



THE HANDY GUIDE FOR THE IEIE-UNIPV PhD STUDENTS

rev.03-2017

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1. INTRODUCTION

1.1 Scope of the PhD guide

The aim of this guide (rev.03, updated on Dec. 2017) is to provide comprehensive answers to the most frequent issues that the IEIE (Ingegneria **E**lettronica, **I**nformatica ed **E**lettrica) PhD candidates can face during their postgraduate studies at the Dept. of Electrical, Computer and Biomedical Engineering (**ECBD**, a.k.a. Dipartimento di Ingegneria Industriale e dell'Informazione, **DIII**) of the University of Pavia (**UNIPV**). While reading this guide, please keep in mind that this is not an official UNIPV document: if you spot something wrong or missing, please let us know (see contacts section at the end of the guide).

This document reports all the main duties that PhD students must undertake during their doctoral training, from the initial enrollment to the final defense, and contains many useful information about Ph.D. students' rights. Additionally, this text also provides a list of the research activities carried out at different laboratories of the DIII, thus allowing prospective students to evaluate which research lab better fits with their personal penchants and giving them the link with the Lab Staff.

Finally, some useful tips are included to illustrate the facilities offered by the University of Pavia to PhD students.

This guide has been set up thanks to the volunteer work of the Pavia IEEE student branch, taking advantage of the help provided by the University PhD office and has been supervised by the PhD-IEIE Board.

We hope that you will come across what you are looking for and we wish you a pleasant and fruitful stay in Pavia.

Thank you and have a nice reading!

The Handy Guide Staff

Pavia, December 2017

2. STRUCTURE & ORGANIZATION

2.1 *The University of Pavia: a little history*

The University of Pavia is one of the oldest universities in Europe. An edict issued by King Lotharius quotes a higher education institution in Pavia as already established in 825. This institution, mainly devoted to law studies, was then chosen as the main education centre for Northern Italy. Enlarged and renovated by the Duke of Milan, Gian Galeazzo Visconti, it became the University of the Duchy, officially established as a Studium Generale by Emperor Charles IV in 1361.

Alessandro Volta (1745-1827) is only one of a large group of famous professors who taught at the University of Pavia. To mention just a few, let us recall Girolamo Cardano (1501-1576), Antonio Scarpa (1752-1832) and Camillo Golgi (1843-1926). The “cardanic joint”, a widely used mechanical device, takes its name from the first. Scarpa was professor of anatomy and medicine. Many parts of human anatomy are today named after him, e.g. “Scarpa’s triangle” and “Scarpa’s fascia”. Golgi invented the so called “black reaction”, which, for the first time, displayed the ramified structure of nerve cells. This was the key to open the chapter of neuroscience, nowadays advancing so quickly. For this discovery, Golgi was given the Nobel prize in 1906, together with the Spanish Santiago Ramon y Cajal. The “Golgi complex” is only one of the many microstructures which are today named after him.

Today Pavia is a Research University, offering a wide variety of disciplinary and interdisciplinary teaching, organized in 18 Departments. The University offers degree courses, PhD programs, post-graduate schools, specialization courses and masters. Research is carried out in departments, institutes, clinics, centers, and laboratories in close association with public and private institutions, enterprises and companies.

The University of Pavia enjoys a strong tradition of international student and teacher exchanges: bilateral agreements involve, among others, the historical universities of the Coimbra Group, and many universities in Europe, the Middle East, the Mediterranean area, the United States of America, China, Japan and many other countries.

The University of Pavia is in a way unique, not only because of its prestigious historical origins and top quality achievements, but also due to its leading and promoting role in the so-called “Pavia System”, characterized by 19 residences where thousands of students can live, study and play sports. The oldest residences, named Collegio Borromeo and Collegio Ghislieri, were built in the 16th century; more recently other colleges for male and female students were founded through both public and private initiatives. The University of Pavia today is made up of:

- 24000 students
- 917 professors
- 85 degree courses
- 17 PhD courses
- 48 specialization schools
- 34 italian “master” courses
- 18 departments
- 9 libraries
- 3 hospitals
- 19 university residences
- 4500 students graduated on 2015
- 820 postgraduate degrees awarded on 2015

2.2 The School of Engineering

The School of Engineering at the University of Pavia is a relatively young institution since it was established in 1971, but it is nowadays ranked one of the best Italian Schools of Engineering.

The Faculty of Engineering is in the West northbound of the city, also known as *Polo Cravino*, and it is made up of two Departments: the DICAR (Dipartimento di ingegneria civile ed architettura) and the DIII (Dipartimento di Ingegneria Industriale e dell'Informazione - Department of Electrical, Computer and Biomedical Engineering).

The available services can make life enjoyable and profitable: special mention shall be given to the library, the green areas, the wide indoor and outdoor wireless network, several cafeterias and a Museum (MTE: Museum of the Electrical Technology). Since 2009, a multi-purpose sports complex has been established, including indoor and outdoor swimming pools, which provides Polo Cravino the look of a real university campus, with an unusual range of services, if compared to the Italian standards.

In recent years, the two Departments have spent a considerable effort towards a stronger development of the internationalization process in the educational field: several Master of Science programs are taught in English, the Erasmus exchange program is widely supported and promoted and several agreements have been signed for the achievement of joint degrees with foreign universities.

2.3 The Dipartimento di Ingegneria Industriale e dell'Informazione (DIII) or Department of Electrical, Computer and Biomedical Engineering (ECBE)

DIII was established on March 2012 with the merge of the three Departments of (i) Electrical Engineering, (ii) Electronics, (iii) Computer Science and Systems.

The staff consists of 23 Professor, 23 Associate Professors, 27 Assistant professors, several adjunct professors, 14 technicians and 11 administrative staff. Also 18 Research Fellows and 92 PhD students work at the DIII (on December 2017). The roster of the PhD School Board (PhD-SB) can be found at http://www-3.unipv.it/dottIIE/index.php?pag=italiano/collegio_docenti.html

The research areas covered at the DIII deal with several topics, ranging from electronics and computer science to electrical engineering, and several more. In the following a list of the laboratories is reported in alphabetical order.

