Master's degree in Interdisciplinary and Innovative Engineering

Today's society demands breakthrough technologies in emerging areas such as energy management, digital industry and healthcare. Facing such challenges requires that interdisciplinary engineering teams work together to come up with creative, reliable, ethical and sustainable solutions.

One of the key factors in leading successful projects is for professionals from different areas to have strong skills in modern engineering methods such as big data, 3D printing, smart sensors and computer simulation. The master's degree in Interdisciplinary and Innovative Engineering has been designed to enhance your academic background with such skills, thus preparing you for the future.

The specialisations will allow you to face real problems in three emerging areas of application: energy-efficient systems, smart factories and healthcare technologies. A research-oriented master's thesis worth 30 ECTS credits will provide you with the opportunity to collaborate with R&D departments at companies, research centres and hospitals.

Specialisations

- Efficient Systems
- Advanced Manufacturing Systems
- Healthcare and Biomedical Applications

GENERAL DETAILS

Duration and start date
2 academic years, 120 ECTS credits. Starting September

Timetable and delivery
Afternoons. Face-to-face

Fees and grants
Approximate fees for the master's degree, excluding degree certificate fee, €6,535 (€9,802 for non-EU residents).
More information about fees and payment options
More information about grants and loans

Language of instruction
English

Location
Barcelona East School of Engineering (EEBE)

ADMISSION

General requirements
Academic requirements for admission to master's degrees

Specific requirements
To be admitted to the master's degree, applicants must certify, at the time of enrolment, that they have a CEFR B2 level of English (at minimum).

Direct admission
It is recommended that applicants have a university-level qualification of a scientific-technical nature, that is, a bachelor's or pre-EHEA degree in engineering or sciences.
With bridging courses
On a case-by-case basis, the academic committee of the master’s degree may consider admitting applicants who have completed qualifications other than those recommended. When such applicants are admitted, the academic committee will specify the bridging courses that must be completed. The bridging courses required may vary in view of the student’s academic background but will be related to the following subjects:
- Electronics
- Programming
- Numerical methods

In any case, applicants will not be admitted if, based on their academic background, they would need to complete bridging courses carrying a total of more than 30 ECTS credits.

Admission criteria
- Academic record (60%)
- Correspondence between the competencies of the entrance qualification and those of the master’s degree (40%)

Places
60

Pre-enrolment
Pre-enrolment closed (consult the new pre-enrolment periods in the academic calendar).
How to pre-enrol

Enrolment
How to enrol

Legalisation of foreign documents
All documents issued in non-EU countries must be legalised and bear the corresponding apostille.

PROFESSIONAL OPPORTUNITIES

Professional opportunities
- R&D centres
- Start-up companies
- Technology management and intellectual property
- Digital transformation projects
- eHealth applications
- Business intelligence
- Industry 4.0 and smart factories
- Sustainability management

Competencies

Generic competencies
Generic competencies are the skills that graduates acquire regardless of the specific course or field of study. The generic competencies established by the UPC are capacity for innovation and entrepreneurship, sustainability and social commitment, knowledge of a foreign language (preferably English), teamwork and proper use of information resources.

Specific competencies:
- Apply sensorisation, instrumentation and data acquisition technologies to characterise, monitor and control the status of systems, plants and processes.
- Apply techniques related to pattern recognition, artificial intelligence, and statistical data analysis so that decisions concerning problems of a multidisciplinary nature can be made in an objective, quantitative and reproducible way.
- Use appropriate computational techniques to simulate engineering-related physical phenomena, and adapt and apply optimisation algorithms to tackle engineering problems.
- Design and implement modelling techniques to describe the operation of systems, predict the stability of a system and apply control techniques in different scenarios.
- Apply predictive analytics to identify innovation risks and opportunities in different company areas and in the planning and management of projects aimed at creating new technological products and business models.
• Assess the sustainability of proposed technological solutions and associated risks in order to address problems objectively and quantitatively, and propose schemes that foster reuse of resources and support the circular economy.
• Catalogue and assess internal and external technologies (both mature and emerging), make proposals concerning how to manage them in a way that is aligned with company strategy, plan and manage RDI projects and follow procedures for obtaining public or private funding for such projects.
• Assess, quantify and manage the business risk associated with technical solutions adopted in engineering projects.
• Design, implement and manage automated systems for the control and supervision of processes in engineering.
• Design and implement image analysis systems for advanced characterisation of complex systems in engineering.
• Design and manage processing and management systems for the production, storage, conversion and distribution of electric power using different technologies (specific competency of the Efficient Systems specialisation).
• Design technical solutions that ensure responsible and sustainable management of materials used and reduce the associated environmental impact (specific competency of the Efficient Systems specialisation).
• Design industrial applications that use physical chemistry processes that optimise the efficiency and sustainability of systems (specific competency of the Efficient Systems specialisation).
• Design and manage production processes that include quality control systems based on advanced characterisation techniques (specific competency of the Advanced Manufacturing Systems specialisation).
• Design and implement procurement, operational and control systems that integrate electronic, electrical and mechanical technology in relation to intelligent production systems (specific competency of the Advanced Manufacturing Systems specialisation).
• Design systems for the monitoring, planning and control of automated industrial processes that allow for automated predictive maintenance based on detection and diagnosis of plant failures (specific competency of the Advanced Manufacturing Systems specialisation).
• Apply advanced techniques for the acquisition, processing, analysis and interpretation of biomedical signals in order to identify and monitor physiological biomarkers in the diagnostic process (specific competency of the Healthcare and Biomedical Applications specialisation).
• Use software tools for design, modelling and computational simulation to design innovative solutions in biomedicine (specific competency of the Healthcare and Biomedical Applications specialisation).
• Develop translational applications aimed at gaining a better understanding of physiological phenomena of clinical relevance, and design new applications in areas that have an impact on healthcare (specific competency of the Healthcare and Biomedical Applications specialisation).
• Produce, document, and present and defend before an examination committee, an original work consisting of an individual or group project of an interdisciplinary nature that draws on and integrates the competencies acquired on the master’s degree.

ORGANISATION

UPC school
Barcelona East School of Engineering (EEBE)

Academic coordinator
Raul Benítez

Academic calendar
General academic calendar for bachelor’s, master’s and doctoral degrees courses

Academic regulations
Academic regulations for master’s degree courses at the UPC

CURRICULUM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>ECTS credits</th>
<th>Type</th>
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<tr>
<td>Data Acquisition &amp; Instrumentation</td>
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<td>Subjects</td>
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<tr>
<td>Data Analysis &amp; Pattern Recognition</td>
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<td>Simulation &amp; Optimization</td>
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<td>Bioinformatics</td>
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<td>Biomechanics &amp; Sport Technology</td>
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