



University  
of Milano-Bicocca

# PhD School





# PhD School



# THE UNIVERSITY OF MILANO-BICOCCA

The University of Milano-Bicocca was established in 1998 when a massive redevelopment project of the site of the old Pirelli factory was coordinated by architect Vittorio Gregotti.

Its campus, unique in Italy, is made up of 28 buildings, all in the Bicocca district except for the School of Medicine and Surgery, which is located in Monza next to the San Gerardo hospital, and the Marine Centre located in the Maldives.

The University of Milano-Bicocca is ranked 82nd by the Times Higher Education 2019 and 34th by Nature Index 2019 among universities under 50 years old.



[www.unimib.it](http://www.unimib.it)





# The Graduate School

The PhD School was established in 2014 and currently delivers **20 PhD programmes** in **7 areas** (Economics and Statistical Sciences, Law, Medicine and Surgery, Psychology, Educational Sciences, Natural Sciences, Sociology). It has more than 900 students (over **15%** are international) and more than 500 faculty members (national and international).

Since its creation, the PhD School has focused on **expanding** its links with national and international companies and has signed more than 300 agreements in last years for PhD positions dedicated to company employees. It has **promoted internationalisation** by signing agreements with foreign Universities leading to dual degree titles, promoted cotutelle agreements between Universities and participated in Marie Skłodowska-Curie Innovative Training Networks.

The School is a member of the EUA-CDE (European University Association-Council for Doctoral Education) and collaborates with Assolombarda, the association of companies in the Lombardy region. The School offers administrative support from admission to awarding the degree.

The School organizes several interdisciplinary courses in English for all students in **5 areas**:

- *Language and Communication basic skills*
- *Basic technology skills*
- *Research management, Knowledge of research system and funding system*
- *Enhancement of research results and intellectual property*
- *Research tools and skills*





## Admission requirements

To be admitted, all candidates must hold:

- a Master's degree or an equivalent foreign qualification in the areas specified by the specific programme in the call for applications
- pass the admission test defined in the call for applications of each programme and possess a certain proficiency level in English (this only applies to some programmes and is specified in the call)
- foreign students who are not proficient in Italian must be proficient in English
- foreign students can be admitted through international agreements or scholarships from their own country (e.g. [www.esteri.it/it/opportunita/borse-di-studio](http://www.esteri.it/it/opportunita/borse-di-studio)).

*For information on call for applications and admission tests, please scan QR code or visit the website.*



[en.unimib.it/education/doctoral-research-phd-programmes/how-apply-phd-programme](http://en.unimib.it/education/doctoral-research-phd-programmes/how-apply-phd-programme)



# PhD Programmes



The PhD Programmes are included in **seven** disciplinary areas

- **Economics and statistical Sciences** pag. 05
- **Law** pag. 08
- **Medicine and Surgery** pag. 11
- **Psychology** pag. 15
- **Educational Sciences** pag. 17
- **Natural Sciences** pag. 21
- **Sociology** pag. 29

The background of the page is a blurred image of a financial market interface. It features a candlestick chart with green and red bars, overlaid with a thin white trend line. At the top, there is a table with columns for 'Bid', 'Ask', 'Last', and 'Size'. A specific data point is highlighted in a red box, showing '1.4505', '1.00', and '1.4500'. The text 'ECONOMICS AND STATISTICAL SCIENCES' is centered in white, bold, uppercase letters. A vertical white line is positioned to the left of the text.

# ECONOMICS AND STATISTICAL SCIENCES



# B4S

## BUSINESS FOR SOCIETY

Nowadays, institutional leaders, policy makers and managers are confronted by novel situations and challenges without historical precedent, that demand greater understanding in terms of theories, methods, and approaches.

The PhD program in “Business for Society” is fit for those who are oriented towards making a significant contribution to the field of strategic management, innovation, and social responsibility. Graduates of the program will have extended knowledge of emerging business and management ideas and deeper understanding of their relevance to applied business settings.

### MISSION AND TOPICS COVERED

The three years program provides students and professionals with key competences in management, organization, finance and law and a solid foundation of economics and analytical and quantitative methods. The program is developed in traditional lectures, laboratory training and seminars; its Teaching Plan includes 20 modules with a total number of 660 hours that equals to 81 credits.

B4S is structured in two curricula:

- Management of institutions and international organization
- Strategic management of innovation in companies and no-profit organizations

### CAREER OPPORTUNITIES

The following opportunities are open to those completing the Ph.D. program:

- highly qualified personnel in research and training institutions;
- professionals in leading management and strategic consulting firms;
- high level professional roles in national and international public institutions with a focus on project management and monitoring; policy intervention design and policy evaluation;
- managerial roles in multinational companies, mainly in departments dealing with R&D, human resources, corporate social responsibility, investor and external relations, marketing and communication;
- entrepreneurs or highly qualified personnel in innovative start-ups, social businesses, and benefit corporations;
- high level professional roles in NGOs operating as project designers, project managers and evaluators, as well as project and scenario analysts.

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# ECONOMIC, STATISTICS AND DATA SCIENCE (ECOSTAT)

The PhD Programme in Economics, Statistics and Data Science (ECOSTAT) is affiliated to the Department of Economics, Management and Statistics of the University of Milano-Bicocca, it lasts 4 years and it is organized on 3 curricula, namely Economics, Statistics and Big Data & Analytics for Business.

ECOSTAT provides students skills on: microeconomics, macroeconomics, econometrics, computational statistics, stochastic processes, inferential and bayesian statistics, analysis of large amounts of structured and unstructured data, big data and data visualization, machine learning, text and web mining. The first-year teaching activities are devoted to “structured” courses. The second-year teaching activities take the form of “reading groups” (promoting critical thinking on specific articles). From the second year, students are asked to develop their own research projects.

## MISSION AND TOPICS COVERED

The mission of ECOSTAT is to exploit the natural interaction between economists, statisticians and data scientists of the University of Milano-Bicocca and transfer this body of knowledge and expertise to highly motivated students.

The students are able to build up “flexible” profiles, which are addressed to scientific research, in universities or in non-academic institutions, national or international.