2.4 The Current Active Laboratories

Aerospace Education and Research Lab

Where: H floor

Contacts: prof. Fabio Dell'Acqua (fabio.dellacqua@unipv.it)

Website: <http://aerospace.unipv.it/>

Research Activities:

- Digital signal and image processing for spaceborne remote sensing and Earth observation
- Remote-sensing based mapping and risk analysis
- Geospatial data processing
- Crowdsourcing and remote sensing

Computer Vision and Multimedia Lab

Where: D Floor

Contacts: Prof. Virginio Cantoni (virginio.cantoni@unipv.it), Prof. Giuseppe Lisanti (giuseppe.lisanti@unipv.it), Prof. Luca Lombardi (luca.lombardi@unipv.it), Prof. Mauro Mosconi (mauro.mosconi@unipv.it), Prof. Marco Porta (marco.porta@unipv.it),

Website: <http://vision.unipv.it/>

Research Activities:

- Image Analysis and 3D Vision
- Visual Attention Mechanisms
- Deep Learning and Machine Learning
- Perceptive Interfaces
- Proteomics and bioinformatics
- Human Identification
- Eye Tracking
- Visual Data Mining for e-learning Applications
- Artificial Vision for Mobile Mapping

Digital Content Analysis Lab

Where: D Floor

Contact: Prof. Marco Ferretti (marco.ferretti@unipv.it), Prof. Maria Grazia Albanesi (mariagrazia.albanesi@unipv.it)

Website: <http://dcalab.unipv.it>

Research Activities:

- HPC in bioinformatics
- Parallel processing optimization
- Evaluation of user-experience in the multimedia field
- Digital image quality assessment
- Computer vision methodologies for sustainability (computational sustainability).

Electrical Drives and Industrial Robotics Lab

Where: A and E floor

Contacts: Prof. Ezio Bassi (ezio.bassi@unipv.it), Prof Lucia Frosini, (lucia.frosini@unipv.it), Prof. A. Ferrara (antonella.ferrara@unipv.it)

Website: <http://www-3.unipv.it/dmae>; <http://www-3.unipv.it/electric/azionamenti/hpage.htm>

Research Activities:

- Identification and Control Algorithms, Robust Control, Optimal Control, Sliding-mode Control, Fault Detection, Cooperative robotic systems
- Robotics Standards, Hybrid position/force control applications, Electrical drives for robotic applications
- Control of electrical drives and machines
- Electrical drives diagnostics

Electromagnetic Devices CAD Lab

Where: E floor

Contact: Prof. Paolo Di Barba (paolo.dibarba@unipv.it) Prof. Maria Evelina Mognaschi (eve.mognaschi@unipv.it)

Website: <http://www-3.unipv.it/electric/cad/>

Research Activities:

- Inverse problems and optimization methods in electricity and magnetism
- Computer-aided analysis and synthesis of electromechanical devices
- Finite elements in electromagnetism
- Electrical models of neurophysiological phenomena.

Electronic Instrumentation Lab

Where: D floor

Contacts: Prof. Carla Vacchi (carla.vacchi@unipv.it), Prof. Lodovico Ratti (lodovico.ratti@unipv.it)

Website: <http://eil.unipv.it/eil/>

Research Activities:

- Design of electronics for scientific, industrial and medical instrumentation
- Hybrid and monolithic detectors for X ray imaging at free electron lasers and synchrotron light sources
- Single photon avalanche detectors in CMOS technology for position sensitive detectors and biomedical applications
- Front-end electronics for pixel detectors in charged particle tracking applications
- Characterization of microelectronic technologies from the standpoint of noise and radiation tolerance

Electrooptics Lab

Where: F Floor

Contacts: Prof. Valerio Annovazzi Lodi (valerio.annovazzi@unipv.it), Prof. Sabina Merlo (sabina.merlo@unipv.it), Prof. Guido Giuliani (guido.giuliani@unipv.it)

Website: <http://www-3.unipv.it/optoele/>

Research Activities:

- Laser sensors and instrumentation
- Optical techniques for characterization of micro-machined devices
- Dynamic behavior of semiconductor lasers
- Optical cryptography
- Nonlinear analysis of biological signals
- Optical biosensors
- Optofluidics
- Silicon Photonics
- Low-noise electronic circuits and systems
- Fiberoptic sensors.

Energy Management Lab

Where: A and E floors

Contacts: Prof. Norma Anglani (norma.anglani@unipv.it), Prof. Francesco Benzi (francesco.benzi@unipv.it), P.I. Andrea Albini (andrea.albini@unipv.it),

Website: <http://labenunipv.wordpress.com/>

Research Activities:

- *Energy planning and management (Laben):*

Modeling and analysis of energy systems for manifold scopes: elaboration and assessment of emission reduction scenarios, implementation of electrical technologies replacing traditional thermal technologies; PAES/PAESC study; evaluation of the impact of renewable technologies, storage and electric vehicles; energy management systems for hybrid microgrids.

- *Energy efficient compressed air systems (Labac):*

Simulation and modeling of compressed air plants; methodology studies on how to assess energy efficiency actions; application and simulation of controlling techniques for adjustable speed drives.

- *Smart metering and building automation:*

Smart metering and protocols for industry and building automation

Femtolab

Where: A floor

Contact: Prof. Luca Tartara (luca.tartara@unipv.it)

Research Activities:

- Nonlinear microscopy systems development

Identification and Control of Dynamic Systems Lab

Where: C Floor

Contacts: Prof. Giuseppe De Nicolao (giuseppe.denicolao@unipv.it), Prof. Antonella Ferrara (antonella.ferrara@unipv.it), Prof. Lalo Magni (lalo.magni@unipv.it), Prof. Davide Raimondo (davide.raimondo@unipv.it), Prof. Chiara Toffanin (chiara.toffanin@unipv.it), Gianluca De Felici (gianluca.defelici@unipv.it)

Website: <http://sisdin.unipv.it/>

Research Activities:

- Model Predictive Control,
- Artificial Pancreas
- Sliding Mode Control
- Robotics
- Traffic control
- Fault Detection
- Fault Tolerant Control
- Hybrid systems
- Systems biology
- Decentralized and distributed control
- System Identification.

Lab. Microcalcolatori

Where: D Floor

Contacts: Prof. Giovanni Danese (gianni.danese@unipv.it), Prof. Francesco Leporati (francesco.leporati@unipv.it), Prof. Claudio Cusano (claudio.cusano@unipv.it), Ing. Gianmario Bertolotti (gianmario.bertolotti@unipv.it)

Website: <https://sites.google.com/site/microcalcolatori/home>

Research Activities:

Custom Computing and Programmable Systems section:

- High performance computing through Application Specific Processors
- Embedded Systems
- Industrial Informatics
- Computerized instrumentation.

Biomedical Instrumentation section:

- Ergonomics
- Sport and Medicine instrumentation
- Automotive
- Wearable and portable instrumentation.

