UPC
Universitat Politècnica de Catalunya
BarcelonaTech

2022-2023

The student, at the centre
Much more than studying
Excellent, cutting-edge research
Innovation and knowledge transfer to companies
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Having celebrated the 50th anniversary of our university and returned to normal after the pandemic, now is the time to project ourselves into the future as an institution.

The UPC reaffirms its vocation as a benchmark in engineering, architecture, sciences and technology in Catalonia.

In the immediate future our university must face three great challenges:

The first is to strengthen the links between the knowledge we generate and society’s needs. The world’s best universities are those that have created a dynamic, transformative ecosystem around them, and they must be our guide. The UPC must strengthen its role as an agent of change that is in line with territorial agents.

The second challenge is to increase the impact of our teaching activity. We will do so by improving learning processes, intensifying our lifelong training activity and establishing ties to vocational training.

Talent is everywhere and we want it to access the UPC in equitable conditions. Technology needs the capacities of women and students from all socioeconomic backgrounds.

The third challenge refers to the UPC’s international dimension. We play a leading role in designing the European university of the future in the framework of the Unite! alliance, which has the support of the EU to continue its activity by incorporating two new universities into the alliance and making its work plan up to 2027 possible.

Our vision is to contribute to a fairer society that is sustainable and aware of the need to act against climate change, a task in which the ethical and humanistic dimension of science and technology is essential. It’s a formula that guarantees that the UPC makes the best contribution to building a better future that is within everyone’s reach.

But we can’t face this or any other challenge without our principal asset: the UPC community. Students, administrative and service staff, teaching and research staff and alumni: enthusiastic people who contribute to making us what we are.

Welcome to the UPC!

Daniel Crespo Artiaga
Rector
The UPC
As a public university that is well positioned in the main international university rankings, the UPC has close ties to the production sector and the territory. Quality graduate employment is one of the features that sets it apart.

THE UPC, A UNICORN INCUBATOR
With nine entrepreneurs and six start-ups valued at over one billion euros or that may be so valued in the next two years, the UPC is one of the top universities at which founders of unicorn companies have trained.

QUALITY GRADUATE EMPLOYMENT
A year after graduating, 93% of UPC graduates are in employment and 90% have taken less than six months to find a job. Most of them started their careers thanks to work placements, 96% of which were on a paid basis.

(GS: AQU Catalunya)

GENERATING 0.3% OF CATALAN GDP
The UPC contributed to generating 0.3% of Catalonia’s GDP in 2019. For every 100 euros of public funding it received, the UPC returned 601.5 euros to society.

In terms of contribution to the labour market that year, the University directly or indirectly contributed to creating or maintaining 10,371 full-time equivalent jobs.

(Source: Impacte econòmic i retorn social de la UPC. Any 2019)

POSITION OF THE UPC IN THE MAIN INTERNATIONAL RANKINGS

QS World Rankings by Subject, 2022

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<th>Subject</th>
<th>World</th>
<th>Europe</th>
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<td>Architecture &amp; Built Engr.</td>
<td>19</td>
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<td>Civil &amp; Structural Engr.</td>
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<tr>
<td>Chemical &amp; Materials Engr.</td>
<td>113</td>
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<tr>
<td>Computer Science &amp; Systems</td>
<td>101-150</td>
<td>36-58</td>
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<tr>
<td>Statistics &amp; Operational Res.</td>
<td>101-150</td>
<td>26-46</td>
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<td>Environmental Sciences</td>
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The student, at the centre

The UPC puts the student at the centre of the learning process. In this process, the University proposes solid theoretical training, as well as experiences and projects based on formulas such as hands-on learning, learning by doing and project-based learning. Internationalisation, which permeates all of the University’s activity, is a key part of education that takes place on the world stage.

Placements in companies, subjects taught by professors who are active in the professional world and the development of student projects are some key aspects of UPC curricula. Teaching methodologies that use formulas such as hands-on learning, learning by doing and project-based learning are distinguishing features of a university with a considerable practical component, in which the development of projects, often from a multidisciplinary perspective, is a constant feature. The key to the teaching model is the combination of solid theoretical training with the opportunity to participate in a large number of real projects that make the learning process unique. The recipe works: 93% of UPC graduates are in work a year later and employer satisfaction is particularly high.

“At the UPC, students gain the capacity to solve any problem,” is a common comment of companies in their assessments of the training received by graduates. The aim is for students to gain the capacity to advance with knowledge independently, to develop creative thinking and to tackle the solution of interdisciplinary problems. In the UPC model, curricula are focused on the competencies and abilities that students must gain. For this reason, the effort that students make is valued, and not just the number of class hours.

Another essential element in the UPC teaching model is international competency. The University’s marked international vocation is the key here. Internationalisation permeates all the University’s activity, from research to knowledge transfer and social engagement.

Needless to say, teaching is also experienced as a fully international vocation that goes beyond traditional student mobility and opens up to new perspectives. At the UPC, a student might share a lecture with fellow students who are in attendance at KTH in Sweden or a university in China. Blended intensive programmes (BiPs) are a good example of this. They are recognised with 3 ECTS credits and are short, intensive programmes that use innovative teaching formulas such as online cooperation. BiPs combine short-term physical mobility (between 5 and 30 days), a virtual teaching component and an international context.

The Cosmic Research team in the Bondar launch control room.

