uniformation
- Labour law and union law in the Italian system, in comparison with the other European legal systems and the international law.
- International private and public law and European Union law also in the perspective of their historical evolution.

DOCTORAL SCHOOL: PHILOSOPHY

website: http://www.filosofia.unipd.it/post-lauream/scuola-dottorato
contact person: g.fiaschi@unipd.it

Research lines:

The Doctoral School in Philosophy includes three PhD paths:

1. "Philosophy and History of the Ideas"

   Main research lines:

   a. Aristotle and the Aristotelianism in the antiquity, Patristics, in the Middle Ages Arab, Byzantine and Latin.
   b. Critical medieval text edition.
   c. The problem of the soul in the patristic and medieval thought.
   d. History of the philosophical historiography.
   e. Modern and contemporary figures and problems of the thought.
   f. Origins and developments of the contemporary anthropology.

2. "Political Philosophy and History of Political Thought" -

   Main research lines:

   a. The problem of modern political subjectivity (identity and conflict, thought of difference, political belonging between centralism and federalism, multiculturalism and religious difference, communication and participation in contemporary democracy)
   b. The main political concepts of the modern age: their genesis, logic and modifications (reason of the State, modern political Aristotelianism, Modern School of Natural Law, political utopianism, German classical philosophy, crisis of sovereignty and federalism).

3. "Theoretical and practical philosophy" -

   Main research lines:

   a. Theoretical philosophy, with a specific regard on the structure of the scientific knowledge, the religious, and the artistic experience. Moreover, this issue will be especially addressed with respect to the German classical philosophy;
   b. Moral philosophy and applied ethics, with respect to the social ethics and bioethics;
   c. Logic, philosophy of language and philosophy of science.

DOCTORAL SCHOOL: PHYSICS

website: http://www.fisica.unipd.it/~dott/dottorato.html
contact person: andrea.vitturi@unipd.it

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@od.infn.it)
- Subnuclear physics (contact: Ugo Gasparini, ugasparini@pd.infn.it)
- Astrorparticle physics (contact: Antonio Saggion, saggion@pd.infn.it)
- Condensed matter (contact: Filippo Romanato, filippo.romanato@unipd.it)
- Biological physics (contact: Amos Maritan, maritan@pd.infn.it)

For further details on the research lines at the Department of Physics cf.
http://www.fisica.unipd.it/index.php?id=ricerca&L=2

DOCTORAL SCHOOL: LAW

website: http://www.giuri.unipd.it/~dottorato/
contact person: roberto.kostoris@unipd.it

The PhD School project is designed to have a joint programme for the first year of each cycle, represented by modules of legal topics, aiming to open the scientific and cultural horizons of the young people who are facing for the first time the world of research. At a second stage, and accordingly to the branches defined by the disciplinary scientific fields, specific programmes will be elaborated by each candidate, aiming to supply the educational process with a specialised significance, always promoting, besides that, the interdisciplinary values, and national and international participation to scientific cooperation networks.

The School is articulated in several research areas, which are coordinated with the aim of developing an educational plan for the scientific and professional preparation of a jurist, who, acquiring a method and field knowledge, knows how to critically penetrate every aspect of the many-sided juridical experience, without moreover neglecting the particular focus on the topics concerning the disciplines in which he/she will write his/her doctoral thesis, topics which will be more congenial to him/her with the aim to assure the possibility of spending the title within the entire professional marketplace, in addition to the usual academic career.

DOCTORAL SCHOOL: INFORMATION ENGINEERING

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

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/wdyn/index.php?lingua=en&IDsezione=3299

DOCTORAL SCHOOL: MANAGEMENT ENGINEERING AND REAL ESTATE APPRAISAL

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

The Doctoral School in Management Engineering and Real Estate Appraisal includes two PhD curricula: “Management and Engineering” and “Real Estate Appraisal and Land 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” curriculum. 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 Appraisal and Land Economics” curriculum. 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

DOCTORAL SCHOOL: INDUSTRIAL ENGINEERING

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

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, Materials and Mechanical Engineering:

- Chemical reaction and process systems engineering
- Processes and plants for the production of alternative fuels
- Safety and risk analysis engineering
- Biological chemical engineering, particle technology
- Specialty chemical syntheses with reference to fluorinated compounds
- Environmental chemical engineering
- Polymer chemical engineering
- Metallurgical engineering
- Structural and functional ceramic nano-composites
- Multifunctional porous ceramics
- Environmentally sustainable ceramics
- Polymer processing engineering,
- Net-shape manufacture and systems
- Precision engineering
- Micro- and nano-manufacturing engineering
- Industrial geometrical metrology
- Mechanics of biological tissues, analysis and manufacturing of biomedical systems
- Mechanics of two-wheeled vehicles
- Motorcycle riding simulators
- Structural integrity
- Measurement and identification of mechanical systems
- Development of light vehicles for sustainable mobility

Curriculum in Energy Engineering:

- Thermo-fluid dynamics of single and two phase systems
- Energy saving in refrigeration and industrial processes
- Solar energy conversion
- Environmental control and building physics
- Fluid machines
- Internal combustion engines

- Air propulsion
- Electrical machines and drives - industrial automation
- Electric power systems and high voltage technologies
- Electrotechnics and electrical technologies
- Photometry and lighting engineering
- Controlled thermonuclear fusion

DOCTORAL SCHOOL: MECHATRONICS AND PRODUCT INNOVATION ENGINEERING

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

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

DOCTORAL SCHOOL: DEVELOPMENTAL MEDICINE AND HEALTH PLANNING SCIENCES

website: http://www.pediatria.unipd.it/on-line/Home.html
contact person: giuseppe.basso@unipd.it
giovanni.dagata@unipd.it

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.

- Pediatric and Experimental Surgery

  This area studies the major pediatric diseases of surgical interest to allow for advances in both the introduction and use of new, innovative technologies to achieve the highest possibile standard of results. For most pediatric pathologies surgery approaches are complex and multidisciplinary in nature, thus it is extremely vital to use the procedural

knowledge to provide tools that allow for the valorization of the general knowledge and to favour innovative research even through results application in applied basic research.

- Prenatal diagnosis of fetal abnormalities and high risk pregnancies as well as neonatology follow up.
- Health planning Models/systems 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.

DOCTORAL SCHOOL: ONCOLOGY AND SURGICAL ONCOLOGY

website: http://www.dsoc.medicina.unipd.it/on-line/Home/OffertaDidattica/Dottorato.html#DottoratoENG
contact person: paola.zanovello@unipd.it
dm.dagostino@unipd.it

Research lines:

- Molecular oncology and histopathology
- Bioinformatics
- Viral oncology
- Tumor immunology
- Genetic predisposition to cancer
- Gene therapy of cancer
- Onco-hematology
- Tumor surgery and loco-regional treatments
- Tumors of urogenital tract

DOCTORAL SCHOOL: MATERIALS ENGINEERING AND SCIENCE

website: http://www.chimica.unipd.it/index.php?lang=eng&context=336
contact person: gaetano.granozzi@unipd.it

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

DOCTORAL SCHOOL: ANIMAL AND FOOD SCIENCE

website: http://www.dsa.unipd.it/dottorato/index_en.html
contact person: martino.cassandro@unipd.it

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.

DOCTORAL SCHOOL: CIVIL AND ENVIRONMENTAL ENGINEERING SCIENCES

website: http://www.image.unipd.it/scuola_dottorato/
contact person: stefano.lanzoni@unipd.it

Research lines:

- Fluid mechanics and hydrodynamics
- Fluvial morphodynamics
- Surface hydrology
- Transport of pollutants within surface and subsurface water bodies
- Reclamation of contaminated sites. Solid waste management
- Slope stability
- Environmental geomechanics
- Structural mechanics and engineering
- Computational mechanics
- Dynamics of water-limited vegetation
- Self-organizatrion and networks in nature
- Advanced numerical methods
- Theory and applications of finite-element methods
- Subsurface hydrology
- Ecogeomorphology
- Statistical hydrology and mechanics

DOCTORAL SCHOOL: EARTH SCIENCES

website: http://www.geoscienze.unipd.it/dottorato/home
contact person: massimiliano.zattin@unipd.it

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.