Laser Source Laboratory (Industrial Photonics Group)

Where: F and A Floors

Contacts: Prof. Antonio Agnesi (antonio.agnesi@unipv.it), Prof. Federico Pirzio (federico.pirzio@unipv.it), Prof. Alessandra Tomaselli (alessandra.tomaselli@unipv.it)

Website: <http://www-3.unipv.it/ls/>

Research Activities:

- Diode-pumped solid-state lasers
- Fiber lasers
- Ultrashort pulse generation
- Laser beam and resonator modeling
- New laser material investigations
- Non linear optical harmonic and parametric generation
- Laser material processing
- Non linear microscopy and laser spectroscopy.

Light-matter Interaction Lab.

Where: A floor

Contact: Prof Daniele Bajoni (daniele.bajoni@unipv.it)

Website: <https://sites.google.com/site/ilmunipv/>

Research activities:

- Nonlinear photonics in micro- and nanostructures
- Integrated quantum photonics
- Sources of entangled states
- Strong light-matter interaction
- Photonic crystals and cavities.

Microwave Lab

Where: H Floor

Contacts: Prof. Luca Perregrini (luca.perregrini@unipv.it), Prof. Maurizio Bozzi (maurizio.bozzi@unipv.it), Prof. Marco Pasian (marco.pasian@unipv.it)

Website: <http://microwave.unipv.it/>

Research Activities:

- Inverse scattering problems and real-time monitoring
- Green Microwaves
- Microwave industrial applications
- Antennas for deep space communication.

Performance Evaluation Lab

Where: D Floor

Contacts: Prof. Maria Carla Calzarossa (mcc@unipv.it), Prof. Luisa Massari (luisa.massari@unipv.it)

Website: <http://peg.unipv.it/>

Research Activities:

- Methodologies and tools for performance evaluation and workload characterization of complex systems and services
- Characterization of Web dynamics
- Benchmarking.

Power System Analysis Lab

Where: E floor

Contact: Prof. Mario Montagna (mario.montagna@unipv.it)

Research Activities:

- Analysis and management of large interconnected systems by computer methods: load flow and OPF studies, transient stability, impact of FACTS devices on power system management
- Non-deterministic approaches to power system design, planning and operation: application of genetic algorithms, tabu search and interval arithmetic to the traditional computations of power system analysis.

Quantum Electronics and Nonlinear Optics Lab

Where: F Floor

Contacts: Prof. Ilaria Cristiani (ilaria.cristiani@unipv.it), Prof. Paolo Minzioni (paolo.minzioni@unipv.it)

Website: <http://www-3.unipv.it/eqn/>

Research Activities:

- Optical trapping and manipulation
- Optofluidics and Acoustofluidics
- Silicon Photonics
- Integrated Optical Devices
- Biophotonics
- Photonic applications of Biopolymers

Robotics (Lab. di Robotica)

Where: C Floor

Contact: Prof. Tullio Facchinetti (tullio.facchinetti@unipv.it)

Website: <http://robot.unipv.it/>

Research Activities:

- Mobile robotics
- Real-time systems
- Energy efficiency
- 3D graphics
- Distributed embedded systems
- Sensors, sensor fusion
- Smart grid, load management
- Domotics, home automation, smart buildings.

Sensors and Microsystems Lab

Where: A floor

Contacts: Prof. Piero Malcovati (piero.malcovati@unipv.it)

Website: <http://sms.unipv.it/>

Research Activities:

- Design of integrated circuits for sensors and microsensors read-out
- Design of analog to digital converters for sensors applications
- Design of switched capacitor DC-DC power converters
- Laboratory characterization measurements on sensors and related read-out circuits

Service Engineering Lab

Where: C Floor

Contact: Prof. Gianmario Motta (motta05@unipv.it)

Website: <http://camellia.unipv.it/servizi/>

Research Activities:

- Techniques of systems analysis
- Systems for urban mobility
- Service and enterprise systems.

Telecommunications & Remote Sensing Lab

Where: H Floor

Contact: Prof. Lorenzo Favalli (lorenzo.favalli@unipv.it)

Website: <http://tlclab.unipv.it/>

Research Activities:

- Digital signal and image processing for avionic systems
- Remote sensing data processing
- Remote sensing for human settlements and risk monitoring
- Telecommunication systems and components
- Multimedia data processing
- Wireless telecommunications and sensor systems.

3. PhD

3.1 PhD Higher Education in Pavia

The University of Pavia provides graduate students with a unique experience. The PhD programs offered by the University of Pavia are supervised by SAFD (Scuola Avanzata di Formazione Dottorale), the PhD Higher Education School.

Our programs cover a wide range of topics and are organized into three disciplinary groups (macro-area): Science and Technology, Life Science, Human and Social Science.

The University of Pavia is very much involved in developing new pathways that allow graduate students not only to develop their skills useful for future careers in academia, but also the abilities necessary to be active outside the University. The Board of our PhD Higher Education School is constantly engaged in improving the quality of the PhD programs and consequently the preparation of doctoral students. In particular, the School is promoting interactions between University and Industry, as well as international programs allowing our graduate students to obtain a joint degree with other European institutions. Our mission is to make sure that highly motivated students from all over the world are admitted to our PhD programs and will successfully interact with our best faculty members.

Being one of the oldest academic institutions in the world, the University of Pavia combines a prestigious history with a clever mix of cutting-edge innovation. Students have access to a vast library system and may be included in the research teams of internationally recognized laboratories.

Besides studying and carrying on research, graduate students can experience living in Pavia, a city-campus with intense cultural life, offering an experience which is unique in Italy and rare in Europe.

Prof. Daniele Boffi

Pavia PhD Higher Education Director

3.2 PhD Program in Electronics, Computer Science and Electrical Engineering (IEIE – Ingegneria Elettronica, Informatica ed Elettrica)

The PhD course, active since 1983, is well-established and addresses a large variety of topics in the fields of Electronics, Computer Science and Electrical Engineering (IEIE: Ingegneria Elettronica, Informatica ed Elettrica). These topics are related from the cultural and application viewpoints.

The PhD program aims to train researchers with advanced methodological knowledge and technical skills and it fosters the personal growth of students' creativity through the practice of scientific research in cutting-edge sectors of Engineering. This will enable them to start a successful career at Universities, companies and research centers both nationally or abroad.

The large network of international collaborations of the research groups involved in the PhD course gives students the opportunity to exchange with prestigious Universities, research centers and companies.