The student association Cosmic Research, of the UPC’s Terrassa School of Industrial, Aerospace and Audiovisual Engineering, successfully built and launched the most powerful suborbital supersonic rocket built in Catalonia and the most powerful one in Spain built by university students.
HIGH ACADEMIC PERFORMANCE: STUDYING FOR TWO DEGREES AT THE SAME TIME

The CFIS is a unique centre set up by the UPC in 2003. Here, students with ability, interest and motivation can take interdisciplinary studies, taking two official degrees in the field of mathematics, physics and engineering that follow a highly intensive curriculum.

One of its attractions is the international mobility programme, which has a specific line of grants so that students can write their bachelor’s thesis at prestigious institutions around the world and at top-level international companies.

EDUCATION WITHOUT BORDERS

The UPC wants students to become global citizens who are able to understand and embrace the complexity of multiculturalism with a respectful, open and tolerant attitude. Its commitment and responsibility towards global challenges involves internationalising its academic curriculum, working in networks, building bridges and understanding different views of the world. In addition to exchange agreements on UPC degrees (1,640 with 767 universities around the world), the new Erasmus programme (2021-2027) promotes inclusivity, digitalisation and sustainability with other types of mobility, such as short stays and hybrid mobility, which make stays more flexible and grant more financial aid to vulnerable populations.

As a partner university in the Unite! alliance, the UPC offers students multiple options for international education and participation in projects and events with students from the most prominent technological universities in Europe.

AND IF YOUR DREAM IS TO START A COMPANY...

...Empren UPC facilities are the ideal setting for students to develop their innovative projects and new business ideas. They are located on most of the campuses and function as a pre-incubation programme for technology-based projects.

In the Empren facilities, students have work areas, share resources and services, receive training and advice on starting a company and can be mentored by specialists.

PLACEMENTS TO EXPLORE THE JOB MARKET AND EXPAND COMPETENCIES

Work placements are a great option to experience the job market and complement the knowledge gained in the academic training provided by the UPC. Students gain new competencies that prepare them for professional activities. For the company, signing an educational cooperation agreement allows it to have advanced trainee staff and to attract new talent.

At the UPC, placements are almost always paid. They increase graduate employability and promote innovative capacity. They are a defining element of the UPC and contribute to making the institution the best university in Spain in terms of quality graduate employment.

In the 2021-2022 academic year, 5,283 students participated in placement programmes.

UPC ALUMNI, THE COMMUNITY OF RELATIONSHIPS

More than 70,000 people are part of the UPC Alumni network. The community is grouped by interests through clubs, and it has no borders. An example is the UPC Seniors Club, which channels the interests of retired people from the University through social engagement and promotes university degrees for over 55s. At the other end of the life timeline are clubs such as Dones Polítecniques, in which women active in an engineering profession accompany future female engineers in the first steps of their careers.

The goal is clear: to accompany people and create a great community. In the words of entrepreneur and alumni Isabel García, “The aspiration is to have a university to which you can always return and find what you need at each moment: professional relationships, knowledge, lifelong learning, friends and so on.”

The CAT14X is a prototype by the BCN eMotorsport team, made up of ETSEIB and ETSETB students. It has been designed to participate in manual and autonomous car competitions. It has excellent reliability and incorporates the use of four engines and an autonomous system. Optimised regenerative braking has reduced the weight of the vehicle, a key element in these races.
At the UPC, students can join a human towers group to try to touch the sky with their hands as part of a coordinated team. In addition to this Catalan tradition, which is strongly rooted among young people, there are many other options, such as university theatre, Japanese culture and cinema. In total, around 150 student associations are active on UPC campuses.

Particularly notable are initiatives that, more than hobbies, are a personal or group response to the desire to make the world a better place. Examples would be associations that participate in university governance or the actions of student delegations that actively safeguard and defend students’ interests and the quality of education.

The Student Council is the UPC’s highest student representation body, acting on behalf of students and organising cross-disciplinary initiatives.

Sports practice at the University is another factor that brings the community together. The Sports Service organises and coordinates a wide range of activities, from elite athletics competitions to regular sports practice and interuniversity tournaments.

Academic life at the UPC develops in an environment of knowledge that is full of opportunities. Over a hundred student associations ensure that students can find a project they identify with and enjoy university life in another way. Comprehensive training of students is in the background.
Sustainability

In recent years, the climate emergency has become one of the priorities of university associations. In 2019, a group of students declared a state of climate emergency at the UPC. A few weeks later, the UPC University Senate ratified a proposal to make climate action a priority.

The UPC has adopted a climate action strategy to achieve neutrality in greenhouse gas emissions by 2030. To work towards this, it has intensified its actions to increase its own production of energy by installing solar plants in buildings. In this academic year, 2022-2023, the plan is to have a solar campus that generates 687.22 kWp.

The Centre for Development Cooperation, 30th anniversary

In the 2022-2023 academic year, Judith Molero is going to Mozambique to begin a cooperation visit in which the aim of the project is to work for gender equality. The project, which is not related to the bachelor's degree in Marine Sciences and Technologies that Judith has taken, becomes a personal experience. “Experience is what counts here,” she explains with a big smile, and adds, with a knowing look, that “the master’s degree will have to wait...”

Judith Molero's stay in Mozambique will take place during the celebrations of the 30th anniversary of the foundation of the Centre for Development Cooperation (CCD), the University unit that deploys the UPC community’s potential to help transform the world and that has this year become an operational unit within all of the University’s schools.