DOCTORAL SCHOOL: CROP SCIENCE

website: http://www.sciproveg.com/eng/
contact person: angelo.ramina@unipd.it

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

DOCTORAL SCHOOL: PHARMACOLOGICAL SCIENCES

website: http://www.dfem.unipd.it/PostLauream/postlaureamA.htm
contact person: pietro.giusti@unipd.it

Research lines:

- Pharmacokinetics, dynamics and therapeutic applications of natural, synthetic and biotechnological products
- Mechanisms of adverse reactions to drugs and toxic compounds
- Preclinical and clinical drug evaluation
- New approaches to disease treatment
- Critical care therapy
- Pharmacovigilance for the appropriate use of drugs
- Cardiovascular, gastrointestinal, respiratory and endocrine pharmacology
- Neuropsycopharmacology
- Immunopharmacology
- Antibiotics and cancer chemotherapy
- Pharmacogenetics and pharmacogenomics
- Toxicology
- Mutagenesis and cytotoxicity
- Clinical pharmacology
- Therapeutic drug monitoring
- Pharmacoepidemiology
- Pharmacoeconomics
- Intensive neurological, respiratory and cardiocirculatory therapy
- Cell therapy
- Neuropathic pain molecular targets

DOCTORAL SCHOOL: LINGUISTIC, PHILOLOGICAL AND LITERARY SCIENCES

website: http://www.maldura.unipd.it/dottorato/
contact person: paola.bagante@unipd.it

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.

DOCTORAL SCHOOL: MATHEMATICAL SCIENCES

website: http://dottorato.math.unipd.it/
contact person: daipra@math.unipd.it

The School focuses on the following fields of research:

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

DOCTORAL SCHOOL: MEDICAL, CLINICAL AND EXPERIMENTAL SCIENCES

website: http://www.dimedia.unipd.it/index.php?page=dottorati-2
contact person: gaetano.thiene@unipd.it

The Medical, Clinical and Experimental Sciences Doctoral School aims to train Research Doctors in the biomedical sphere. 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 Surgery and in the various specialized branches to apply 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 Research Doctor will be capable of designing experimental protocols, of directing research projects and of treating patients with the rigor of the experimental method. The doctoral School in Medical, Clinical and Experimental Sciences is organized in 6 courses:

- Hepatology and Hepatobiliary Surgery and Transplantation;
- Clinical Methodology, Endocrinological, Diabetological and Nephrological Sciences;
- Neurosciences;
- Cardiovascular Sciences; Geriatric,
- Haematological Sciences and Physiopathology;
- Rheumatological Sciences.

DOCTORAL SCHOOL: MOLECULAR SCIENCES

Website: http://www.chimica.unipd.it
Contact person: antonino.polimeno@unipd.it
daniela.longo@unipd.it

Research lines:

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

DOCTORAL SCHOOL: PEDAGOGICAL, EDUCATIONAL AND INSTRUCTIONAL SCIENCES

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

The Doctoral School has three research areas composed by specific arguments. The research areas are the following:

- Educational and training sciences.

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

- Instructional sciences 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 learner-centred teaching and significant learning; 3) general teaching methodology, subject teaching methodologies and interdisciplinary approaches, 4) class and group dynamics, considering interactions, communication strategies and techniques involved in the creation and management of "learning communities"; 5) the study and definition of teaching methodologies and tools suitable for a modular perspective, towards an integration of diversity in its multiplicity of forms and features.

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-centred" to a "human-centred" 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).

- 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, 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 organisations.

DOCTORAL SCHOOL: PSYCHOLOGICAL SCIENCES

website: http://scuoladott.psy.unipd.it/index.php?l=eng
contact person: clara.casco@unipd.it

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 perception, comprehension, 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

DOCTORAL SCHOOL: SOCIAL SCIENCES: INTERACTIONS, COMMUNICATION, CULTURAL CONSTRUCTIONS

website: http://www.sociologia.unipd.it/
contact person: franca.bimbi@unipd.it
alberta.contarello@unipd.it
marco.sambin@unipd.it

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

DOCTORAL SCHOOL: STATISTICAL SCIENCES

website: http://www.stat.unipd.it/phd
contact person: monica.chiogna@unipd.it
dottorato@stat.unipd.it

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.

DOCTORAL SCHOOL: SPACE SCIENCES, TECHNOLOGIES AND MEASUREMENTS

website: http://cisas.unipd.it/didactics/STS_school/WEB/phd_course.php
contact person: giampiero.naletto@unipd.it

The School is divided in two Curricula :

Sciences and Technologies for Aeronautics and Satellite Applications - STASA

- Solar system exploration and observations of the Universe
- Space systems
- Satellite navigation
- Optics and space Instrumentation
- Analysis of space missions for astronomy and earth observations

Mechanical Measurements for Engineering and Space - MMIS

- Diagnostics and reliability of mechanisms and structures
- Innovative methods for measurements in fluids
- Innovative methods for mechanical and thermal measurements
- Measurements and instrumentations in aerospace engineering
- Methods of biomedical measurements

DOCTORAL SCHOOL: VETERINARY SCIENCES

website: http://www.dottorato.veterinaria.unipd.it/index.php?lang=en
contact person: gianfranco.gabai@unipd.it

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 cells), 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 (CIRSOV), and learn about the methodologies and the scientific principles necessary for research and study in different fields of clinical veterinary science.