ECOSTAT proposes innovative “training” profiles, which are addressed to the non-academic job market.

High research standards are guaranteed by a first-class Faculty. Finally, ECOSTAT is building a network of international PhD programmes.

## CAREER OPPORTUNITIES

ECOSTAT form highly skilled young researchers who will find career opportunities in: 1) academia and research centers; 2) economic institutions and authorities; 3) data analytics and big data; 4) consulting and quantitative finance.

Based on historical data from the former PhD in Economics and the former PhD in Statistics at our University, 2/3 of the students who were awarded the PhD in Economics has positions of assistant professor or research fellow within universities and research centers in Italy and abroad. Those who have chosen a non-academic career work within national and international public institutions and authorities. Students who completed the PhD in Statistics have positions in foreign and Italian universities, primary European banks and consulting companies.

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# LAW



# THE NEW PUBLIC ADMINISTRATION: HUMAN CAPITAL & DATA

The PhD program in “The new public administration: human capital & data”, in line with the objectives of the National Recovery and Resilience Plan (PNRR), is designed for those who wish to apply for a top level or high professional employment in the public sector.

The doctoral program is organized in association between the Universities of Milan Bicocca, Venice Ca’ Foscari, Florence and Milan Statale. Agreements are in place with several types of public organizations for conducting research projects and for hosting doctoral students for a period from 6 to 12 months.

## MISSION AND TOPICS COVERED

The PhD program lasts three years and is structured into 2 curricula, with a strong multidisciplinary connotation:

- selection, management and enhancement of human capital in public organizations;
- data, policies and services in public organizations.

The PhD program consists of an initial training common to both curricula in the first year (at least 64 hours, divided in 4 courses) and specific curricular teaching in the second and third year of the programme (at least 32 hours per year for each curriculum). The doctoral students are required to spend a period of study and research in a public organization (from 6 to 12 months) during the 2nd or 3rd year and a period abroad in a scientific institution (minimum 6 months/maximum 18 months).

The curriculum of studies has been designed ad hoc and developed with the contribution of the other Universities and of the public organizations involved in the PhD programme. Courses are offered both in Italian and/or English and might be integrated with classes belonging to other UNIMIB doctoral courses.

## CAREER OPPORTUNITIES

This PhD programme aims to train high skilled professional (in Italian “Elevata Professionalità – EP”, which means “high professionalism”) and young talents that can pursue a successful career in any type of public organization, spanning from the State to regional and local government and including public organizations active in many policy fields such as for example health, education & research, culture & tourism, environment, police & safety, welfare, economic regulation & economic development. Other relevant career opportunities might be in international and non-governmental organizations as well as in non-profit, social enterprises and companies working with public organizations. A career in research and/or training institutions might also be an opportunity.

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# LEGAL SCIENCES

The PhD Course in Legal Sciences is aimed at Law graduates who have an interest in deepening their studies in the legal field, both in its national and international dimensions. The Course provides students with a wide and varied spectrum of scientific tools necessary for the education of jurists and for the comprehension of Law. It includes five curricula covering all the different fields of law.

## MISSION AND TOPICS COVERED

Joining this PhD programme means becoming part of an active and wide community of scholars, having access to an advanced study course, strongly focused on an interdisciplinary perspective and devoted to fully understanding the existing interconnections between different legal systems, thereby enhancing the candidate's critical analysis and expertise in one of 5 curricula:

- *'Public Law, Public Economic Law, Philosophy of laws'* covers topics ranging from the organisation of public powers to the protection of individuals' rights and legal theory
- *'Roman Law, Private Law, Labour Law, Taxation Law and Civil Procedure'*
- *'Criminal Law and Criminal Procedure, Criminology, Criminal Economic Law, History of Criminal Law and Criminal Procedure'* focus on cultural and practical grounding in, respectively, civil and criminal law
- *'Public, European and International Law'* is an International Joint Doctorate Programme with the University of Nice Cote d'Azur, which awards a Double PhD Degree. It focuses on a cross-sectoral approach by exploring interactions between different areas of legal studies
- *'Law and Pluralism'* is an International Joint Doctorate Programme delivered in collaboration with the Union University of Belgrade, which awards a Double PhD Degree and is part of the "Department of Excellence" Programme. It explores the legal possibilities arising out of situations of conflict generated by the cultural, ethnic and religious pluralism of contemporary societies

## CAREER OPPORTUNITIES

Beyond preparing students for the traditional legal professions (lawyers, judges and notaries) and an academic career, the PhD Course prepares students for employment in management roles in the local and national administrations and in European and international institutions.

It also prepares students for highly-qualified roles in the private sector, e.g. counselling activities in the industrial and commercial fields. The PhD diploma entitles its holder to register directly for the Italian judiciary competitive exam.

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# MEDICINE AND SURGERY



# TRANSLATIONAL AND MOLECULAR MEDICINE (DIMET)

The PhD Programme in Translational and Molecular Medicine (DIMET) is an inter-departmental programme aimed at promoting the application of basic and applied research in clinical settings. The cultural challenge of the post-genomic era hinges on the understanding of the cellular and molecular mechanisms at the basis of human diseases in order to design new therapeutic strategies. This goal requires professional profiles with a robust background in basic research, but also skills in bridging the gap between laboratory and clinical investigation. DIMET is aimed at the increasing demand for such new models of innovative inter-sectorial training programmes in Biomedicine, in line with the EU Horizon 2020 Program.

## MISSION AND TOPICS COVERED

DIMET organises coordinated and cross-disciplinary training to form highly-qualified PhDs and MDs with potential bench-to-bedside round trips. The participation in DIMET of private Research Institutes exposes students to different research environments, approaches and methodologies. DIMET students are strongly encouraged to spend a period abroad to improve their research and promote students' international networking. To this end, DIMET participates in international educational programmes, such as Marie Curie Actions.

The DIMET programme covers three main interconnected areas:

- Cellular and molecular mechanisms
- Clinical and regenerative medicine
- Technological platforms, nanomedicine and diagnosis.