In 2022, a total of 245 people are participating in the 53 projects carried out in collaboration with other universities, NGOs, charities and other bodies. More than a hundred members of the community travel to participate directly on the ground in the initiatives that are carried out in 21 countries.

A university aligned with the Sustainable Development Goals (SDGs)

The UPC offers opportunities for transformative learning through high-quality education. Nevertheless, the institution acts from many other perspectives to deal with the main social challenges and their resolution. Climate action, the energy transition and the transformation of forms of production, and the reduction of inequalities on the planet make up some of the institution’s challenges that are aligned with the Sustainable Development Goals (SDGs). From its research centres and laboratories, the UPC promotes research and technology transfer projects for emerging challenges from a global perspective, but also from a local, dynamic and accessible perspective that is open to society. Below are some examples of this activity.

Aquí STEAM UPC brings women’s talent closer to technology and engineering studies, breaks stereotypes and gender roles and makes new female models visible. UPC researchers are presented to girls and boys as role models.

The UPC-Mercabarna Chair works from the EEABB to prevent and reduce food waste in retail and wholesale food distribution.

The Specific Centre for Hydrogen Research of the UPC (CER-H2) works to make green energy a sustainable solution for the energy transition.

The Autonomous Delivery Device (ADD) automates last-minute logistics and helps improve traffic and air quality. It was developed by CARNET, the Institute of Robotics and Industrial Informatics (IRI) and the University’s industrial partners.

For real equality of opportunity

Committed to a better world
Over the years, the UPC has established itself as a benchmark institution in technological fields that are fundamental to the progress of society, such as telecommunications, health and transport technologies, civil and environmental engineering, robotics, artificial intelligence and big data, and the energy transition and sustainability, among others.

The UPC is well positioned in the main international university rankings and continues to be the leading Catalan university in raising European funding in the Horizon 2020 programme, as well as the Spanish university that has the greatest number of patents. In the last year, it has launched 859 research projects at the forefront of science and also within the framework of national and international alliances with other institutions of excellence.

An example of this activity is the REST-COAST project, a four-year action plan to restore the coast and adapt it to the effects of climate change that is linked to the Barcelona School of Civil Engineering (ETSECCPB). The EHAWEDRY project is another example: the Barcelona School of Industrial Engineering (ETSEIB) is proposing a paradigm shift with respect to energy harvesting strategies.

The research activity on UPC campuses is contributing to forging current and future technological progress. The knowledge and innovation generated in different areas translate into real solutions for overcoming social and economic challenges, such as the introduction of artificial intelligence (AI) and the energy transition. The impact of this activity makes the UPC one of the main European universities.

EXEMPLARY CUTTING-EDGE RESEARCH

Almost 4,000 people comprise the teaching and research staff and the staff who work exclusively in research.
Energy for the future: hydrogen

In a context such as the current one, in which hydrogen is being put forward as a key sustainable solution for the energy transition, the UPC incubates research, innovation and technology transfer initiatives and projects focused on addressing the challenges of this emerging sector.

Obtaining green and blue hydrogen, designed fuel cells for the transport sector and creating more efficient catalysts are some of the cutting-edge projects led by the UPC through the Specific Centre for Hydrogen Research (CER-H2). The Centre, which is located on the Diagonal-Besòs Campus, has around 30 researchers who have, for years and in a range of research groups, been investigating hydrogen technologies in all areas of application: energy, industry, transport, housing, etc.

The CER-H2, which aims to become an international benchmark and particularly to align with the Horizon Europe plan and the European Next Generation recovery plan, brings together a powerful core of knowledge on hydrogen, ranging from hydrogen production, storage and distribution, its uses and from hydrogen production, storage and distribution, its uses. The UPC has joined the metropolitan agreement of the first Spanish public service station offering green hydrogen, which will be launched in the coming months. The UPC has joined the metropolitan agreement of the first Spanish public service station offering green hydrogen, which will be launched in the coming months.

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Fuel cells for vehicles

One of the most important applications of hydrogen is in the field of mobility, where progress is being made in designing fuel cells for electric vehicles and also for mobile devices. Work is being done to create innovative components that improve the efficiency and performance of fuel cells for hydrogen-based electric vehicles in order to reduce production costs and drive the market for this type of transport.

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In Catalonia, the UPC is the institution that participates in the greatest number of artificial intelligence (AI) projects in the European Horizon 2020 programme and the RIS3CAT strategy. In addition, it was the first university in Spain to offer full official training in AI, with bachelor’s, master’s and doctoral degrees in this field.

At the epicentre of the artificial intelligence ecosystem in Catalonia

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Catalonia is a leading region in AI in Europe, with an annual turnover of 1,358 million euros, 179 companies and more than 8,000 professionals, a strategic sector that will lead society’s technological revolution in the coming years. The UPC contributes to making Catalonia a driving force in AI in Europe. The University is a founding partner of the European AI4EU initiative, which focuses on developing a European AI platform for transferring technology to the business sector and which will set the roadmap for research, development and innovation in this area in the next ten years in Europe. In this context, the UPC is a key part of Catalonia’s artificial intelligence strategy (Catalonia.AI). It is the Catalan body that does the most research and innovation in this field, with a leading technological and knowledge ecosystem made up of 18 research centres and groups and 280 researchers, who participate in major national and international scientific and technological projects. One of these centres is the Intelligent Data Science and Artificial Intelligence (IDEA-UPC) research centre, which is currently the largest AI centre in Catalonia, with almost 60 permanent researchers and around 150 doctoral students. Examples of its projects are the development of surgical and healthcare robots; new text and voice machine translation systems; the digitalisation of pathological anatomy services through artificial vision systems; and the application of AI in the Industry 4.0 setting.

