



DECRETO RETTORALE N. 6384

Bando di concorso per l'ammissione a n. 6 posti per il corso di Dottorato internazionale
in Science presso l'Università Cattolica del Sacro Cuore
ciclo XXXVI – sede di Brescia

IL RETTORE

- Visto lo Statuto dell'Università Cattolica del Sacro Cuore, emanato con decreto rettorale 24 ottobre 1996, e successive modifiche e integrazioni;
- visto il regolamento generale di Ateneo dell'Università Cattolica del Sacro Cuore, emanato con decreto rettorale 26 ottobre 1999, e successive modifiche e integrazioni;
- vista la legge 5 febbraio 1992, n. 104;
- visto il d.p.r. 9 maggio 1994, n. 487;
- visto il d.m. 22 ottobre 2004, n. 270;
- vista la legge 30 dicembre 2010, n. 240, in particolare l'art. 19;
- visto il decreto ministeriale n. 45 dell'8 febbraio 2013;
- viste le note del Ministero dell'Università e della Ricerca, prot. n. 7757 e 8034, rispettivamente dell'11 marzo e del 16 marzo 2020 aventi ad oggetto le Indicazioni operative sulle procedure di accreditamento dei Dottorati A.A 2020/21 – XXXVI ciclo;
- viste le procedure per l'ingresso, il soggiorno e l'immatricolazione degli studenti stranieri/internazionali ai corsi di formazione superiore in Italia per l'anno accademico 2019-2020, dettate dalla Direzione generale per lo studente, lo sviluppo e l'internazionalizzazione della formazione superiore;
- visto il Regolamento UE 2016/679 in materia di protezione dei dati personali (*General Data Protection Regulation*), pubblicato sulla Gazzetta Ufficiale Europea del 4 maggio 2016;
- visto l'accordo per il corso di Dottorato internazionale in *Science* tra l'Università Cattolica del Sacro Cuore, la Katholieke Universiteit Leuven (Belgium), la Pontificia Universidad Católica de Chile Santiago (Chile) e l'University of Notre Dame du Lac - Notre Dame, Indiana (USA), datato 12 maggio 2016;
- visto il proprio decreto n. 3627 del 12 luglio 2017, recante: «Modifiche al “Regolamento dei corsi di dottorato di ricerca e delle scuole di dottorato di ricerca dell'Università Cattolica del Sacro Cuore”»;
- visto il proprio decreto n. 5784 del 23 ottobre 2019, recante: «Modifiche al “Codice etico dell'Università Cattolica del Sacro Cuore”»;



- vista la delibera adottata dal Senato accademico, nell'adunanza dell'11 maggio 2020;
- vista la relazione del Nucleo di Valutazione d'Ateneo del 22 maggio 2020 relativa alla "Verifica dei requisiti di idoneità per l'istituzione del XXXVI ciclo dei Corsi di Dottorato";
- vista la delibera adottata dal Consiglio di amministrazione, nell'adunanza del 27 maggio 2020;
- valutata l'opportunità di avviare le procedure selettive sotto condizione dell'accREDITamento e della verifica di mantenimento dei requisiti di accREDITamento da parte di ANVUR,

DECRETA

Art. 1

L'attivazione del corso di Dottorato Internazionale in *Science* – XXXVI ciclo, con sede amministrativa presso l'Università Cattolica del Sacro Cuore in accordo con la Katholieke Universiteit Leuven (Belgium), la Pontificia Universidad Católica de Chile Santiago (Chile) e l'University of Notre Dame du Lac - Notre Dame, Indiana (USA), secondo le disposizioni contenute nel documento allegato - in lingua inglese (*allegato 1*), quale parte integrante del presente decreto.

Art. 2

La nomina dei membri del collegio dei docenti del corso di Dottorato di cui all'art. 1, i cui nominativi sono riportati in *allegato 2*, quale parte integrante del presente decreto.

Milano, 28 maggio 2020

IL RETTORE
(Prof. Franco Anelli)
F.to: F. Anelli

IL DIRETTORE AMMINISTRATIVO
(Dott. Paolo Nusiner)
F.to: P. Nusiner

Per copia conforme all'originale.

IL FUNZIONARIO DELEGATO
(Romolo De Angelis)

Public Call for Admission to 6 positions in the International PhD in Science at Università Cattolica del Sacro Cuore - XXXVI Cycle

Art. 1

Opening

This Call indicates the Coordinator, the partner universities, the duration of the course, the number of positions available and the number of scholarships granted by the partner Universities of the International PhD in Science.