## CAREER OPPORTUNITIES

DIMET builds "translational" professional profiles with a robust background in basic research and the ability to rapidly transfer new knowledge from basic sciences to biomedicine in order to generate new advanced diagnostic and therapeutic applications.

Possible career opportunities therefore include research in the public or private sectors, biotechnology enterprises, private/public agencies working at the interface between basic research and healthcare.

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# NEUROSCIENCE

The PhD programme is based at the School of Medicine and Surgery and is an active part of the Milan Centre for Neuroscience. It cooperates with Italian and international Universities' hospital-based research centres, the Pharmaceutical Industry and Research Facilities that offer unique experimental opportunities. It is part of the Network of European Neuroscience Schools of the European Federation of Neuroscience Societies and the Organization for PhD Education in Biomedicine and Health Sciences in the European System.

The PhD includes 3 curricula: **Experimental, Clinical and International.**

## MISSION AND TOPICS COVERED

The PhD programme offers a multidisciplinary environment comprising neurobiology, psychology, neuropsychology and clinicians, and collaborates with the industrial sector. This network gives access to omics and in vitro or in vivo imaging platforms, including the European X Rays Synchrotron Facility.

The PhD programme is divided between 3 curricula: (1) the Experimental neurosciences track is aimed at understanding the biological mechanisms and pathogenesis of diseases using animal or cellular models. It is also intended to test possible pharmacological treatments and the crosstalk between the normal functioning and pathology of the nervous system and other conditions (e.g. immunological, oncological, infectious, degenerative diseases); (2) the Clinical neuroscience track focuses on the understanding of the mechanism of brain functions in a normal condition or in brain disorders, and the use of specific programmes for functional recovery; (3) the Neuroscience international track, which leads to a "dual PhD" title with the University of Surrey.

The PhD programme in Neuroscience organises courses and workshops on various topics (neuroimmunology, neuroimaging, clinical neurology and psychiatry, neuropsychology, animal models of diseases etc.) in order to provide students with the basic knowledge required to comprehend biomedical instrumentation and its use in addressing medical problems. It also offers students advanced knowledge of the technologies that are most relevant for their research work.

## CAREER OPPORTUNITIES

PhD training in Neurosciences offers the opportunity to experience different laboratories, operating in academic as well as non-academic institutes, with a high research standard and employing innovative technologies.

This experience can lead to a career not only in academic research but also in non-clinical and clinical R&D activities in Biotech, Pharma or Medical Device companies, dedicated to neurosciences or neuroscience-based products, as well as Contract Research Organizations (CRO).

Finally, for MD specialists or psychologists, the interdisciplinary, international and integrated milieu provides a rare opportunity for personal and professional growth in specific professional fields.

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# PUBLIC HEALTH

The Doctorate in Public Health Programme offers students a multidisciplinary profile that allows them to address complex problems of public health policy and use advanced analytical and managerial tools to lead organisational and societal changes. PhD students will learn the theory and practice of development, translation, assembling scientific evidence and using it to achieve field results, gain hands-on experience working to achieve a specific public health task under the guidance of our Faculties and gain experience in a variety of public health organizations.

The PhD course in Public Health combines three different curricula: clinical research in chronic diseases; biostatistics and epidemiology; health technology assessment (HTA) and health services research (HSR).

## MISSION AND TOPICS COVERED

The programme's mission is to prepare PhD students to translate public health research into effective policies, programmes and initiatives to improve individual and population health. It offers real-world fieldwork experience conducted at various healthcare organizations and, through its multidisciplinary approach, provides advanced education in public health, along with skills in management, leadership, communications and innovative, out-of-the-box thinking.

The first two years of the Doctorate in Public Health involve full-time study, mainly on-campus, as part of a collaborative group of approximately 5-10 students. The academic training will cover the biological, clinical, social and economic foundations of public health, as well as the essential statistical, quantitative, and methodological skills needed to address today's complex public health challenges through a multidisciplinary approach. Students will be encouraged to devise a personal study plan by selecting courses that deepen knowledge of specific topics and foster skills to support their Doctoral Project.

## CAREER OPPORTUNITIES

Beyond academia, job opportunities are offered in non-governmental organizations, the Health Ministry, government agencies, healthcare providers, start-ups, private sector businesses, including pharma, vaccine and medical device companies.

The programme prepares students for high-level leadership in order to make a difference in the fields of public health and healthcare