In addition to leading research in this field, the UPC has a full offering of bachelor’s, master’s and doctoral degrees in the AI field. The University also works to ensure that no one is left out when it comes to this new technology and offers free training on the CiutadanIA course that is open to all.

Digital twins to make industry more efficient, more reliable and safer

Researchers at the Department of Civil and Environmental Engineering, which is linked to the Barcelona School of Civil Engineering (ETSECCPB), are leading one of the work packages in the ASHVIN European project. The aim is to use digital twin technology to make the European construction industry more efficient, more reliable and safer.

Digital twins are virtual replicas of objects or processes that simulate the behaviour of their real counterparts in real time. There are a range of benefits to this technology, as they allow situations to be reproduced, experimented on and predicted in a safe environment to improve effectiveness. “It is not a new concept: it was developed for the first time at NASA to prove the viability of their missions. What we want with the ASHVIN project is to apply this innovative technology to the world of civil engineering,” explains Rolando Chacón, a researcher at the Department of Civil and Environmental Engineering and the UPC project manager of Assistants for Healthy, Safe, and Productive Virtual Construction Design, Operation and Maintenance using a Digital Twin (ASHVIN).

Thus, ASHVIN, which has received funding from the European Commission’s Horizon 2020 research and innovation programme, will improve productivity, reduce costs and ensure safe working conditions in the European construction industry. The proposal is based on the creation of a European standard for digital twins, an open-source digital twin platform that integrates image processing and Internet of Things technologies, and a series of tools and procedures that ensure productivity, cost and safety improvements.
Taking a doctoral degree at the UPC: extending the frontiers of knowledge

Bachelor’s, master’s and doctoral degrees: three stages of education that culminate in the doctoral degree, the highest academic degree awarded by the University, which involves advanced training in research techniques. That is the first step on an exciting path that reaches its highest point in the defence of a doctoral thesis, an original piece of work in a cutting-edge field.

The UPC offers 45 doctoral programmes in architecture, urbanism and building construction, sciences, civil and environmental engineering, ICT engineering and industrial engineering. Currently, more than 2,107 students are being trained to become future PhD holders and there are around 100 industrial doctorates that involve carrying out research in collaboration with a company. Last year, 231 doctoral theses were defended on topics as diverse as using silver in bone implants because of its antibacterial properties, treating bone tumours with low-temperature atmospheric plasmas and testing the use of hydroxyapatite, a ceramic material, as a catalyst to harness CO₂. These are just three examples that show the talent of PhD holders educated at the UPC.

All of this has a strong international component: more than half of the students at the UPC’s Doctoral School come from other countries, from the rest of Europe, Latin America, Asia – and a third are given the international mention in their degree, which implies, alongside other requirements, that they have spent time at a foreign university and have written part of their thesis in a foreign language.

In this context, the Doctoral School works to ensure the academic quality of the doctoral programmes to attract the best national and international candidates and to offer a solid research and professional career programme, thus promoting international mobility. An education that is rewarded at the end of the degree: almost all UPC PhD holders are in employment, generally in positions that correspond to their degree.

When citizens get involved in research

Citizens can participate actively in university research and become a key part of many of the projects carried out at the UPC. It’s what’s known as citizen science. This participation, which can occur in different ways, connects scientific challenges with society and its needs.

Sharing data on urban journeys to help find less-polluting routes or reporting on passenger density in public transport via an application are forms of citizen participation in the research projects carried out by the UPC.

This citizen participation takes many forms and is increasingly a trend all over the world. Citizens can, for example, describe artworks to train artificial intelligence models that help us to understand our cultural and artistic heritage and make it more accessible to the general public or identify organisms on the seabed through live images from an underwater camera. Research projects empower citizens, who take charge of one or more stages of scientific research by posing questions, formulating hypotheses and collecting and analysing data. Ultimately, it is another way of bringing the activity of the University’s laboratories, groups and research centres closer to society and, at the same time, to make research staff aware of local concerns.

The citizen science initiatives of the UPC are described in the Citizen Science Portal: https://cienciaciutadana.upc.edu/
A university with an international vocation that is more inclusive, digital and sustainable, that functions as part of a network and is based on long-term alliances with universities and other academic and scientific institutions in Europe and around the world. The UPC strives to be a community of citizens who have the ability to understand the world and contribute to it, a community of open, tolerant, empathetic and adaptable people who have the skills and knowledge they need to contribute to the great challenges of today’s society.