In Tab.1 the number of the new PhD students, annually enrolled, in the engineering area (I), in the IEIE course (II) and the share of foreigners for the IEIE course (III):

Tab. 1: New enrollment of PhD students every AY for the engineering area (I) and the IEIE course (II) and (III)

Academic Year	New PhD students in the overall Engineering Area (I)	IEIE New PhD Students (II)	IEIE- New Non-Italian PhD students (based on the citizenship) (III)
2016/17	41	18	5
2015/16	39	12	3
2014/15	40	13	6
2013/14	38	15	6
2012/13	33	14	6
2011/12	31	10	2

Objectives

Scientific research in the fields of IEIE is the basis of the PhD course, whose main aim is to foster researchers with adequate skills, contributing to what Society asks in terms of development, innovation and services. Scientific creativity and organization skills represent the major drivers of the course. The professors involved in the course are very active in research at international level. Moreover, their well-equipped laboratories represent an excellent playground for the students.

Research Projects/Areas

The research should be carried out, starting from an independent original project or idea, in close and continuous contact with one (or even better, more) research groups. Interdisciplinary studies are very welcome and constitute a value added for the Department activities.

The main areas are: (i) Electrical Engineering, (ii) Informatics & Automation (iii) Photonics and Space Communication Systems.

In details, such areas cover topics in: Electric and Magnetic CAD, Energy and Electrical Systems, Electromagnetic waves, Informatics, Automation, Instrumentation, Photonics and Telecommunications.

Courses

During the three year-study, PhD students must acquire 180 credits; 30 awarded for attending courses and seminars and 150 for their research activities. The PhD course organizes many seminars, even along with other courses of the School of Engineering Science. All is registered on a personal academic record booklet.

PhD students are recommended to attend - possibly every year - an international doctoral school relevant to the thematic areas they are working in. Moreover, they are encouraged to promote the diffusion of scientific results e.g. exploiting the web dissemination of their resume. Scientific dissemination is strongly encouraged through giving presentations at conferences and through seminars.

For students of Cycle XXXIII the following specific courses will be offered:

1 - New trends in Photonics

This course is a survey of some of the main research topics in today's Optoelectronics and Optics, with special emphasis on the activities of the members of the Department of Electrical, Computer and Biomedical Engineering.

2 - Management of electrical power networks: a panoramic approach

The course aims at giving a general overview of the strategies, devices, models and problems concerning the optimal control of power networks, to provide a bidirectional energy flow between the grid and other sources of electrical power.

3 - The Internet of Things and its challenges (basic)

4 - The Internet of Things and its challenges (advanced).

As of Cycle XXXIII, the curriculum in Electrical Engineering is international and it foresees the cooperation with Lodz University of Technology, Poland (regulated by the agreement AC 7,474/2076 Prot. 707,434 of 27/72/76).

Job Opportunities

The possible career of PhD students spans over academic and research institutions as well as industries and entrepreneurship in Italy and abroad.

Director

Prof. Paolo Di Barba (2014/2015-...-2017/2018)

Dipartimento di Ingegneria Industriale e dell'Informazione

Address: Via Ferrata, 5 – 27100 Pavia - Italy

Ph.: +39 0382 98 5250

e-mail: paolo.dibarba@unipv.it

http://www-3.unipv.it/dottIEIE/index_en.php?pag=english/welcome.html

4. THE PhD ROLE AND DUTIES

4.1 Why becoming a PhD Student?

There may be several reasons addressing to such a choice: the interest to master a specific subject, an inspiring mentor, to be keen in working in the research field, an opportunity gained over time, a mean to improve our own career, an innate love for science and knowledge.

Whatever the reason is, there must be a self-consciousness that, however inspired one can be, the way ahead can also be tough and although it is an intellectually exciting experience, it requires sacrifices.

No matter how big, well organized or guided the research group, which you will be working with, can be, once you get started you are expected to find your own way through and give your contribution with ideas and actions.

Supervisors can feature their role in different ways: some play a very controlling role and plan most of the activities and some other believe in a more proactive role for the PhD student, being able to formulate, support and argue his/her own project proposal and ideas. Anyway, all are expecting you to fulfill your duties at the very best, by blending creativeness and scientific rigor.

There are very nice guides on the web you can read if you want to have a more insightful overview on “how to survive your PhD”: we, of course, recommend you surf for and read them!

4.2 Admission & Enrollment

Doctoral studies at University of Pavia (UNIPV) are open to candidates without any restriction on age and citizenship.

Once in a year, in late springtime, a call for applications is published at the <http://www.unipv.eu/site/en/home/research/phd-courses.html>, with all the information you need to apply. Candidates are admitted to the program through a selection procedure based on qualifications assessment and exam(s).

The main requirement to access the doctoral studies is to have a second-level University degree; candidates who graduated in a foreign University must hold a degree equivalent to an Italian second-level degree for duration, level and disciplinary field. In this case, some documents are needed for the declaration of equivalence, clearly listed in the call for applications. The degree must be attained by the deadline specified in the call for applications.

The applications must be submitted online. The selection results will be published online as well, and the candidate will have to enroll in the PhD program by completing an online procedure and paying the enrollment fees, whose exact amount is set each year by UNIPV's Academic Board (Consiglio di Amministrazione, CDA) and specified in the call for applications.

The call for applications announces the PhD positions available for each PhD program. These are the possible types of positions made available for a PhD program:

- *Regular positions*: such positions are mainly covered with scholarships, but some “regular” positions without scholarship are often available as well. Such positions are not linked to a specific research topic and there is no specific requirement to apply for them (besides, of course, the possession of a second-level degree);
- *Positions with scholarship linked to a specific research topic*: such positions are reserved to candidates interested in performing research in a particular topic, which is specified in the call for applications;
- *Positions jointly-supervised with companies*: only candidates already employed by the companies mentioned in the call for applications can apply for this category. An agreement between the company and the university must be subscribed. The University of Pavia does not provide any PhD scholarship for these positions: the candidate will keep his/her salary while attending the PhD program;
- *Positions reserved to candidates with a scholarship from a foreign country*: such scholarships are reserved to candidates already holding a scholarship to support their PhD in Italy. The scholarship can be provided by their government or by other private or public entities in Italy or abroad. The University of Pavia does not provide any PhD scholarship for these positions.
- Positions reserved to candidates holding a scholarship from a specific international mobility programme: only candidates already selected for the international mobility programme mentioned in the call are allowed to apply for these positions.