## CONTACTS

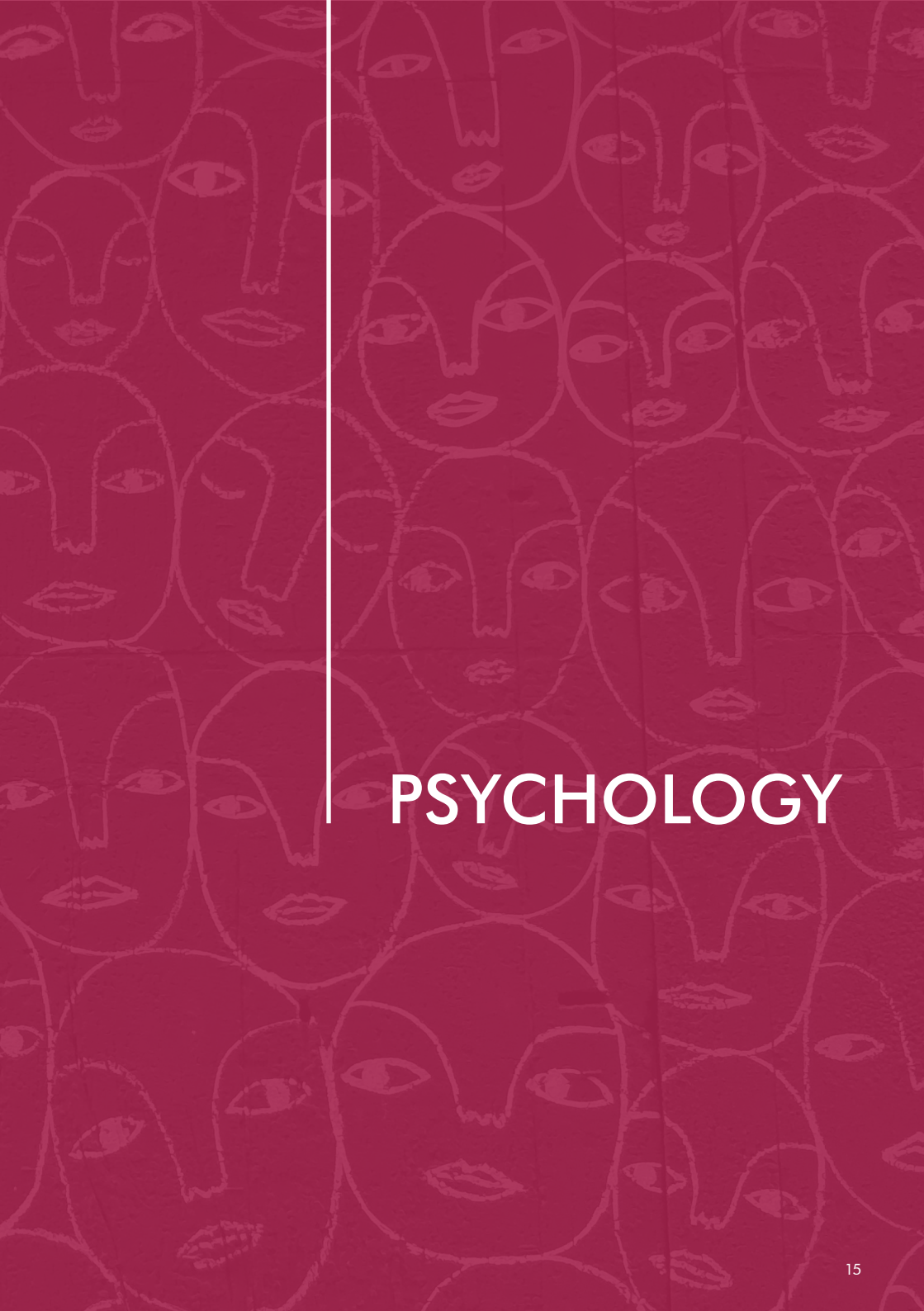
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# PSYCHOLOGY

# PSYCHOLOGY, LINGUISTICS AND COGNITIVE NEUROSCIENCE

The PhD programme in Psychology, Linguistics, and Cognitive Neuroscience is based at the Department of Psychology and offers training in the psychological theories, principles and research methods relevant to the understanding of the functional organization and cerebral bases of perception, attention, language, thinking and reasoning, motivation and emotions, personality and personality disorders, clinical psychology, social and organisational psychology, as well as psychological measurement.

This program offers three curricula:

1. The Mind, Brain and Behavior, 2. Social, Cognitive and Clinical Psychology, 3. Experimental and Applied Psychology (in partnership with the University of Surrey)

## MISSION AND TOPICS COVERED

The three curricula are aimed at training highly-qualified professionals for working in both academia and business, in the public and private fields. In line with the Department of Excellence Project, the PhDs will be able to conduct basic research, including research that can be translated to the business sector, especially when the role of human factors is relevant to the development of technology. By taking advantage of the facilities at the Department of Excellence centres, MiBTec and Bi.CAP, interested PhDs may also be able to use virtual and augmented reality paradigms, and undergo training in psychological and linguistic app development.

- **The Mind, Brain and Behaviour** curriculum is aimed at training qualified researchers in psychological measurement, cognitive neuroscience, perception, attention, cognitive processes and language across the entire lifespan
- **The Social, Cognitive and Clinical Psychology** curriculum is aimed at training qualified researchers in thinking and reasoning, motivation, clinical psychology, social and organisational psychology
- **The Experimental and Applied Psychology** curriculum is aimed at training qualified researchers in the areas of social perception and cognition, impression formation, and attitudes. This is an International curriculum in collaboration with the University of Surrey awarding a double degree (<https://www.surrey.ac.uk/school-psychology>)

## CAREER OPPORTUNITIES

The programme is aimed at training highly-qualified professionals who can be employed in academia and beyond in the transfer of psychological/linguistic knowledge in educational settings, health (diagnostic and rehabilitation, risk/protective factors, use of diagnostic models, safety of individuals and groups) and personal care facilities, socio-economic and business settings (ergonomics, data analytics, decision-making, personnel training, marketing), as well as in innovative high-tech fields (virtual and augmented reality, apps and mobile devices) in which humans and the synergy between technology and human factors play a key role.

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The background features a collage of educational items. On the left, there's a red and blue geometric model of a cube. In the center, several papers are scattered, some with text like 'Problems 1', 'Problems 2', and 'Problems 3'. On the right, a hand is visible holding a pen, ready to write. The entire scene is overlaid with a semi-transparent magenta filter.

# EDUCATIONAL SCIENCES

# DACS

## CULTURAL AND SOCIAL ANTHROPOLOGY

The doctoral programme in cultural and social anthropology (DACs) promotes research into historical anthropology, politics, religion, gender, health, art, migration and issues related to labour, environment and resources. The programme is committed to long-term fieldwork and welcomes proposals in all the fields of cultural and social anthropology, with a preference for research that casts light on the transformations of Latin American, South-East Asian, Middle Eastern, African and Eastern Asian communities and societies.

### MISSION AND TOPICS COVERED

The programme develops students' cooperative skills and provides the opportunity to join our ongoing research projects at the national and international level. It encourages students to follow research themes across disciplinary fields and question ethnography in the light of current issues of broader concern: citizenship, the economy, the environment, gender, labour, migration, politics, health and education.

In addition to anthropologists, the Faculty includes specialists in history, philosophy, geography, literary studies and pedagogy. The anthropologists who participate in the programme are specialists on different regions of the world (Europe, the Middle-East, Africa, Asia, South America and Oceania). Their interests cover epistemology, politics, history, economy, gender, kinship, heritage, art, labour and dispossession. Eight members of the doctoral committee are based abroad.