ON THE WORLD STAGE

Beyond mobility, internationalisation at the UPC is a practice of cross-disciplinary excellence for all of its areas of activity and for everyone.
In recent years, the UPC has forged alliances around the world and today it plays an active part in an extensive and rich network of international strategic partnerships. These institutional ecosystems facilitate the community’s mobility, the development of international teaching and research projects and the attraction of talent and opportunities. In this global context, international cooperation to respond to shared problems drives its activity, an activity without borders that has the world as its stage. These are the main international networks to which the UPC belongs:

**THE UPC IN INTERNATIONAL NETWORKS**

- **UNITECH International**
- **CELSAER Conference of European Schools for Advanced Engineering Education and Research**
- **CLUSTER Consortium Linking Universities of Science and Technology for Education and Research**
- **CINDA Centro Interuniversitario de Desarrollo**
- **UNITE!, BUILDING THE EUROPEAN UNIVERSITY OF THE FUTURE**

The nine universities combine the talent of a community of more than 280,000 students and nearly 80,000 bachelor’s, master’s and doctoral degree graduates each year.

The UPC is one of the nine European universities that are part of Unite!, the University Network for Innovation, Technology and Engineering. This alliance of European technological universities works with the support of the European Commission to promote the construction of the future European Higher Education Area.

Unite! wants to become a model European university of innovation, technology and engineering and to offer excellent education and research that focus on today’s major social challenges. The alliance works intensively with the communities of the nine universities on implementing future European bachelor’s degrees and developing a European Doctoral School around strategic areas such as sustainable energy, artificial intelligence, Industry 4.0 and entrepreneurship.

From the alliance, the UPC designs and implements new learning models based on challenges and the development of digital, hybrid and face-to-face environments, new environments that will facilitate access to international programmes for students who have until now been excluded for economic, social or physical mobility reasons.

- **Universia**
- **Universitat Politècnica de Catalunya - BarcelonaTech**
- **Wrocław Tech**
- **Politecnico di Torino**
- **Grenoble INP-UGA**
- **Aalto University, Espoo/Helsinki**
- **Technical University of Darmstadt**
- **Graz University of Technology**
- **Universidade de Lisboa**

**INTERNATIONAL DOUBLE DEGREE PROGRAMMES WITH 26 UNIVERSITIES**

- **30% INTERNATIONAL MASTER’S DEGREE STUDENTS**
- **55% INTERNATIONAL DOCTORAL DEGREE STUDENTS**

**UPC STUDENTS ON MOBILITY PROGRAMMES**

- **1,315**
- **1,441**
- **1,640**
- **219**

**INTERNATIONAL EXCHANGE STUDENTS AT THE UPC**

**STUDENT EXCHANGE AGREEMENTS WITH 767 UNIVERSITIES**

**EDUCATIONAL COOPERATION AGREEMENTS WITH INTERNATIONAL INSTITUTIONS**

**UNITECH International**

- **Red Emprendia**
- **Maggilhães**
- **RMEI**

**TELESCOPI**

- **Instituto de Observatorios de Buenas Prácticas de Dirección Estratégica Universitaria en Latinoamérica y Europa**

**EUA European University Association**

- **Universia**
- **Universitat Politècnica de Catalunya - BarcelonaTech**

**A photograph of the Fourth Unite! Dialogue that the UPC hosted in Barcelona last year.**
The UPC's connection with the business fabric generates innovation environments that contribute to laying the foundations for Industry 4.0 by applying cutting-edge technologies. This transfer of knowledge allows the industrial sector to adapt to the challenges of today's society by applying advanced manufacturing technologies, artificial intelligence, industrial robotics and nanotechnology. This collaboration materialises every year in more than a thousand national and international agreements and projects that transform the knowledge generated by UPC research groups and centres into productive value, with a focus on emerging sectors and without forgetting the needs of small and medium-sized enterprises, for which tailor-made, innovative solutions are designed to respond to challenges in biomedical engineering, logistics, sustainable mobility, telecommunications and new energy sources, for example. In this framework, and as the country's benchmark technological university, the UPC coordinates the project that will lend consistency to new Catalan Industry 4.0: Looming Factory, an emerging group that develops computer algorithms, communication systems and collaborative robots that should make Catalan industry a smart, connected environment that is also essentially human. It offers technologies that will facilitate the leap towards full digitalisation of Catalan industry. In addition to Looming Factory, the University participates in a further five technological alliances with public and private entities to promote developments in areas such as 3D printing, the next generation of computers, the Internet of Things, low-power processors, fusion energy and quantum computing: BASE3D, DRAC, FEM-IoT, FusionCAT and Quantum CAT.

The scientific and technical services of the UPC offer companies a network of laboratories, equipment and professionals to find incremental solutions.

**INNOVATION HUBS**

The synergies between the UPC and the business sector come into being in the innovation hubs, the ideal framework for collaboration on the development of new products and services, often in connection with student projects, spin-offs and start-ups at the University and incubators for emerging companies. Some of the companies that work with the UPC in the innovation hubs model are SEAT and Volkswagen Group Research, Huawei, Damm, Port de Barcelona, Innomads and Valenveras, with which the UPC works in a coordinated manner to advance scientific knowledge in the fields of sustainable mobility, 5G, digital manufacturing and quantum technologies. An example of a university business incubator is the one promoted by the European Space Agency (ESA BIC Barcelona) on the Baix Llobregat Campus. The facility accelerates start-ups that base their business on the innovative use of space technologies. The UPC also participates in 152 institutional research, development and innovation networks and coordinates three benchmark networks belonging to the Catalan government: the Fourth Industrial Revolution Network (XaFIR), in the framework of Industry 4.0, the R&D Network in Health Technologies (XarTEC SALUT) and the Maritime Network of Catalonia (BlueNetCat). The UPC is also the leading university in Spain in generating patents. Some of the recently patented innovations are a biomaterial for treating bone cancer, an intelligent system for pest management and an antibacterial hydrogel for healing chronic wounds. Another formula for concentrating knowledge and transferring it to the market is designing and setting up research centres with this approach in mind. Among the latest initiatives is Agrotech, a research centre that develops technologies stemming from robotics, digitalisation and communications for the agri-food sector. The aim is to contribute to the sector’s transformation and to place it at the forefront of technological innovation.