For some of the above-mentioned types of position, specific selection procedure can be set. Please, for all information refer to the call for applications, which must be read carefully.

In case of doubts, we recommend you contact the PhD office (contacts are reported at the end of this guide).

4.3 First duties (for students from Cycle XXXI on)

Within few days from the beginning of the school and in accordance with the given deadlines, each student must:

- identify the curriculum and at least one supervisor who will supervise the research activities;
- in agreement with the supervisor/s, define in principle the research subject;
- in agreement with the supervisor/s, define the educational program for the first year, in accordance with the educational rules, approved by the School Board (PhD-SB, in Italian Collegio Docenti di Dottorato -CDD);
- fill in the appropriate form with the research subject, the name of the supervisor and the educational program, which must be approved by the PhD-SB.

The supervisor must be chosen within the teaching staff (full professors, associate professors, assistant professors), belonging to the DIII or from outside. Customarily, the student will carry on his/her research activity in the supervisor's laboratory. The supervisor must suggest and orientate the educational and research activity of the student and he/she must manage the assigned funds. The supervisor's approval is necessary for whatever request that the student submits to the PhD-SB or to the PhD Director. The supervisor can be changed upon authorization by the PhD-SB.

The educational program can be changed during the year. This adjustment can be made by filling a new form that must be submitted to the PhD Director for approval. It is not allowed to gain credits or to use the allocated funds for attending courses or schools that have not been approved before.

4.4 Periodic duties

At the end of each academic year, the PhD-SB verifies the activity carried out during the year by each student and decides on his/her admission to the following academic year, according to the University rules (currently, art. 8, Para. 1.e of the UNIPV regulations on PhD programs).

In October, the first and second year students must:

- provide the PhD Director with a short-written report about the activity that has been done during the previous year;
- present and discuss their research activity in front of a specific Internal Academic Board (IAB), selected by the PhD-SB.

Within a few days from the admission to the next year of course, the students must present a new one-year educational program and they must fill in the usual form reporting the number of credits already acquired. At the beginning of the third year, the foreseen educational activity must include the final acquisition of 30 credits.

For each year, it is not required to present a minimum number of publications.

4.5 Final duties (for students from Cycle XXXI on)

The PhD thesis can be written either in English or in Italian, alternatively, in other language upon authorization that can be obtained by presenting the appropriate application form to the PhD Director.

For students applying from Cycle XXXI upwards, the procedure shown in Figure 1 applies (in Italian).

After a positive response from the IAB, by the end of September (or corresponding period), the students must submit the copies of the PhD thesis to the PhD Director's authentication (according to Art. 25, Par. 1 of the DM 45/2013, which is the *current* legal reference framework). On this occasion, the students receive three copies of the written report by the IAB which must be submitted along with their thesis to the members of a second specific External Academic Board (EAB). Each PhD thesis is submitted to two reviewers of EAB,

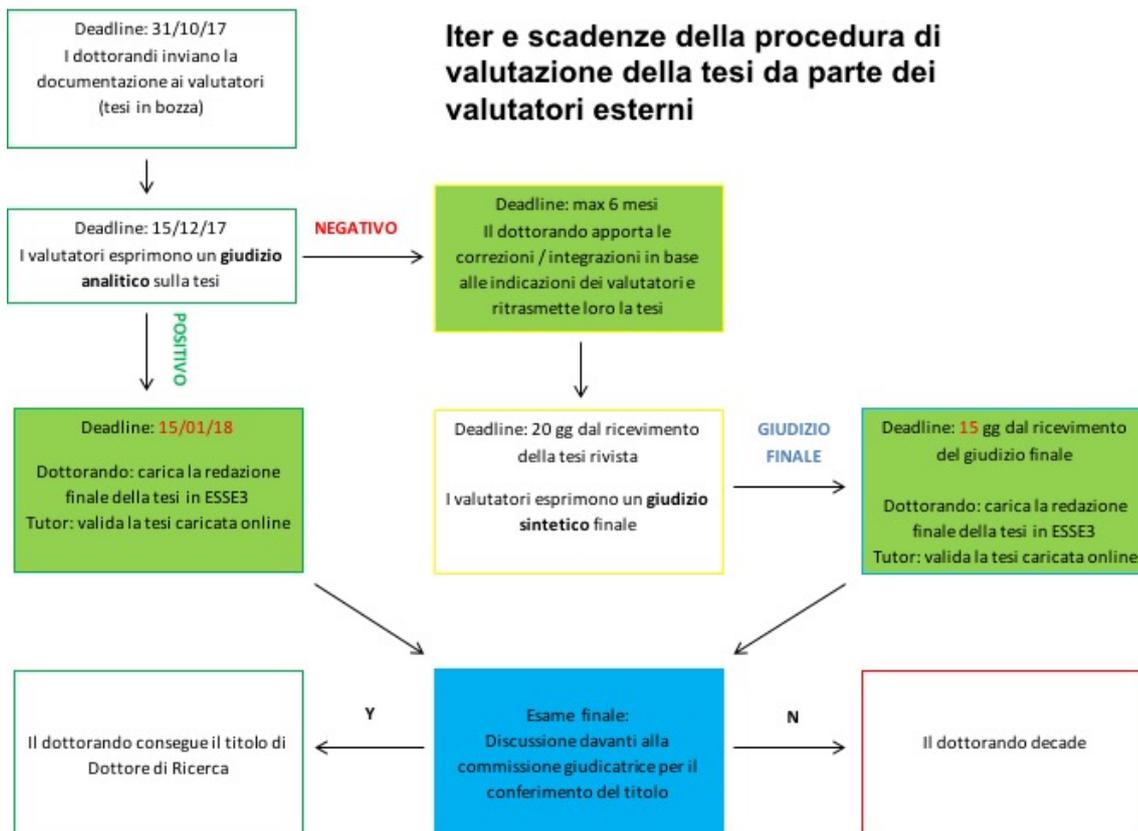


Fig. 1: Flow chart of the evaluation procedure for the last year students' work (Italian)

who make suggestions whether to admit the candidate to the discussion or to ask for integrations to be made within six months. In case of integration, EAB produces a final report with the last evaluation.

The dissertation will occur in front of an Exam Committee (made up of professors from other Universities and an internal member of the PhD-SB), which will grant the PhD title to the candidate after a public defense and considering the EAB final report.

On the same occasion, the students can give the PhD Director a declaration, where they authorize the storage and the consultation of a copy of the thesis at UNIPV library.