International PhD in Science

Coordinator: Prof. Prashant V. KAMAT - University of Notre Dame du Lac, Indiana (United States of America).

Duration: 4 years.

Positions: 6.

Funded positions: 5.

Unfunded positions: 1.

Information: <https://dottorati.unicatt.it/science>

Details of the positions (see also <https://dottorati.unicatt.it/science>):

nr. 1 scholarship (joint research project between Università Cattolica del Sacro Cuore, Università degli Studi Roma 'La Sapienza' and University of Notre Dame du Lac, Indiana - USA) on "Tailoring conductive paths in novel plasmonic/electronic devices".

Research topic: The frontier of electronics is the construction of neuromorphic circuits, i.e. a neural hardware mimicking the procedure used by human brains to process data. The main features of neuromorphic hardware should be: parallel multichannel operations, signal processing via comparison of input data with a specific activation functions and memorization of information until an erasing signal is applied. Substitution Traditional electronics to provide a faster data transfer and processing has been sometime provided by photonics. However, hybrid technologies, as for example plasmonic circuits, might represent a crossover point exploiting the advantages that each solution offers. In this context, the switching can be obtained by varying the absorption and scattering loss of a plasmonic mode within a specific insulator layer. Hence the material composing the layer play a fundamental role in determining the behavior of the optoelectronic device, in particular by controlling the conductivity and the switching performances. The present PhD program will investigate plasmonic devices (based on the propagation of Surface Plasmon Polariton quasiparticles) that might be applied as neuromorphic circuits. More specifically, the program will investigate novel materials and geometries to realize plasmonic memristors (re-writable memories based on resistive properties). The novel plasmonic memristors will be the basic elements to realize hybrid optic and electronic

neuromorphic circuits.

The project requires a student who focuses his activity on the design, construction and characterization of innovative multilayer plasmonic circuits. This will involve simulations of light propagation in nonlinear regime and of plasmonic propagation using both finite difference calculation codes and in COMSOL language. Moreover, the student will synthesize and characterize thin film and nanogranular materials for realization of the novel prototypes, which will be tested in the laboratory.

Candidate Profile:

- Master's degree or similar qualification in Physics, Materials Science, Electronics or adjacent fields. The title must be obtained by October 31st, 2020.
- A solid background in physics or materials science is required.
- Experience in optics, laboratory skills, nonlinear propagation simulation will be considered as an advantage. Programming skills with the finite-element algorithms are also desired.
- A good knowledge of the English language, both spoken and written, is essential.
- Strong commitment, ability to work in a team, and eager for international mobility are desired.

Opportunities:

- Experimental research participating to the international collaboration between research groups USA and Italy. Double degree opportunity.

Contacts:

Prof. Luca Gavioli, Università Cattolica del Sacro Cuore;

Prof. Eugenio Fazio, Università degli Studi di Roma 'La Sapienza';

Prof. Christopher L. Hinkle, University of Notre Dame du Lac, Indiana (USA).

nr. 1 scholarship (joint research project between Università Cattolica del Sacro Cuore, KU Leuven and Istituto per la Microelettronica e Microsistemi (IMM) – Consiglio Nazionale delle Ricerche - CNR) on “2D transition metal dichalcogenides: CVD synthesis, electrical and optical characterization”, funded by Università Cattolica del Sacro Cuore – MIUR PRIN 2017, prot. 2017RKWTMY_003, CUP J54I19001340008, Attosecond transient absorption and reflectivity for the study of exotic materials, aSTAR

Research topic: 2D transition metal dichalcogenides (TMDs) hold great potential for application in different fields, in particular in nanoelectronics and photonics. In nanoelectronics, large energy dissipation due to heating in chips is unsustainable in terms of both costs and performance drop and 2D TMDs hold great potential to alleviate these problems. In photonics, the integration of 2D TMDs is predicted to enhance the energy harvesting. Towards such applications, it is crucial to develop a controlled, engineered, synthesis at large scale of such materials with high uniformity and to investigate their electronic/optical/thermal dynamics. Among the TMDs, MoS₂ and MoTe₂ are the most attractive materials to be investigated.