**The UPC transfers knowledge to all types of companies and to students’ business ideas.**

The UPC is the leading university in Spain in patent applications.
THE FUTURE OF SUSTAINABLE AUTOMOTIVE ENGINEERING: IN MOTION AT THE UPC

Automotive engineering is the second most important industry in Catalonia. It employs 56,200 people directly, a figure that rises to 143,000 if distribution and repair are included. It has 10,000 companies and generates more than 10% of GDP. It is a strategic sector for the country to which the UPC provides training, research, knowledge transfer and innovation. The University contributes every year to training professionals at the bachelor's, master's and doctoral levels in automotive engineering and has a group of 2,800 professors who are experts in different areas of knowledge, with a large core of research groups that carry out technological innovation in this field. The UPC's pledge is to promote a sustainable mobility model that has a low environmental impact and is efficient and equitable. With this milestone in mind, the University has a large network of alliances with the sector's main actors and carries out technology transfer to car companies. The SEAT-UPC Chair and the UPC's leadership in urban mobility innovation through CARNET (the hub created with SEAT and Volkswagen Group Research) are two clear examples. Added to this is the University's participation in major international projects, such as EIT Urban Mobility, a European consortium that promotes innovation and entrepreneurship to achieve more efficient, intelligent and decarbonised cities, and in which the main European automotive engineering companies are present.

ENTERPRISE CHAIRS, A LONG-TERM ALLIANCE

Enterprise chairs are an instrument for establishing long-term collaboration between businesses and the University. They offer a wide range of advantages, as they are tailor-made and promote training, research and technology transfer projects and scholarship that are of interest to both the company and the UPC. The chairs promote student placements in companies and bachelor's, master's and doctoral theses.

Girbau Group-UPC Chair of Research and Innovation in Industrial Laundry Technology
SEAT-UPC Chair in Automotive Excellence and Innovation for Sustainable Mobility
AMES Group-UPC Chair in Design and Innovation of New Biomaterials
Barcelona Chair of Housing Studies
Batlleiroig Chair
Telefónica Móviles España Cognitive IoT Chair, Universitat Politècnica de Catalunya, Universitat Pompeu Fabra
Fabra Urban Regeneration Chair
EIC-UPC Engineering and Business Chair
Endesa Red-UPC Chair in Energy Innovation
Estabanel-UPC Chair
Construcció Group Chair: Circular Economy Hub for Construction and Industry
JG Ingenieros Group-UPC Chair for Sustainability Studies of Buildings
HP-UPC Digital Manufacturing Innovation Hub Chair
Jujol Chair
Klockner-UPC Chair in Dental Implants and Prostheses
Vanderlande Industries Spain Chair

INDUSTRIAL DOCTORATES, ATTRACTING THE RIGHT TALENT

Industrial doctorates are a formula to increase the competitiveness and internationalisation of the Catalan industrial fabric and promote the recruitment of university talent by businesses. They are based on agreements with the UPC and last for three years, during which doctoral candidates carry out a research project that is the object of a doctoral thesis at a company. The programme fosters industrial doctoral degree holders acting as bridges for knowledge transfer and also create highly qualified jobs in the country's industrial fabric. The UPC has established itself as a leading university in industrial doctorate projects in Catalonia, with over 230 projects awarded, in the ten years that the programme supported by the Government of Catalonia has been running.
UPC STRUCTURE

DEPARTMENTS

CEM. Materials Science and Engineering
CEN. Nautical Science and Engineering
CS. Computer Science
DAC. Computer Architecture
DEAI. Agro Food engineering and Biotechnology
DECA. Civil and Environmental Engineering
DEE. Electrical Engineering
EEL. Electronic Engineering
EEG. Engineering graphics and Design
EO. Statistics and Operations Research
EMH. Mechanical Engineering
EMIT. Mining, Industrial and ICT Engineering
ENTEL. Network Engineering
EPC. Project and Construction Engineering
EQG. Chemical Engineering
ESAI. Automatic Control
ESSL. Service and Information System Engineering
FIS. Physics
MAT. Mathematics
MF. Fluid Mechanics
MHT. Heat Engines
OQ. Management
OQO. Optics and Optometry
PA. Architectural Design
RA. Architectural Representation
RMEE. Strength of Materials and Structural Engineering
TA. Architectural Technology
THATC. Theory and History of Architecture and Communication Techniques
TIC. Signal Theory and Communications
UDT. Urbanism and Regional Planning