4.6 Useful info for foreign PhD students

- The **Welcome Point** gives support and advice to incoming international students, researchers and university professors visiting the University of Pavia. In particular, the Welcome Point staff provides information on enrollment at the university, housing, fiscal code, University canteens, health insurance, University Sports Centre (CUS), scholarships, opening a bank account. For more information: <http://welcomepoint.unipv.it/>.
On the Welcome Point website a very useful and detailed "International incoming student's guide" is made available in English, Chinese, Arabic, German, Spanish and Portuguese ("Guides" section).
- The **Foreign Students' Office** is available to assist foreign students during the gathering of the necessary documentation for the *residence permit (permesso di soggiorno)* and other issues related with being a non-EU student.
Please see the Frequently Asked Questions webpage
<http://www.unipv.eu/site/en/home/research/phd-courses/articolo5119.html> for more information and opening hours.
- The **Language Centre (CLA)** organizes Italian courses for foreign students (from beginner to advanced level) three times a year, in September, October and February. More information at the Language Centre website: http://cla.unipv.it/?page_id=171.
- The **PhD office website** is available also in English version:
<http://www.unipv.eu/site/en/home/academics/research-doctorates---phd.html>. Also, the annual Call for applications is published both in Italian and in English.
- All PhD students are covered by an accident **insurance** and third-party liability insurance during their authorized PhD activities in Italy and abroad. However, foreign students oversee their own health insurance, which is also mandatory to get the *Permesso di soggiorno*. More details are available in the above-mentioned "International incoming student's guide". For further information, please contact the Welcome Point for assistance (contact information in the "Contacts & links" section).

4.7 IEEE Student Branch UNIPV

What is the IEEE?

The IEEE (Institute of Electrical and Electronics Engineering) is the largest scientific organization in the world focused on technological innovation, with more than 400.000 members in 150 nations worldwide. The IEEE is the leading authority in many fields of interest, ranging from Informatics to Electrical Engineering, from Biomedical technology to consumer Electronics, from micro-sensors to aerospace applications.

What is an IEEE Student Branch?

Student Branches are the backbone of the IEEE student program. A Student Branch is composed of post-graduate and under-graduate engineering students longing to contribute to the "active" part of IEEE. IEEE has created a variety of resources to ensure that students are successful in their work.

The goal is to bring young students closer to the world of research and to encourage them to meet and to share their ideas with each other.

What about the IEEE Student Branch UNIPV?

The IEEE Student Branch of the University of Pavia has again proven itself to be one of the most active branch associations in Italy since 2011 and is currently carrying on serving the scientific community with its rich program of seminars, workshops and other various activities open to everybody.

For more info, contact ieee.sb@unipv.it or visit the official website <http://ieee.unipv.it/>.

Moreover, please, visit also the Facebook page <https://www.facebook.com/IEEESBPV/>

What can I get from a IEEE Student Membership subscription?

IEEE membership helps support the IEEE mission to foster technological innovation and excellence for the benefit of humanity. Three main reasons for joining IEEE:

Knowledge

IEEE members gain exclusive access to the latest and best research, news, television programs, and educational resources needed to expand their expertise and stay current.

Community

As an IEEE member, you are part of the world's largest community of technology professionals —a network of communication and learning where innovators share what works, what does not, and what is needed now.

Profession

IEEE members can achieve more of what matters in your life and career through IEEE student programs such as competitions, scholarships, awards, continuing education courses and certifications, conferences, and more.

Uncover IEEE member benefits that are most relevant to you: IEEE members can access information on local events and activities by signing in to my IEEE

(http://www.ieee.org/membership_services/membership/my_ieee.html) the members' personalized gateway to IEEE membership. Additionally, members can also:

- access individual Society memberships and subscriptions;
- connect with local IEEE Sections and volunteer leadership;
- find upcoming conferences;
- learn more about individual benefits;
- read the latest news from IEEE, IEEE Spectrum, IEEE Standards News, and The Institute.

Latest news

Among the IEEE Student Branch of Pavia (SB10871) it is possible to form sub-units belonging to the various IEEE Societies. This is extremely crucial, when asking for funding and when trying to invite DL (Distinguished Lecturers). During the 2017, time of writing this manuscript, there are two sub-units: the IEEE MTT-S SB Chapter and the WIE Affinity Group. The former is related to the Microwave Theory and Techniques Society, while the latter is related to the Women in Engineering Society. Together with the major unit of the IEEE SB they could organize great event for the Engineering Faculty of the University of Pavia, so please, do not hesitate to contact reference people and join and collaborate in these very active organizations.

4.8 Pavia Engineering Student Branch ACERSAT – UNIPV

In strength cooperation with the IEEE Student Branch, another official student association, officially recognized by the University of Pavia, is the Pavia Engineering Student Branch, named PESB. References are present on the official web-page of the University of Pavia (<http://www.unipv.eu/site/home/naviga-per/laureati/acersat/articolo7003.html>) and on the IEEE SB page (http://ieee.unipv.it/?page_id=1541). Active students, both undergraduate and graduate, can enroll for free and collaborate to set up and organize various cultural activities, asking for funding accordingly to the regulations promulgated by the University of Pavia, annually.

5. ADMINISTRATIVE ISSUES

5.1 *The program*

The PhD programs offered by the University of Pavia have a three-year legal duration.

According with the current Italian regulations (DM 45/2013), a PhD program is a full-time commitment and requires attendance to lessons and research activities. Long-distance attendance is not possible.

5.2 *PhD degree attainment*

The PhD degree is awarded after the thesis discussion, upon positive evaluation of a Committee. The official diploma is delivered by the Rector during the annual PhD ceremony which takes place usually in November-December, but, if you need the diploma in advance for some specific reason (to have it legalized, for instance), you can ask the PhD office if it is possible to speed up the procedure.

The PhD office is able to certify the PhD attainment a few days after the thesis discussion (see the “Certificates” paragraph below).

5.3 *Incompatibility*

According with the Italian law, if you are enrolled in a PhD program you are not allowed to enroll in another University course at the same time, neither in Italy nor abroad.

5.4 *Enrollment fees*

At present, the enrollment fees have an approximate amount of 300 € per year. The amount may change in the future, based on CDA's decisions.

5.5 *Financial support*

PhD positions at UNIPV can be either covered by scholarship or not. Your right to get a scholarship provided by UNIPV depends on your position on the final ranking of the PhD public selection. For more information on the different types of position available, see para. 4.2.

In Italy, the PhD student is not considered as an early-stage researcher as in other European countries; for such reason, the financial support is not provided through a stipend but through a scholarship.