In this context our research project targets 2 main goals and some key aspects as follows:

- 1) Establish standard growth protocols for the chemical vapor deposition (CVD) synthesis of 2D

TMDs at large scale on bulk flat and ad-hoc patterned substrates (i.e. SiO₂/Si, Si₃N₄/Si).

1.1 develop a scheme of a fabrication compatible with a process transferrable to the wafer scale;
1.2 study the electrical and optical response of such structures in proto-devices (internal photoemission, electron transport, absorbance, photoluminescence, photoconductivity).

1.3 explore transfer methods as key enabling technology for TMD integration to Si CMOS platform.

2) Develop time-resolved high resolution optical microscopy methods to investigate the electronic and thermo-mechanical aspects of 2D TMDs deposited on a bulk substrate.

2.1 fast optical surface mapping in various environments (i.e. air and liquids) by microsphere assisted optical microscopy to get sensitivity to the few atomic layers constituting the surface termination;

2.2 thermo-mechanical characteristics of the film-substrate adhesion and its uniformity (by optical techniques and dynamic AFM);

2.3 investigation of the electronic and thermo-mechanical response of patterned surfaces.

Candidate Profile:

- Master's degree or comparable qualification in Physics, Materials Science, Materials Engineering, Electronic Engineering or adjacent fields. The title must be obtained by October 31st, 2020.
- Candidates should have a solid background in optics and/or materials science, and a strong interest for multidisciplinary research.
- experience in the growth of 2D transition metal dichalcogenides by chemical vapor deposition and their characterization using Raman spectroscopy, scanning electron microscopy and electrical methods (C-V, I-V, Internal photoemission) and/or in microscopy and/or ultrafast optics will be considered as an additional advantage.
- A good knowledge of the English language, both spoken and written, is essential.
- Strong commitment, ability to work in a team, and eager for international mobility are desired.

Opportunities:

- Participating to an international collaboration among Università Cattolica del Sacro Cuore, Institute of Microelectronics and Microsystems (IMM-CNR) and KU-Leuven (Belgium).
- Double degree opportunity.

Contacts:

Prof. Gabriele Ferrini, Università Cattolica del Sacro Cuore;

Dr. Alessio Lamperti, IMM-CNR Consiglio Nazionale delle

Ricerche;/alamperti/Desktop/ASSEGNO PROF/PhD UniCatt-

KULeuven/alessio.lamperti@mdm.imm.cnr.it

Prof. Valeri Afanasiev, KU-Leuven;

Prof. Christ Glorieux, KU Leuven.

nr. 2 scholarships (joint research project between Università Cattolica del Sacro Cuore and KU Leuven) on "Coherent Control of Quantum Materials":

- of which n. 1 scholarship funded by Università Cattolica del Sacro Cuore – MIUR PRIN 2017, prot. 20172H2SC4_005, CUP J54I19001350008, Engineering coherent transport of atoms and electrons in layered structures CEnTraL.

Research topic: Controlling electronic quantum coherence in solids at ambient conditions is a long sought-after target in condensed matter physics. Quantum pathways could be exploited to coherently convert photons into charge excitations, to manipulate electronic phase transitions for quantum and neuromorphic computing, to control and store quantum information. Unfortunately, the quantum-coherent nature of electronic excitations in materials is usually lost on extremely fast timescales (few femtoseconds), as a consequence of the interactions with the incoherent fluctuations of the environment.

The ultimate goal of this project is to investigate strategies to achieve the coherent optical control of the macroscopic properties of technologically relevant quantum materials.

More specifically, the project will develop along the following lines:

As a first step, we will develop an ultrafast experiment, based on the combination of a suitable number of phase coherent ultrashort optical pulses, to selectively excite solids. Particular effort will be dedicated to synthesize light pulses as short as 10 femtoseconds, via a non-collinear optical parametric amplifier (collaboration with Prof. Giulio Cerullo, Politecnico di Milano). In parallel, we will develop suitable theoretical modeling to treat quantum dynamics on ultrafast timescales and in interacting environments.

As a second step, we will investigate the electronic decoherence dynamics in various correlated materials, such as LaVO₃ and V₂O₃, which represent paradigmatic examples of correlation-driven Mott insulators. By combining the experimental and theoretical outcomes, we will address the possibility of enhancing the decoherence time by tuning the temperature, strain, excitation protocols and chemistry of the systems. We will also investigate the possibility of coherently manipulate the photoinduced insulator-to-metal transition in V₂O₃ and, possibly, to coherently control phase transition in other systems (e.g. superconductivity in copper oxides).