TECNIO RESEARCH CENTRES*

CATMech. Centre for Advanced Technologies in Mechanics
CCP. Catalan Plastics Centre
CDSE. Centre for Sensor, Instrument and Systems Development
CTCEA. Centre for Technological Innovation in Static Converters and Actuators
CREE. Biomedical Engineering Research Centre
CFTP. Heat and Mass Transfer Technological centre
CECEM. Electromagnetic Compatibility Group
ICM. Innovation in Materials and Molecular Engineering, Centre for Structural Integrity, Micromechanics and Reliability of Materials
InLab. FIB
INTETER. Terrassa Institute of Textile Research and Industrial Cooperation
IRL. Institute of Robotics and Industrial Informatics
INTEM. Institute of Energy Technologies
LABON. Hydraulic and Pneumatic Systems Laboratory
MCCIA. Motion Control and Industrial Applications Research Group
SART. Technological Development Centre for Remote Acquisition and Data Processing Systems
SER. Renewable Electrical Energy Systems
SSR-UPC. Smart Sustainable Resources

SPECIFIC RESEARCH CENTRES

AGROTECH-UPC. Agri-Food Technology Specific Research Centre
CEER. Specific Centre for Hydrogen Research of the UPC
CATMech. Centre for Advanced Technologies in Mechanics
CCABA. Centre for Advanced Broadband Communications
CDSE. Centre for Sensor, Instrument and Systems Development
CEIMAC. Architectural Design and Construction Centre of Catalonia
CEIBM. Molecular Biotechnology Centre
CEIP. Research and Development Centre for Business Improvement and Innovation
CETPO. Technical Research Centre for Dependency Care and Autonomous Living
CommSensLab-UPC. Remote Sensing, Antennas, Microwaves and Superconductivity Group
CPSV. Centre for Land Valuation Policy (CER)
CSAL. Centre for Research and Services for the Local Administration
CREB. Biomedical Engineering Research Centre
CRED. Centre for Engineering and Heat Installations
CREE. Barcelona Research Centre in Multiscale Science and Engineering
CS2AC-UPC. Continuum and Computational Mechanics
Centre for Engines and Heat Installations
CS3AC-UPC. Supervision, Safety and Automatic Control
IDEAI-UPC. Intelligent Data Science and Artificial Intelligence Research Center
LaqCN. Numerical Methods for Applied Sciences and Engineering
LIM/UPC. Maritime Engineering Laboratory
MC2-UPC. Continuum and Computational Mechanics
PERC-UPC. Power Electronics Research Centre
SSR-UPC. Smart Sustainable Resources
TALP. Centre for Language and Speech Technologies and Applications

ASSOCIATED RESEARCH ENTITIES

BSC-CNS. Barcelona Supercomputing Center - Centro Nacional de Supercomputación (MareNostrum)
CIIIC. International Centre for Coastal Resources Research*
CMNE. International Centre for Numerical Methods in Engineering*
CREDA. Centre for Agrofood Economics and Development
CTTC. Discommunications Technology Centre of Catalonia*
EURCAI. Technology Centre of Catalonia
FPA. Miguel Agusti Foundation
IUBAT. ICT Foundation
IIBEC. Institute for Bioengineering of Catalonia*
IFCA. Institute of Photonic Sciences*
ICII. Institute of Space Studies of Catalonia*
IEBEC. Institute of Space Studies of Catalonia*
IEBC. Catalonia Institute for Energy Research*

* Entity that is a member of the Research Centres of Catalonia (CERCA) programme

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THE UPC GROUP

The UPC Group consists of entities in which the UPC has a direct or indirect controlling interest. All of them aim to make the University’s mission a reality by making a variety of contributions.

SPONSORS OF EXCELLENCE

Colleagues and organisations and sponsors

Almost 3,000 companies have some kind of link to the UPC. Some of these corporations have opted to strengthen these ties to the University from different perspectives. The most common form university corporate relations take is knowledge and technology transfer agreements and work placement programmes that allow corporations to recruit new talent from the UPC, including through industrial doctorates. There is a steady increase in the number of large, medium-sized and small enterprises that establish long-term institutional ties to the UPC in which the relationship spring from working on projects of common interest. These projects are always tailor-made and respond to the strategy of both the company and the University. Setting up enterprise chairs and developing corporate social responsibility through sponsorship and patronage are some of the lines of work in this relationship framework.

The University is launching a large-scale project at the FPCat-UPC Sustainable Mobility Campus (Martorell).

SPONSORS

Accenture
Agbar, S.L.U.
AMES PM TECH CENTER SAU
Baltic Royal Arquitectura SLP
CELLnex TELECOM S.A.
CIMSA Cementos de España, S.A.U.
Construcció
Endesa Red S.A.
Esteban y Pahísa, S.A
Fundación ONCE
GE Renewable Energy
HP Printing and Computing Solutions (HP)
Hypermic Materials & Technologies
JG Ingenieros
LG Electronics Spain
Mercados de Abastecimientos de Barcelona (MERCABARNA)
Naturgy Energy Group, SA
NTT DATA, S.L.U.
Official College of Industrial Engineers of Catalonia
Premium PSJ
Siemens Energy, S.A.
SOADCO (Kockner Implant Systems)
Sonotic Making Sense of Sounds S.L
Telesfora
Vanderlande Industries España, S.A.U.
Ziyou

COLLABORATORS

Área Metropolitana de Barcelona
Collège de Quantity Surveyors, Technical Architects and Building Engineers of Barcelona
Caja d’Enginyers Foundation
Collège of Engineering Graduates and Industrial Engineers of Barcelona
Collège of Industrial Engineers of Manresa
Constructora del Cardoner S.A
Corporación de Prácticas del Puerto de Barcelona, S.L.P
DENSO Barcelona SAU
dSPACE GmbH
GRADIENTE™ S.A.E.
Inaco, S.A.
L’AMP S.A.
Mutualitat de Previsió Social, Official College of Industrial Engineers of Catalonia
URBIDERMIS, S.L

FPCAT-UPC SUSTAINABLE MOBILITY CAMPUS (MARTORELL)

The University is launching a large-scale project at the FPCat-UPC Sustainable Mobility Campus (Martorell).