At present (academic year 2016/2017), the PhD scholarship has a total pre-tax amount of 13.638,47 € per year, that is about 1.030 € net per month. The scholarship amount can be increased by 50% in case of research periods carried out at foreign institutions, for a maximum of 18 months in total, not necessarily consecutive (see par. 5.15). For more information on how to get the scholarship increase, see par. 5.15.

5.6 *Budget for research activity*

Each PhD student (with or without scholarship) can benefit from a budget for research activity amounting to at least 10% of the scholarship (from II year onwards). This budget is aimed at supporting the PhD student mobility, in Italy or abroad, and the costs related to his/her educational program.

For information on how to use this budget for research activities, see <http://www.unipv.eu/site/home/ricerca/dottorati-di-ricerca/articolo12702.html> (in Italian only).

5.7 *Authorizations*

All PhD students must take care of being authorized for all PhD activities which take place outside the structures of the University of Pavia, in Italy or abroad. This is very important: should you be hurt or cause damage to somebody during a non-authorized activity outside the University, the insurance may not accept to refund the damage if your presence there was not authorized.

So, if you are planning to perform your research in structures other than the University's, contact the PhD Director and ask him/her to include your request in the next PhD-SB meeting.

In addition, you must ask for the PhD-SB authorization if you are willing to accept a job, to suspend the program or the scholarship, to teach a course to enter into a jointly-supervised PhD agreement (see also par. 5.8, 5.11, 5.12, 5.21). Besides, it is always advisable to discuss in advance with your supervisor any significant request.

5.8 Program/scholarship suspension

You can ask for a suspension of the program for periods up to one year, upon approval of the PhD-SB. During the suspension period, you do not receive the scholarship installments and you are not subject to the duties of a PhD student. You will have to catch up the suspension period and the scholarship installments at the end of the III year.

After discussing it with the supervisor/s, you must get in touch with your PhD Director and ask him/her to submit your suspension request to the PhD-SB; in addition, you must submit the appropriate form to the PhD office. The suspension form is available here: <http://www.unipv.eu/site/en/home/study/course-catalogue/phd-courses/articolo13048.html>.

You can also ask for a suspension of the PhD scholarship only, while going on with the PhD program, in case of possible funding other than the scholarship. Also in this case, you must ask for the PhD-SB approval and submit the appropriate form to the PhD office.

5.9 Withdrawal

You can withdraw from the PhD by simply filling in a form and submitting it to the PhD office; it is advisable to discuss your decision with your supervisor and your PhD Director before. The scholarship installments already received must not be reimbursed.

The withdrawal form is available here: <http://www.unipv.eu/site/en/home/study/course-catalogue/phd-courses/articolo13048.html>

5.10 Maternity leave

In case you get pregnant during the PhD program, you are supposed to submit to the PhD Office (mariagrazia.ronfani@unipv.it) a certificate of your doctor stating the expected birth date. You will have to take a five-month mandatory leave: 2 months before the delivery + 3 months after, or 1 before the delivery + 4 after (in the latter case your occupational doctor must give a written favorable opinion). Also, the scholarship (if you are a scholarship holder) will be suspended during the maternity leave. The maternity leave period will be recovered at the end of the third year, together with the scholarship installments, if applicable.

If you wish, you can extend your maternity leave up to a maximum of one year, including the mandatory 5 months.

5.11 Working during the PhD

According with the Italian and University regulations, the PhD program is a full-time commitment. If you wish to undertake an occasional working activity, you must ask for the PhD-SB authorization.

5.12 Teaching activity

If you have been offered to teach a course, you must ask the PhD-SB authorization before accepting. The maximum allowed number is 40 teaching hours per academic year.

5.13 Vacations

PhD students do not have to stick to a strict work schedule; their timetable and vacations are agreed with their supervisors, according with the Department closure days. Public holidays in Italy occur on the following recurrences: New Year's Eve (January 1st), Epiphany (January 6th), Easter/Easter Monday (in March-April), Liberation Day (April 25th), Labor Day (May 1st), Republic Day (June 2nd), Assumption Day (August 15th), All

Saints' Day (November 1st), Immaculate Conception (December 8th), San Siro Day (Pavia's patron saint, December 9th), Christmas (December 25th), St. Stephen's Day (December 26th).

5.14 Insurance

Everyone who is regularly enrolled in a PhD program (that is, who has paid the enrollment fee) is covered by accident insurance and third-party liability insurance during their authorized PhD activities in Italy and abroad. More details on the insurance policies are available at the following link <http://www.unipv.eu/site/home/navigaper/laureati/assicurazioni.html> (in Italian only).

Please note that those policies do not replace the general health insurance.

If you need a certificate stating that you are insured as a PhD student for accidents and third-party liability, see par. 5.16 below.

5.15 Research periods abroad

You can spend up to 18 months (not necessarily consecutive) abroad during the PhD program. Mobility periods must be agreed with the supervisor; in addition, all PhD students (with or without scholarship) who want to spend a research period abroad must ask for the PhD-SB authorization.

PhD students with scholarship who want to spend a research period abroad can ask for a 50% increase of their scholarship.

For scholarship holders: to get the 50% increase of the scholarship, one must follow the procedure described in the following link: <http://www.unipv.eu/site/en/home/study/courses/phd-courses/articolo12687.html>, and ask for the PhD-SB authorization.

If you are not a scholarship holder, you can consider applying for the Erasmus program to get a financial contribution to support your period abroad (see par. 5.23).

5.16 Certificates

The PhD office issues many types of certificates – enrollment, scholarship, PhD attainment etc. – in Italian, English or French. For information on how to request a certificate, see the following links:

- <http://www.unipv.eu/site/home/ricerca/dottorati-di-ricerca/articolo5124.html> (it)
- <http://www.unipv.eu/site/en/home/research/research-doctorates-ph.d/articolo10582.html> (en)

Please note that an appropriate duty stamp (*marca da bollo*) must be put on each certificate or copy (current fee 16,00€).

If you need a transcript stating the courses/exams taken during the PhD program, you must contact your PhD Director.

If you are planning a research period outside the UNIPV structures, you might be requested to submit to the hosting structure a certificate of insurance. This kind of document does not need the duty stamp to be issued. Currently (2017) you can request it to virginie.gallati@unipv.it, specifying the name and address of the structure and the name of your supervisor in the structure, and attaching a copy of your authorization to carry out your research activity there.