### CAREER OPPORTUNITIES

The flexibility and capacity for adaptation that our PhDs acquire during their training as social and cultural anthropologists are assets in a variety of professional settings, in addition to academic research. Knowledge of local languages and cultural traditions, a micro-analytical focus able to uncover the dynamics of change underway in a specific setting, the ability to read cultural and social situations with a bottom-up approach that privileges the perspective of the actors involved, are all skills that enable our students to meet the challenges of an increasingly international economy, transnationally-linked communities and multicultural citizenry.

Our alumni operate in the fields of human rights, migration, development and environment, as well as in institutions, associations and organizations that work in the fields of heritage, cultural promotion and multicultural education. Their aptitude for critical analysis and cross-cultural understanding can be applied in both the public service and the private sector.

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# EDUCATION IN THE CONTEMPORARY SOCIETY

The PhD programme, Education in the Contemporary Society, fosters theoretically informed and methodologically rigorous research on issues related to education and learning, thanks to a multidisciplinary board that includes experts in pedagogical, psychological, and philosophical issues pertaining to education. It prepares PhD students for using a variety of qualitative and quantitative research methods, taking advantage of the richness of cultural perspectives, scientific backgrounds and methodological approaches that characterise the Board. This richness of methods and approaches endows PhD students with skills appreciated in various educational environments.

## MISSION AND TOPICS COVERED

The PhD programme conducts empirical, experimental, theoretical, transformative, historical and comparative research focused on issues related to education and learning at various ages and in different contexts: schools, health systems, informal and non-formal learning contexts, social intervention contexts.

The PhD programme covers a wide range of educational issues, mainly concerning the role of new technologies and media in education; didactic and teaching methodologies in various learning environments; the education-related complexities arising in contemporary societies and likely work and professional scenarios; the challenges posed by multiculturalism, radicalisation and fundamentalism; the educational implications of social exclusion and inequalities; cultural discrimination and injustice; methods for sustaining lifelong learning and continuing education; promotion of well-being and a high quality of life; methods for training in health and care; communication; family education; gender; social understanding; migration processes and intercultural education.

## CAREER OPPORTUNITIES

- Experts in planning, evaluation and supervision of educational processes in different contexts
- Experts in training teachers/educators, job training and life design
- Coordinators of socio-educational agencies and projects
- Coordinators of agencies and projects devoted to rehabilitation and the promotion of health and wellness
- Experts in the framework of learning and educational processes targeted at children/families
- Research experts in a wide range of research-approaches and methodologies
- Experts in the framework of intercultural processes, migration, intercultural communication, social inclusion
- Experts in the design of Serious Games and interactive virtual simulations
- Experts in the design of online learning environments/ learning processes based on new media, digital technologies, coding, and robots
- Consultants and educators with expertise in philosophical practices

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# INTANGIBLE HERITAGE IN SOCIO-CULTURAL INNOVATION

The doctoral program in Intangible Heritage in Socio-Cultural Innovation has been set up in partnership with the Universities of Perugia and Basilicata. The PhD candidates will investigate: the processes of mediation, interpretation, and participation implicated in the active conservation of local heritage; the role of public policy and issues facing the governance of intangible heritage at different scales; cooperation between public and private actors; the importance of participatory and inclusive heritage programs (informed by anthropological, artistic, communications, economic, pedagogical, psychological, sociological, and historical perspectives); the challenges of digitization; the ethical dimension; and community involvement.

## MISSION AND TOPICS COVERED

This interdisciplinary 3-year program engages with local actors while retaining a national and international focus. The research projects:

- foster the recovery, reformulation, and intergenerational transmission of intangible heritage knowledge and conservation methods;
- devise practices of inclusion, accessibility, and civic involvement to match socio-economic and demographic change in local communities;
- favor formal and informal processes leading to the emergence of new intangible assets and new forms of participation, identity, and belonging from contemporary culture;
- inform public policies combining local, regional, national, and international perspectives to enhance sharing and participation in the intangible heritage domain;
- monitor and document the heritage conservation and promotion practices of local communities and practitioners, with a focus on mediation/facilitation;
- demonstrate the participatory use of digital technologies to communicate intangible heritage research;
- work with bodies run by the Ministry of Culture to enhance organizational practices and policies for preserving and promoting intangible heritage;
- improve the administrative capability of public bodies in charge of cultural heritage via strategic diagnostics, coordination, and decision-making.

## CAREER OPPORTUNITIES

This PhD program trains flexible professionals equipped to work in the field of conserving and promoting intangible heritage at:

- business enterprises in the field of cultural heritage;
- administrative and technical departments of the MIC (Ministry of Culture);
- museums and other public amenities;
- companies and public bodies with a role in the tourist sector;
- companies and digital enterprises in the field of cultural, tangible, and intangible heritage and its communication/promotion/enhancement;
- universities, research institutions, local authorities, regional boards of the Ministry of Culture, service companies, businesses, professional firms, museums.

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# NATURAL SCIENCES

# PHYSICS AND ASTRONOMY

The PhD programme in Physics and Astronomy at the “G. Occhialini” Physics Department is aimed at developing professionals who are able to pursue a career in both fundamental and applied research.

The Department collaborates with major national research Institutes such as INFN, CNR, INAF, ENEA, and several international laboratories (CERN, JET, ESO, ...), in addition to many foreign Universities. Applied research is conducted in collaboration with national and international companies, such as ENI, Infineon Technologies, ST-Microelectronics, Melexis etc.

It covers six curricula, the first five of which are in agreement with INFN:

Theoretical physics. Sub-nuclear physics. Astrophysics. Plasma Physics and Biophysics. Applied Physics and Electronics. Mathematical aspects of string theory (International Dual Degree in agreement with the University of Surrey, UK).

## MISSION AND TOPICS COVERED

The aim of the PhD programme is to train highly-qualified researchers with expertise and skills in different areas of theoretical, experimental and applied Physics.