Within the present project, two positions (1 mainly experimental and 1 mainly theoretical) are available. While on the experimental side the candidate is expected to acquire, during his/her PhD studies, the knowledge in the field of ultrafast and material science necessary to successfully fulfill the main goals, from the theoretical side her/his study will be focused on the development of mathematical many-body models for describing the coherent dynamics of correlated materials and on their analytical/numerical solving procedure. Depending on the expertise of the applicants, possible combinations of the theoretical and experimental tasks can be considered.

The candidate will join the joint activities of internationally recognized experimental groups in the field of ultrafast spectroscopies (experiments, UCSC), open quantum (theory, UCSC and KULeuven), oxide synthesis (experiments, KULeuven) and will interact with external theoretical (e.g. Prof. M. Capone SISSA Trieste; Hubbard model, DFT) and experimental groups (e.g. Prof. G. Cerullo Politecnico di Milano; ultrafast experiments) collaborating to this project.

Candidate Profile:

- General requirements:

Diploma: Master's degree or comparable qualification in Physics, Materials Science, Electronic engineering or adjacent fields. The title must be obtained by October 31st, 2020.

A strong interest for multidisciplinary research is required.

A solid background in solid state physics, optics, quantum mechanics and statistical physics is recommended.

A good knowledge of the English language, both spoken and written, is essential.

Strong commitment, ability to work in a team, and eager for international mobility.

- Specific requirements:
 - For the experimental position: experience in ultrafast science, laser physics, pump-probe techniques, data analysis and numerical programming (LabView, Matlab, C, Python, Fortran) will be considered as an advantage;
 - For the theoretical position: experience in quantum many-body theory, numerical simulation of many-body systems and open quantum systems will be considered as an advantage.

Opportunities:

The opportunity to perform experimental research in an interdisciplinary research environment and actively participate in the international collaboration among research groups in Italy and Belgium, with the aim of achieving a doctorate diploma under the joint supervision by KU Leuven and UCSC. The overall tutoring activity will be conducted by staff members at UCSC and KU Leuven. At the end of the program you will be awarded a degree from both UCSC and KULeuven (double-degree),

The opportunity to gain teaching experience by being involved in teaching duties for a limited amount of time (e.g., co-supervising Bachelor and Master students during their experiments and research).

Contacts:

Prof. Claudio Giannetti, Università Cattolica del Sacro Cuore;

Prof. Fausto Borgonovi, Università Cattolica del Sacro Cuore;

Prof. Jean Pierre Locquet, KULeuven;

Prof. Wojciech De Roeck, KULeuven.

nr. 1 scholarship (joint research project between Università Cattolica del Sacro Cuore and KU Leuven) on “Achieving quantum coherence in organic solar cells”.

Research topic: Access to and control of the quantum-coherence of a system is emerging as a promising strategy for the realization of devices with disruptive properties and unprecedented efficiency. For instance, quantum coherence, in organic photovoltaics, could play a crucial role at each step of the photoconversion process. At the excitation stage (1), coherence (superposition) of excitonic states is proposed to amplify processes of multiexciton generation. During the exciton transport (2), energy losses can be minimized if the exciton diffuses on a distance comparable with its coherence (delocalization) length. Finally, if the charge collection

(3) occurs on timescales faster than the electronic decoherence, the charge thermalization is ideally circumvented and the conversion efficiency maximized.

Recently, coherent two-dimensional (2D) optical spectroscopy has been proposed for the measuring of the coherent and dephasing times. However, the interpretation of the spectra typically relies on theoretical modeling that can be highly nontrivial for complex systems. One more versatile solution is offered by interferometric time-resolved multi-photon photoelectron spectroscopy (inter-tr-mPPE). The technique exploits two phase-locked, delayed laser pulses generated in a Mach Zehnder interferometer to record one photoemission spectrum per time delay between two phase-coherent pulses.

The aim of the present project is the realization of an inter-tr-2PPE setup to directly address coherences of an optical excitation and its dephasing in the time and energy domain. To achieve this, we are looking for a highly motivated student to implement the tr-2PPE spectroscopy facility available at the Elphos lab of the Department of Mathematics and Physics (Università Cattolica del Sacro Cuore) with a fully collinear interferometric scheme designed for inter-tr-mPPE experiments. This spectroscopy will be applied, for the first time, to organic systems, based on carbon nanostructures, grown and characterized in KU Leuven laboratories, combined with acene organic molecules where coherence is expected to act both at the excitation time and during the excitation transport on experimentally accessible and technologically promising timescales.