DOCTORAL SCHOOL: HISTORY, CRITICISM AND PRESERVATION OF CULTURAL HERITAGE

website: http://www.beniculturali.unipd.it/cms/
http://www.dottorato-ams.lettere.unipd.it/

contact person: vittoria.romani@unipd.it giovanni.leonardi@unipd.it
rosa.sentito@unipd.it flavia.marcellan@unipd.it

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, from Late Prehistory to Classic Worldcraft 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

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

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

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

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

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

INTERNATIONAL COURSE: ARTERIAL HYPERTENSION AND VASCULAR BIOLOGY

website http://www.dmcs.unipd.it/on-line/Home/Didattica/Dottorato/articolo7002304.html
contact person: teresamaria.seccia@unipd.it

The International PhD program in Arterial Hypertension and Vascular Biology is based in the Department of Clinical and Experimental Medicine (DMCS)-Internal Medicine 4 of the University of Padova. This is a referral centre for Arterial Hypertension and cardiovascular diseases in Italy and a Centre of Excellence for Hypertension Research of the European Society of Hypertension. This program is the first in Europe devoted to Hypertension research and was established in conjunction with the Medical Academy of Gdansk, Poland. It requires a rotation across the two Universities and possibly stages at other leading research centres in Europe and the US.

Upon completion of the 3 years course it confers a PhD degree, which is officially recognized in both Countries.

Aim and Organizational Framework

The overall aim of the course is to develop PhD students' knowledge in order to enable the to gradually undertake independent research in the cardiovascular field by enhancing their laboratory skilful facing innovative technologies.

After being introduced to a wide array of inter-disciplinary and comprehensive cardiovascular disease programs, each PhD student will be gradually educated to cutting-edge instrumentation, methods and technologies. Thus, he/she will be assigned a specific research project in the field of Arterial Hypertension and Vascular Biology under the strict supervision of an experienced tutor.

The program also includes regular seminars on themes of basic and clinical research, clinical care devoted to cardiovascular health, and regular journal clubs and reviews of ongoing research projects in the different laboratories participating to the PhD Program.

The PhD student is required to actively participate in research teams and to spend stage at the member University of Gdansk or another leading research centre in Europe or US for a minimum of 6 months.

PhD students will benefit from the inter-departmental collaboration with Anatomy, Pharmacology, Vascular Surgery and Endocrinology Units, which share their core facilities and expertise in tissue and intracellular protein localization, morphologic and morphometric techniques and tissue transplant in animal models. Moreover, PhD students referring to Padua and Gdansk mutually benefit from the integrative and research collaborations between the Universities.

The PhD entails specific commitment and training in the following areas:

1. Experimental research

- Vascular biology with emphasis on the role of the endothelium and endothelial dysfunction and on its role in the control of vascular tone;
- Pathophysiology of salt and water homeostasis;
- Endocrine control of blood pressure;
- Methodologies of molecular analysis;
- Experimental atherosclerosis;
- Models of arterial hypertension;
- Experimental and molecular pharmacology;
- Principles of pharmacokinetics and pharmacodynamics applied to arterial hypertension.

2. Clinical research.

- Epidemiology and statistics applied to hypertension;
- Principles of pharmacoeconomics applied to hypertension;
- Methodologies for assessment of target organ damage in hypertension;
- Pathophysiology of the secondary forms of hypertension;
- Guidelines for risk stratification and treatment;
- Design and planning of clinical trials in hypertension.

To date the PhD Program has been extremely successful in reaching these goals as testified not only by an impressive list of publications of the most prestigious journals in the field of Hypertension but also by the swift (immediately after and sometimes even before graduation) appointment of practically all the PhD students in industries and academic or hospital positions of the past years.

INTERNATIONAL COURSE: FUSION SCIENCE AND ENGINEERING

website: http://www.igi.pd.cnr.it/education/eudoctorate.html
contact person: piero.martin@unipd.it
fiorella.colautti@igi.cnr.it

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.