Research areas include the following topics:

- Theoretical physics: string theory and quantum field theory, theory and phenomenology of fundamental interactions, lattice field theories and computational physics
- Subnuclear physics: particle physics at the Large Hadron Collider, flavour physics, neutrino physics, astroparticles and fundamental physics in space
- Astrophysics: cosmology and the primordial universe, the study of galaxies, high energy astrophysics, gravitational waves and their sources
- Plasma physics: magnetically-confined plasmas, thermonuclear plasmas, laser-produced plasmas, industrial applications of plasmas
- Biophysics: non-linear optical microscopy applied to biosystems, models for dynamic processes, nanoparticles for nanomedicine
- Applied Physics: physics for medicine (e.g. PET and other diagnostic techniques) and physics technologies (e.g. trace contamination analysis or precision gamma/alpha spectrometry)
- Electronics: Design and characterisation of analogue or mixed integrated circuits for research projects and for industry. Digital systems based on microcontrollers, FPGA and integrated circuits. Physics of devices based on semiconductors

## CAREER OPPORTUNITIES

Those awarded the PhD will be able to devise and manage a research project with a global attitude to problem-solving, model creation and implementation. The PhD opens opportunities in academia, in public or private research institutes and in industrial companies, in R&D divisions or in marketing positions. Industrial sectors include the field of High-Tech and Information and Communication Technology.

Other opportunities lie in the advanced tertiary sector in the development of quantitative models for the analysis of complex systems, for data analysis and for big-data, as well as in the economic-financial, bio-medical and environmental fields.

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# COMPUTER SCIENCE

The PhD programme in computer science is provided by the Department of Informatics, Systems and Communication. It prepares highly-qualified researchers for carrying out high-impact and high-quality research in academia and in designing and developing complex innovative solutions for industry.

Our programme combines training activities, in the form of coursework, on both fundamental and emerging topics in computer science, with research activities in multiple and interdisciplinary areas of computer science.

## MISSION AND TOPICS COVERED

The PhD programme in computer science covers a variety of topics, specifically:

- Foundations of Computer Science focuses on the study of theoretical and foundational aspects of computation, modelling and simulation of complex systems and the development of innovative algorithmic methodologies.
- Computational Life Science and Bioinformatics considers various algorithmic and computational aspects of genomics, transcriptomics and phylogenetics in Bioinformatics, simulation and modelling of processes in computational biology and, specifically, systems biology
- Software Engineering and Architecture deals with topics related to the development of software systems, in particular, the design, quality control, maintenance and evolution of software systems.
- Web and Information Systems aims to develop models and techniques to support the processes of management and analysis of various types of data
- Intelligent Sensing, including Robotics, Real-time Systems, and Computer Vision, focuses on robotics, real-time intelligent sensing, and various aspects of the analysis and management of multimedia and sensorial data of several kinds
- Artificial Intelligence and Decision Systems involves the study of research topics traditionally linked to Artificial Intelligence, along with methods, techniques, models and applications for decision support

## CAREER OPPORTUNITIES

The growing demand for highly-qualified staff members able to perform research, promote innovation and design and develop complex IT systems is generating an increasing need for personnel with both advanced knowledge of the state-of-the-art and the ability to master and improve it.

Our students are prepared to enter the national and international markets in all fields of computer science: bioinformatics, software engineering, data science, robotics, artificial intelligence, machine learning and cybersecurity. This trend is also confirmed by the growing number of PhD positions, created in collaboration with companies willing to define ad hoc training and research paths leading to future recruitment.

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# MATHEMATICS

Course in agreement with the University of Pavia

The programme involves the Universities of Milano-Bicocca (MIB) and Pavia (PV), along with the Istituto Nazionale di Alta Matematica (INdAM), and is based at the Department of Pure and Applied Mathematics, University of Milano-Bicocca, and the “F. Casorati” Department of Mathematics, University of Pavia.

It is divided between 6 curricula:

1. Algebra and Geometry, 2. Mathematical Analysis, 3. Numerical Analysis and Mathematical Modelling, 4. Mathematical Physics, 5. Probability, Statistics and Mathematical Finance, 6. Mathematics in Life Sciences and Physics

## MISSION AND TOPICS COVERED

The Joint PhD Program in Mathematics promotes research in the following areas:

- Group theory, Lie algebras (MIB); category theory, algebraic geometry (PV), differential geometry (MIB and PV), symplectic (MIB) and hyperbolic (PV) geometry
- Partial differential equations and their applications; control and optimisation theory, nonlinear and functional analysis (MIB and PV); harmonic and geometric analysis (MIB); variational techniques, calculus of variations (PV)
- Study of numerical methods for PDEs with focus on applications; constrained optimization models and methods; computer aided design, approximations of data and functions, numerical linear algebra (MIB and PV)
- Soft matter mathematical modelling, kinetic theory, classical and quantum field theory, complex systems (PV); fluid mechanics (PV e MIB), integrable systems, Frobenius manifolds, dynamical systems, quantum mechanics (MIB)
- Bayesian statistics, quantum probability, probability measures (PV); statistical mechanics (MIB and PV); random walks, systems, stochastic equations and control, economic and financial applications (MIB)
- Studies for biological, biomedical, physical and thermomechanical models (MIB and PV, in collaboration with Surrey University)

## CAREER OPPORTUNITIES

In addition to academia and public and private research centers, students will find professional opportunities:

- in banks and insurance
- companies to carrying out actuarial activities
- private companies, to carry out modelling, data analysis
- consulting and IT companies
- statistical and financial consultancy as freelancers
- teaching, mostly in High Schools

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# MATERIALS SCIENCE AND NANOTECHNOLOGY

The PhD programme is based in the Department of Materials Science and is aimed at preparing researchers with expertise and the ability to work independently in the emerging fields of Materials Science and Nanotechnology. There are two curricula: Materials Science and Technology of Materials. The latter includes research in collaboration with industries that offer PhD scholarships to students to complete our programme.

The doctorate is delivered in partnership with the European doctorate in Physics and Chemistry of Advanced Materials (PCAM), which includes 14 European universities (<http://www.pcam-doctorate.eu>) and the “International Doctoral School in Functional Materials & Innovation” funded by the European Institute of Technologies.

## MISSION AND TOPICS COVERED

The Materials Science and Nanotechnology programme offers students the possibility to conduct research on activities that span several fields (see <https://www.mater.unimib.it/en/research/research-areas>) including design, synthesis, growth, functional characterisation and atomistic simulations of materials for different technological applications.