Candidate profile:

Master's degree or similar qualification in Physics, Materials Science, Chemistry or adjacent fields. The title must be obtained by October 31st, 2020.

- A solid background in physics, materials science or materials chemistry is required.
- Experience with femtosecond laser systems and in time resolved spectroscopies (pump-probe set up), and in home-built instrumentation will be considered as an advantage.
- A good knowledge of the English language, both spoken and written, is essential.
- Strong commitment, ability to work in a team, and eager for international mobility is desired.

Opportunities:

- Experimental research participating to the international collaboration between research groups KU Leuven and Italy. Double degree opportunity.

Contacts:

Prof. Stefania Pagliara, Università Cattolica del Sacro Cuore;
Prof. Jin Won Seo, KU Leuven.

nr. 1 position without scholarship promoted by Università Cattolica del Sacro Cuore (joint research project between Università Cattolica del Sacro Cuore and KU Leuven) on: "New Challenges for Teaching and Learning Science in Primary School".

Research topic: A basic understanding of Science is considered mandatory for every modern European citizen. Many international reports identify the lack of human resources, above all women, in key Scientific professions and call for modernising Science teaching in school and

achieving gender balance. The recommendation of the European Parliament and of the Council of December 18th 2006, upgraded in May 2018, focused on key competences for lifelong learning, highlights the Mathematical competence and the basic competences in Science, Technology and Engineering: «Competence in science refers to the ability and willingness to explain the natural world by making use of the body of knowledge and methodology employed, including observation and experimentation, in order to identify questions and to draw evidence-based conclusions. [...] Competence in science, technology and engineering involves an understanding of the changes caused by human activity and responsibility as an individual citizen» [1]. In order to develop these competences, every European State has to carry out different educational policies, plans and practices.

This project concerns an in-depth exploration of Science Education with particular attention to the Primary School context. Major issues are: 1) to provide a mapping of the policies and strategies in place across Europe to improve and foster Science teaching and learning in education systems, starting from the last OCSE-PISA results; 2) to focus on the Italian school system in order to create materials and methods to support Science teachers to raise the motivation of pupils, to increase their interest in the subject, and at the same time, to enhance attainment levels. The project aims to develop scientific ways of thinking through investigation, laboratory, modelling, argumentation, applying information and communication technologies and innovative teaching strategies. We are therefore trying to build in-service teacher education materials that will support primary teachers when faced with teaching of the Science content and method of the National Curriculum and to validate some instruments directly into the classroom. The final aim is to mentor Elementary Science teachers with a systematic, ongoing collaboration with a research group made up by members of KU Leuven and Università Cattolica.

[1] Council of the European Union (2018). Council Recommendation of 22 May 2018 on key competences for lifelong learning (2018/C 189/01). Official Journal of the European Union, C 189/1-13.

Candidate profile:

- Master's degree or similar qualification in Physics, Biology, Chemistry or adjacent fields.
- A solid background in Physics, Biology, Chemistry is required.
- Experience in Science teaching.
- A good knowledge of the English language, both spoken and written, is essential.
- Strong commitment, ability to work in a team, and eager for international mobility is desired.

Opportunities:

Experimental research participating to the international collaboration between research groups in Belgium and Italy. Double degree opportunity.

Contacts:

Prof. Stefania Pagliara, Università Cattolica del Sacro Cuore;
Prof. Mieke De Cock, KU Leuven.

Art. 2

Assessment procedure

The comparative evaluation of candidates applying to the International PhD in Science aims to discern the candidate's aptitude for and interest in the scientific research proposed in the Research Program. The examination panel reserves the right to ask for a telephone or remote interview (such as Skype or similar).

Art. 3

Admission requirements

Application for participation in the competition, with no restrictions with respect to age and nationality, is open to candidates holding a Master's degree, or an Italian university degree obtained under the education system prior to Italian Ministerial Decree no. 509 of November 3rd, 1999 or a second-level university qualification obtained abroad and deemed eligible.

Application for participation is also open to candidates due to obtain one of the above-mentioned qualification by October 31st, 2020. In this case, examination candidates shall provide the Examination Panel with a self-declaration form attesting graduation or a qualification from a foreign university. Failure to do so will be cause for invalidation of the application.