5.17 E-mail account and personal area

As soon as you get enrolled in the PhD program, you will be assigned a new *ateneopv.it* (= *universitadipavia.it*) e-mail account, which is the one the Office will use to communicate with you. It is important that you check it frequently. To access your *ateneopv.it* e-mail, visit the www.unipv.it website, then click on webmail (on the top), then webmail *studenti*.

As a student of UNIPV, you will also have access to a Personal Area (Area Riservata, <https://studentionline.unipv.it/esse3/Home.do>) with all information on your career; there you'll find the online procedures to enroll in the next academic years, to pay the enrollment fees etc. The credentials to access the Personal Area are also valid for all the UNIPV online facilities: Wi-Fi, online libraries...

Please note that the password to access the ateneopv.it e-mail account is different from the one you need to enter your Personal Area.

- If you forgot the password of the ateneopv.it e-mail, send an e-mail to virginie.gallati@unipv.it, attaching a copy of a valid ID, and ask for a new one.
- If you forgot the password of the Personal Area, follow the instructions available at the following link: <https://studentionline.unipv.it/Anagrafica/PasswordDimenticata.do>

5.18 Students card

All PhD students receive from their PhD Director a Students Card, which must be stamped each year to be valid. This is a document you can use on your daily life to prove that you are a student and to benefit from discounts if available (theatre, cinema, gymnasium, swimming pool...). However, the students card may not be enough in case you must register for a conference, rent a house etc.: in those cases, you may be required to submit a certificate (see par. 5.16).

5.19 Bus and canteen cards

As a PhD student, you are entitled to ask for a bus card and a canteen card.

The bus card is issued by the Line s.p.a., that is the company managing public transports in Pavia. For more information, see <http://pavia.lineservizi.it/tessera-unipass/>.

The canteen card is issued by the EDiSU (the Regional Institute for the Right to Education) and must be requested at the following webpage (in Italian only): <http://www.edisu.pv.it/index.php?page=richiesta-benefici>.

During the online procedure, you will be asked to provide information on your financial situation. If you do not have such document, you will receive the canteen card anyway, with the right to a complete meal for 5,50 € (current fee) in the EDiSU canteens.

5.20 PhD students' representation in the University Bodies

- **Academic Senate**
1 PhD student (see the *Statuto*, art. 11 <http://www.unipv.eu/site/home/ateneo/statuto-e-regolamenti/nuovo-statuto-dateneo.html>). The Academic Senate members are elected according with the rules specified in the *Regolamento Generale di Ateneo* <http://www.unipv.eu/site/home/ateneo/statuto-e-regolamenti/nuovo-regolamento-generale-dateneo.html>.
- **Department Council**
The number of PhD students included in the Department Council is set according with the rules specified in the *Regolamento Generale di Ateneo*, art. 51 <http://www.unipv.eu/site/home/ateneo/statuto-e-regolamenti/nuovo-regolamento-generale-dateneo.html>.
- **PhD Academic Board**
2 PhD students, enrolled in different cycles, who remain in office for one academic year and can be re-elected (see the *Regolamento in materia di dottorati di ricerca*, art. 7, par. 8 <http://www.unipv.eu/site/home/ricerca/dottorati-di-ricerca/articolo837.html>)

5.21 Executive PhD

The Executive PhD is a doctoral study path co-supervised by University and external institutions. Employees of companies or external institutions (mostly enterprises) apply for the PhD public competition and, if successful, are admitted to the PhD program without scholarship. During the 3-years program, the student will share his/her time between the job and the PhD, while keeping his/her full salary.

The PhD student focuses on a research topic agreed between University and company, which both take advantage of the other party contribution to the project (instruments, courses...).

The Executive PhD is a way for the company to invest in a brilliant employee by offering him/her a high-level training on research, and for the University to train a good and motivated PhD student while strengthening its bonds with the enterprises.

If you are interested in undertaking an Executive PhD project and your company is willing to support you on this path, please contact the PhD Director.

All information on how to apply for this category, if available, will be included in the call for applications, which – we can't stress it enough - must be read carefully and in full.

5.22 Erasmus

All PhD students can take part in the Erasmus program (see <http://www.unipv.eu/site/home/internazionalizzazione/erasmus.html>), but only those without scholarship are entitled to apply for the Erasmus scholarships.

For more information: erasmus@unipv.it.

6. CONTACTS & LINKS

6.1 PhD Office

Via Ferrata 5 – Pavia
Open from Monday to Friday 9.30am-12.00pm
<http://www.unipv.it/dottorati> (it)
<http://www.unipv.eu/site/en/home/research/phd-courses.html> (en)
Staff:
lorenza.andreoli@unipv.it
alessandra.carrea@unipv.it
virginie.gallati@unipv.it (eng)
mariagrazia.ronfani@unipv.it

6.2 IEIE Administrative Staff

Via Ferrata, 5 - Pavia
Open from Monday to Friday 9.00am-12.30pm and 2.00pm-5.00pm
tel. +39 (0)382 98 9898
e-mail: nicoletta.galli@unipv.it
http://www-3.unipv.it/dottIEIE/index_en.php?pag=english/welcome.html

6.3 Welcome Point

Corso Strada Nuova, 65 - Pavia (main entrance of the University)
Open from Monday to Friday 9.00 – 12.00, 14.00 – 17.00
welcomepoint@unipv.it
<http://welcomepoint.unipv.it/>

6.4 International Relations Office - International Mobility (for information on Erasmus programs)

Via Sant'Agostino, 1 - PAVIA
erasmus@unipv.it
<http://www.unipv.eu/site/en/home/international-relations/erasmus.html>
Open on Monday, Tuesday, Thursday and Friday: 9:30 - 12:00; Wednesday: 13:45 - 16:15

6.5 URP (Ufficio Relazioni con il Pubblico)

Corso Strada Nuova, 65 - Pavia
Open from Monday to Friday 9.00am-12.30pm and 2.00pm-5.00pm
tel. +39 (0)382 98 9898
urp@unipv.it
<http://www.unipv.eu/site/home/ateneo/amministrazione/area-didattica-e-servizi-agli-studenti/servizi-generali-agli-studenti/urp---ufficio-relazioni-con-il-pubblico---informastudenti.html>

***** Suggestions on how to improve this guide? *****

Email to: ieee.sb@unipv.it

7. Updates since July 2014

rev.02 (June 2015): Sections 5 and 6

rev.03 (December 2017): Sections 2.3, 2.4, 3.1, 3.2, 4.2, 4.3, 4.4, 4.5, 4.7, 4.8, 5.21

Thanks for your reading!