The main classes of materials investigated are: organic, polymeric and inorganic semiconductors (thin films, quantum dots, nanostructured materials) for photovoltaic, photocatalysis, smart windows, optoelectronics, thermoelectrics, photonics, sensors and imaging; inorganic semiconductors and dielectrics for microelectronics (memories and logic), spintronics and neuroelectronics; nanostructured oxides for applications in sensors, photocatalysis and autotraction (nanostructured fillers); glass-based materials for sensors, imaging and lighting; composite materials for electrochemical energy storage and conversion; polymeric or hybrid porous materials for storage and separation of technologically-relevant gas mixtures; molecular and polymeric organic material for drug delivery.

Most of the research activities are carried out within international projects that offer students a broad range of opportunities for secondments abroad.

## CAREER OPPORTUNITIES

Among those awarded the PhD in the last five years, around half currently occupy a post-doctorate position in Universities and public research centres in Italy and abroad, while the other half have permanent positions in high-tech industries in Italy or other European countries.

Indeed, interaction with industry plays an important role in the organisation of research. Several scholarships for collaborative research have been funded over the years by leading industries such as ENI, STMicroelectronics, Trelleborg, SAES Getters, and by the research centres of IIT, ENEA, RSE, and CNR. The PhD programme has a strong and long-standing collaboration with the company Pirelli, which has been funding three scholarships per year since 2005.

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# CHEMICAL, GEOLOGICAL AND ENVIRONMENTAL SCIENCES

The PhD programme is full-time and is arranged in three curricula leading to a doctoral degree in Chemistry, Geology and Environmental Sciences. The programme provides outstanding students with an opportunity to pursue in-depth and rigorous research projects, exploring a wide range of issues including climate change and planet Earth, sustainability, energy, water, resource use, land use, environmental issues and conservation. This unique framework of scientific disciplines is made possible thanks to the laboratory facilities available at the Departments of Earth and Environmental Sciences (DISAT), Biotechnologies and Biosciences (BtBs) and Materials Science.

## MISSION AND TOPICS COVERED

The PhD programme is multidisciplinary and transdisciplinary, offering interactions among scholars with different cultural backgrounds while maintaining a high level of specialisation in the specific research topics.

- **Chemical Sciences.** Professionals are trained in the following areas: Chemistry applied to the development of materials; Chemistry of bioactive compounds; Chemistry applied to the prevention and solution of environmental problems
- **Geological Sciences.** Professionals are trained who are able to promote cultural growth and research in the field of Geosciences and Geosciences, applied to the protection of the environment, resources, and cultural heritage. In particular, skills will be developed on the dynamics of the Earth, climate change and the environmental and geological risks that also derive from human activities
- **Terrestrial and Marine Environmental Sciences.** This develops the ability to operate in multidisciplinary and sustainable research activities, along three main lines: 1) knowledge of the terrestrial and marine environment; 2) assessment and prevention of risks, for humans and the environment, deriving from anthropic activities; and 3) development of innovative methodologies and technologies for the rehabilitation, conservation of the terrestrial and marine environment and for the protection of biodiversity

## CAREER OPPORTUNITIES

Professionals specialising in the scientific fields of the PhD programme are in high demand as more and more focus is placed on the direct and indirect effects of climate change on our planet.

Examples of recent careers include: a) environmental risk assessment in industry; b) design of innovative materials for energy, microelectronics, photonics and the environment; c) development of low environmental impact processes; d) planning of interventions for the conservation of cultural heritage; e) in silico design of new compounds; f) industrial adaptation to European chemical and environmental regulations (e.g., REACH); g) consultancy in agencies of the EU (e.g., JRC, EFSA, ECHA); h) consultancy in environment agencies; i) geological risk assessment; j) planning water supply; k) environmental remediation.

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# MARINE SCIENCES, TECHNOLOGY AND MANAGEMENT (MTM)

The Doctorate course in Marine Sciences, Technology and Management (MTM) is a consortium doctorate offered by the University of Milano-Bicocca with the Italian Institute of Technology -IIT. The two research institutions aim to share their expertise on the UN Sustainable Development Goals (SDGs) most relevant to the marine field. Ph.D. students will have the opportunity to use cutting-edge laboratories within the Department of Environmental and Earth Sciences as well as at the Italian Institute of Technology and the MarHE Center infrastructure, a research center for higher education located in the Maldives.

## MISSION AND TOPICS COVERED

The Ph.D. aims to train highly qualified professionals and researchers to assume leadership roles in the field of marine sciences, both in Italy and abroad. Among the objectives of the research program envisaged by the doctoral course is the acquisition of skills in the field of marine sciences, even through the use of innovative technologies, as well as the acquisition of economic, legal and social management tools. In addition, one of the course's objectives is the development of team-working skills, and the ability to develop an experimental project under the professors' supervision. The PhD program also aims to provide the industry with professionals capable of improving their competitiveness at a national and international level.

The main research topics of the PhD are: Marine biodiversity, Ecology and marine biology, Ocean processes and Global change, International Law of the Sea and Polar Law, Peaceful resolution of maritime disputes, Sustainable use of marine resources, Integrated coastal zone management, Ocean technology, Marine biogeochemical cycles, Dynamics and restoration of coastal ecosystems, Computational modeling, Political, cultural and social geography of the sea, Ocean literacy and Ocean citizenship, Coastal and Maritime tourism, Vulnerability and Environmental conflicts, Marine renewable energy, Ocean physics, Chemical oceanography, New materials applied to the marine environment, Blue Economy, Psychological and social determinants of pro-environmental attitudes and behaviors.

## CAREER OPPORTUNITIES

Among the most important career prospects are academic research both in Italy and abroad, employment within public or private research institutions. Particularly relevant are the employment prospects in the so-called Blue Economy, this is a large and rapidly evolving segment of the economy, which has taken significant steps to modernize and diversify over the past decade. Alongside the traditional ones, innovative sectors such as those related to the restoration of areas damaged by anthropogenic activities, ocean renewable energy, the blue bioeconomy, biotechnology, sustainable ecotourism, environmental certification, management of marine protected areas, and STEM education are developing.