Italian, EU and non-EU candidates that obtained, or will obtain, a qualification abroad, **by October 31st, 2020**, for the sole purpose of admission to the PhD Programme shall request recognition of its eligibility in the PhD Programme application form. To this end, the application shall be accompanied with appropriate documentation to enable the Examination Panel to rule on the request for eligibility.

Art. 4

Application form

Candidates who intend to participate in the competition must submit an application to the Rector of Università Cattolica del Sacro Cuore by **Friday September 30th, 2020**.

The application form is available at <http://dottorati.unicatt.it/concorsi-milano> **until 2 p.m. (local time) on the expiration date of the present public announcement.**

In the application form, to be filled in online only, available in English and just online, candidates shall declare under their responsibility:

- one of the 4 research topics established by Università Cattolica del Sacro Cuore;
- personal information: surname, first name, fiscal code (for Italian nationals only), date and place of birth, citizenship, residence and domicile elected for the purposes of the competition;
- for graduate students: qualification, date it was obtained and name of the conferring university;
- foreign languages known besides English.

Candidates must complete their application with the following documents – upload format .pdf or .jpg:

- a detailed *curriculum vitae et studiorum* written in English;
- self-certified Master's degree document with final mark and exams transcript, or certification of qualification obtained abroad with final mark and exams transcript translated in English. A self-certified translation will be accepted for the purpose of selection;
- certification of any other qualifications, such as postgraduate and advanced specialisation degrees, obtained in Italy and/or abroad; a copy of any other qualification considered useful for the purposes of the comparative evaluation. The documentation as to be translated in English. A self-certified translation will be accepted for the purpose of selection;
- a list of the publications deemed useful for the purposes of the comparative evaluation, and a list thereof on unstamped paper;
- two references letters written in English. The letters shall be sent to the same email address indicated above phd.science@unicatt.it within the date of expiration of the present public announcement;
- for non-native speakers of English, a certificate attesting adequate proficiency in English, such as:
 - FCE;
 - CAE;
 - CPE;
 - BEC
 - *British Chamber of Commerce*;
 - *Trinity College*;
 - TOEFL;
 - IELTS;
 - or certificate of the kind deemed useful to prove proficiency in English;
- an identification document, duly signed;
- fiscal code (for Italian nationals only);
- card-size photograph;
- students with a degree obtained or to be obtained in NON-EU countries shall provide a translation, authentication and a certificate of equivalence of qualification of their foreign degree certificates, issued by the Italian Consulate/Embassy representative offices in the countries where they have obtained/will obtain the degree. EU students must provide a Diploma Supplement from the University where they completed their studies as an alternative to the certificate of equivalence of qualification.

The application will be considered complete and valid only upon payment of the selection fee of € 100,00 (not refundable) to be paid by credit card (VISA or MASTERCARD).

The University reserves the right to adopt measures for the exclusion of candidates who do not have the prerequisites required or did not comply with the indications of the public announcement, also after the competition-related examinations have taken place.

Candidates with disabilities, in order to attend the selection examination, must specify in

their application the aid required in relation to their disability, in accordance with Italian Law no. 104 of February 5th, 1992.

Art. 5

Application at the Partner Universities

Regarding scholarships at the Partner Universities, as mentioned in the Art.1, the recruitment rules for candidates applying for the International Ph.D. in Science will be provided by each institution according to its own procedures.

Art. 6

Examination Panel

The Examination Panel of the comparative evaluation for admission to the PhD Programme in Science is appointed by Rector's Decree for the competition-related examinations.

The Examination Panels will consist of three academics/researchers pertaining respectively to the PhD Research Programme Topic in Differential geometry and applications to modern physics or Topic in Cooperative Effects in quantum systems.

The composition of the Panels will be published, after the expiration date of the present public announcement, at <http://dottorati.unicatt.it/concorsi-milano>

In a preliminary meeting the Examination Panels shall define the criteria for the comparative evaluation necessary for a single merit-based ranking to be drawn up. These criteria will be published, as by law enacted, at <http://dottorati.unicatt.it/concorsi-milano>

Art. 7

Admission to PhD Programmes

Candidates are admitted to the International PhD in Science according to the ranking, until the established number of positions have been filled.