FUNDACIÓ POLITÈCNICA DE CATALUNYA (FPC)

The Fundació Politècnica de Catalunya (FPC) is an institution created by the UPC to foster and promote lifelong learning activities. The UPC School coordinates this offering.

CIM UPC

CIM UPC is an innovation and technology centre specialised in advanced production technologies. It helps companies and professionals to increase technological capacity and innovation by offering technology services in the industrial sector and specific training programmes.

ITHINKUPC

ITHinkUPC is the consultancy and advanced software services company of the Universitat Politècnica de Catalunya. It helps companies by creating solutions and advanced services.

B_TEC FOUNDATION

The b_TEC Foundation promotes the UPC’s Diagonal-Besòs Campus, contributes to connecting the public administration, the University and the business world, and drives territorial transformation.

UPCNET

UPCnet is a UPC Group company created to provide services in the areas of information and communication technologies. These services are designed for various units of the UPC and other companies in the Group.

INNOVATION AND TECHNOLOGY CENTRE FOUNDATION (CIT UPC)

CIT UPC puts the University’s research capacity at the service of business innovation. The knowledge and results of the UPC’s research and technology transfer centres are the tools it works with.

MEDITERRANEAN TECHNOLOGY PARK (PMT)

A science and technology park promoted by the Government of Catalonia, the Baix Llobregat Provincial Council, Castelldefels City Council and the UPC. It promotes a multidisciplinary space in which research, innovation and knowledge transfer drive development.
ARCHITECTURE, URBANISM AND BUILDING CONSTRUCTION
Architectural Technology and Building Construction, ETSAB
Architecture Studies, ETSAB / ETSAV
Landscape Architecture, EEBB-ETSAV

APPLIED SCIENCES
Data Science and Engineering, ETSETB-FIB-PMI
Marine Sciences and Technologies, majors in: Marine Sciences and Engineering / Marine Technology, EPSEVG-EEABB-ETSECCPB
Engineering Physics, ETSETB
Mathematics, FME
Statistics, FME (interuniversity UB-UPC degree)
Economics and Statistics, FME (interuniversity UB-UPC double degree)

HEALTH SCIENCES AND TECHNOLOGY
Biomedical Engineering, EEBB
Optics and Optical Engineering, EEBB

DESIGN AND MULTIMEDIA TECHNOLOGY
Design, Animation and Digital Art, CITM
Video Game Design and Development, CITM
Multimedia Studies, CITM

ARCHITECTURE, URBANISM AND BUILDING CONSTRUCTION
Architectural Technology and Building Construction, ETSAB
Architecture Studies, ETSAB / ETSAV
Landscape Architecture, EEBB-ETSAV

APPLIED SCIENCES
Data Science and Engineering, ETSETB-FIB-PMI
Marine Sciences and Technologies, majors in: Marine Sciences and Engineering / Marine Technology, EPSEVG-EEABB-ETSECCPB
Engineering Physics, ETSETB
Mathematics, FME
Statistics, FME (interuniversity UB-UPC degree)
Economics and Statistics, FME (interuniversity UB-UPC double degree)

HEALTH SCIENCES AND TECHNOLOGY
Biomedical Engineering, EEBB
Optics and Optical Engineering, EEBB

DESIGN AND MULTIMEDIA TECHNOLOGY
Design, Animation and Digital Art, CITM
Video Game Design and Development, CITM
Multimedia Studies, CITM

NAVAL, MARITIME AND NAUTICAL ENGINEERING
Aerospace Systems Engineering, majors in: Air Navigation / Airports, EETAC
Telecommunications Systems Engineering, majors in: Telecommunications / Network Engineering, ETSECAT

BIOSYSTEMS AND AGRI-FOOD ENGINEERING
Food Engineering, EEABB
Agronomic Science Engineering, majors in: Horticulture and Gardening / Crop and Livestock Production, EEABB
Biosystems Engineering, EEABB
EEABB-ETSECCPB
Agronomic Science Engineering, majors in: Horticulture and Gardening / Crop and Livestock Production, EEABB

INFORMATICS ENGINEERING
Data Science and Engineering, ETSETB-FIB-PMI
Geoinformation and Geomatics Engineering, EEBB
ICT Systems Engineering, EEBB
Artificial Intelligence FIB
Bioinformatics Engineering, FIB (interuniversity UPF-UPC - UU degree)
1/ A rose for Sant Jordi generated by artificial intelligence, a project by UPCArts and the inLab at the Barcelona School of Informatics (FIB).

2/ Ricardo Bofill Levi, awarded an honorary doctorate by the UPC. Bofill was a student at the Barcelona School of Architecture (ETSAB).

3/ Women’s increased presence on UPC degrees and in university life.

4/ Biomaterials for bone regeneration with an innovative treatment based on hydrogels treated with plasma gas, research done at the Barcelona East School of Engineering (EEBE).