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# CONVERGING TECHNOLOGIES FOR BIOMOLECULAR SYSTEMS (TECSBI)

The PhD Programme in Converging Technologies for Biomolecular Systems (TeCSBi) promotes multidisciplinary research in Life Science, specifically for investigating biological systems: understanding their properties, interacting with them or exploiting them for therapeutic or industrial purposes. Complementary expertises of the Members of the School Board in the biological, chemical and computational areas guarantees a multidisciplinary training and ensure the functional and fruitful connection between the different disciplines and technologies essential for developing innovative research projects. The PhD projects concern fundamental and applied research. Industrial partnerships will favour the technological transfer of the created innovation as well as the job placement.

## MISSION AND TOPICS COVERED

The educational goal is to train PhD students to become professionals who have acquired the so-called T-skills, where specific and deep knowledge (vertical skill) is combined with an open vision and wide expertise (horizontal skills), resulting in the ability to become active members of multidisciplinary teams. Accordingly, students will be trained not only to master specific scientific knowledge, but also skills related to entrepreneurship and public engagement.

Research projects focus on three main pillars:

- Systems and molecular biology approaches for the study of complex biological functions
- Synthetic biology, bio-organic chemistry and green chemistry
- Bioprospecting, bioprocesses, management and valorisation of natural resources

TeCSBi adopts an Interdisciplinary approach.

This will be pursued in research and training in order to meet the challenge of understanding, controlling and exploiting complex biological systems with the required biological, chemical and computational expertise.

The PhD course has established and will promote further interactions with industrial partners in order to provide the intersectoral training required to acquire an entrepreneurial mind-set.

## CAREER OPPORTUNITIES

The main areas of interest for the professional profiles developed during the TeCSBi programme are:

- Design, Screening, and Production of molecules of interest to the chemical, pharma and agro-food industries (proteins, metabolites, fine and bulk chemicals, nutraceuticals, nano-particles and nano-derivatives)
- Development and optimisation of sustainable bio-based processes, including technology transfer
- Management of biological (bioprospecting) and natural resources, both in private and public sectors
- Molecular and physiological diagnostics, gene therapy, advanced (bio)materials

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# SOCIOLOGY

# ANALYSIS OF SOCIAL AND ECONOMIC PROCESSES (ASEP)

The Doctoral Programme in Analysis of Social and Economic Processes (ASEP) is based in the Department of Sociology and Social Research of the University of Milano-Bicocca.

ASEP aims at providing students with academic and applied social research training. Upon completion of the programme, students will have the knowledge and skills required to design and carry out, in academic or non-academic settings, conceptually sound and methodologically rigorous empirical research on social and socioeconomic phenomena.

ASEP takes three years to complete. The first year is devoted to taking the coursework, writing the qualifying paper, and preparing the dissertation prospectus. The second and third years, in turn, are completely dedicated to researching and writing the doctoral dissertation.

## MISSION AND TOPICS COVERED

ASEP's mission is to provide highly motivated students with a first-class training and research experience in the field of social science.

ASEP is managed by an international Steering Committee composed of faculties from the Universities of Milano-Bicocca, Barcelona Pompeu Fabra (Spain), California at Los Angeles (USA), Essex (UK), Manchester (UK), New York (USA), and Oxford (UK). The members of the Steering Committee are a diverse group of scholars representing a wide range of disciplines, research interests, theoretical stances, and methodological approaches. Such a variety of expertise provides students with rich academic experience and a broad array of opportunities to pursue their research and career interests. Possible research topics may include, but are not limited to, the following: consumption, culture and cultural change, demography, deviance and crime, economics, education, ethnicity and interethnic relations, family, gender, labour market, migrants and migrations, organizations, policy evaluation, political communication, power, religion, research design and methods, social change, social inequality, social networks, social work, subjective well-being, youth.

## CAREER OPPORTUNITIES

ASEP PhDs can pursue careers both in the academic and the non-academic fields, particularly in the field of market research and in the research departments of public institutions and private companies.

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# URBEUR URBAN STUDIES

The international Doctoral Programme URBEUR offers to scholars, researchers, and professionals an interdisciplinary programme designed to deliver a broad and thorough grounding in the field of urban studies, along with the skills for further development in the specific areas of expertise.

The Programme promotes the development of methodological skills for qualitative research as well as for quantitative analysis. Special emphasis is placed on the acquisition of interdisciplinary competencies and comparative approaches.

URBEUR has been built based on an already developed international academic network and has been further developed during the past 20 years. Strong connections have been created in particular with European institutes (both Universities and Research Centers), covering a wide range of urban-related research, developing PhD students co-tutorships, or creating exchange and visiting experiences focused on letting students share visions and research approaches within an international network.

The collaboration through co-tutorship agreements has been formalized with the following universities: University of Bruxelles; Science Po Paris; University of Liège; University of Berlin; University of Amsterdam; University of São Paulo; University of Grenoble; University of Chicago; University of Barcelona; University of Leuven.

## MISSION AND TOPICS COVERED

The PhD URBEUR Programme provides candidates with all needed theoretical and methodological tools to tackle urban phenomena and transformations. Intensive teaching classes and seminars are designed to provide an interdisciplinary and in-depth knowledge of the urban field focusing on:

new theoretical and research directions in urban sociology; transformations of local and national welfare systems; globalization processes and their impact on cities; social inequalities; urban segregation; urban policies; impact of new technologies; social innovation; urban network; environmental issues; space and society; social housing; urban mobility; urban cultures and diversities; territorial development and urban governance; environment, space, and society; urban and regional economics; advanced quantitative and qualitative methodological skills, suitable for conducting territorial comparative research: social research design; quantitative methods for the social sciences; ethnographic fieldwork and qualitative research methods.

## CAREER OPPORTUNITIES

URBEUR trains high-level researchers and experts for careers in Academia, as well as in international and national institutions and organizations such as research and training centres, national cultural centres, national statistical offices. More than 50% of our Ph.D. graduates hold an academic position in Italy or abroad.

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