The results of the competition in the form of a single merit-based ranking will be published at <http://dottorati.unicatt.it/concorsi-milano>

Art. 8

Enrolment

Candidates admitted to the PhD must enrol via the Doctoral Studies Office at Università Cattolica del Sacro Cuore - Largo Gemelli 1, 20123 Milan, by sending the following documentation by email:

- the PhD Programme application form (once uploaded this will produce a confirmation email sent to the candidate);
- Personal and Tax data Form.

The documents must be sent within 7 (seven) days of receipt the confirmation e-mail of enrolment at Università Cattolica del Sacro Cuore.

Art. 9

Aid and studentships

Tuition fees for the International PhD in Science at Università Cattolica del Sacro Cuore are set annually by the Board of Directors.

PhD students are required to pay tuition fees annually amounting to € 1,516.00, to be paid in three instalments: the first (of € 516.00) upon enrolment, the second (of € 500.00) by February 28th, and the third (of € 500.00) on June 30th each year.

For the Italian law, a scholarship on the PhD programme is compatible with other income (also earned on a regular basis) in the calendar year of the scholarship, provided that such income does not exceed the scholarship itself. Should these income limits be surpassed, the scholarship shall be revoked for the year in question. Students with scholarships shall annually declare the income and notify of any excess of the prescribed limits.

The scholarships are renewed annually, provided that the PhD students have completed the programme of activities set for the previous year.

The amount of the scholarship, paid in monthly instalments, is € 15.343,28 per year, before social security charges. The scholarship is subject to the payment of social security contributions (INPS separate management) pursuant to Art. 2, Paragraph 26, of Italian Law 335 dated of August 8th, 1995, and subsequent amendments. The scholarship is exempt from local income tax and personal income tax (IRPEF).

The studentship amount shall be increased by max. 50 percent, for a period not over 18 months, if the PhD student is authorised by the Teaching Panel to conduct research abroad.

Starting from the second year, to each PhD student, with or without a studentship, is granted an annual sum covering research activities in Italy and abroad amounting to 10 percent of the annual gross amount of the scholarship, equal to € 1.534,33.

Art. 10

Public employees

Current Italian legislation on leave of absence or special leave applies to public employees admitted to International PhD in Science.

Art. 11

Incompatibility

Attendance of the PhD Programme is not compatible with enrolment in other study programmes, postgraduate schools (except for medical specialisation schools), and other PhD Programmes (except in the case of joint dissertation supervision agreements).

Art. 12

Obligations of PhD students

PhD students are required to take part regularly in the activities set out in their curricula, and to commit to the regulatory norms of their University of enrolment.

Art. 13
Conferment of PhD degree

The procedure of PhD degree conferment is governed by the regulatory norms of the University of enrolment.

Art. 14
Public disclosure

This public announcement is published on the *Euraxess* European website, on the MIUR website and at: <http://dottorati.unicatt.it/concorsi-milano>

Art. 15
Final provisions

For any matter not explicitly contemplated in this public announcement, the provisions indicated in the Regulatory Norms of the University of PhD students' enrolment shall apply.

Head of the procedure of the present selection is Dr Roberto BRAMBILLA, Director of Postgraduate Education and Research Partnership, Via Carducci 28/30, Milan, Italy.

Nomina dei membri del collegio dei docenti del corso di Dottorato internazionale in *Science*, con sede amministrativa presso l'Università Cattolica del Sacro Cuore in accordo con la Katholieke Universiteit Leuven (Belgium), la Pontificia Universidad Católica de Chile Santiago (Chile) e l'University of Notre Dame du Lac - Notre Dame, Indiana (USA), – ciclo XXXVI

Collegio dei docenti:

- Prof. Prashant V. KAMAT - University of Notre Dame du Lac, Indiana – Coordinatore;
- Prof. Luca GAVIOLI, Università Cattolica del Sacro Cuore;
- Prof. Marco SQUASSINA, Università Cattolica del Sacro Cuore;
- Dott. Claudio GIANNETTI, Università Cattolica del Sacro Cuore;
- Prof. Mauro SPERA, Università Cattolica del Sacro Cuore;
- Dott. Riccardo MARZUOLI, Università Cattolica del Sacro Cuore;
- Prof. Francesco BANFI, Università di Lione (FRANCIA);
- Prof. Alejandro CABRERA, Pontificia Università del Cile (CILE);
- Prof.ssa Patricia CLARCK, University of Notre Dame du Lac, Indiana; (STATI UNITI D'AMERICA);
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