

# Master's degree in Biomedical Engineering

The **Master's degree in Biomedical Engineering** ([master's degree website](#)), coordinated by the **Universitat de Barcelona (UB)** with the **UPC as a participant**, aims to solve any specific engineering problem arising in biology and medicine. It is an interuniversity master's degree that offers technical, scientific and practical technology training that is suitable for application in the basic disciplines of medicine and will enable graduates to further their careers in the fields of industry, health, research, development and innovation.

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## GENERAL DETAILS

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### Duration and start date

One academic year, 60 ECTS credits. Starting September

### Timetable and delivery

Afternoons. Face-to-face

### Language of instruction

Subjects will be taught in Spanish or English, depending on the student's level of comprehension and on the teaching objectives of the master's degree course.

### Official degree

[Recorded in the Ministry of Education's degree register](#)

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## ADMISSION

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### General requirements

[Academic requirements for admission to master's degrees](#)

### Places

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### Pre-enrolment

To enrol for an interuniversity master's degree coordinated by a university other than the UPC, you must enrol through the coordinating university:

[Universitat de Barcelona \(UB\)](#)

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## PROFESSIONAL OPPORTUNITIES

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### Professional opportunities

The content of the master's degree in Biomedical Engineering is applicable to three main sectors: industry, healthcare and research, development and innovation.

#### Industry

In the industrial sector, the structure presented in the White Paper on Research, Development and Innovation in the Healthcare Products Sector—published in 2001 by the Spanish Federation of Healthcare Technology Companies (FENIN) with the support of the Ministry of Science and Technology and the Ministry of Health and Consumer Affairs—identifies 10 principal sub-sectors requiring qualified graduates: electromedicine; in vitro diagnosis; nephrology; cardiovascular medicine; neurosurgery and pain treatment; orthopaedic surgery and traumatology; single-use medical product manufacturing; healthcare services; dental technology; and optics and ophthalmology.

## Healthcare

There are currently some 800 hospitals in Spain, only 250 of which employ technical staff specifically responsible for maintaining installations. The acquisition, renewal, operation and optimisation of these installations, all of which have a considerable bearing on process efficiency and care quality, are tasks often assigned to different managers, while training is generally provided by the sales staff of the product distributors. Therefore, new graduates with the knowledge and training required to identify and implement the most suitable policies in specific circumstances can make a valuable contribution to improving the current situation.

## Research, development and innovation

New graduates of the master's degree in Biomedical Engineering are needed to join the internationally renowned research groups of the Institute for Bioengineering of Catalonia (IBEC) and the Catalan public universities. The course content is designed to reflect current requirements in scientific research, development and innovation. Journals and conferences in the biomedical engineering sector group scientific activities in the following major areas: bioelectronics; biomaterials; biomechanics; biosystems; biomedical imaging; nanobioengineering; biomedical signal processing; and medical technology.

## 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.

On completion of the course, students will be able to:

### Specific competencies

On completion of the course, students will be able to:

- Analyse complex systems and decide which aspects or subsystems are most important, according to the specifications of the task to be carried out.
- Use the basic and specific instrumentation of biomedical engineering.
- Experimentally check the validity of the theoretical models for the apparatus, devices, machines and systems used in biomedical engineering.
- Install hardware and software for data acquisition systems and update systems.
- Design and carry out the experiments required for research projects.
- Manage the literature, documents, legislation, data bases and specific software used in biomedical engineering.

### Attitudes

- A desire for continuing professional improvement.
- Critical awareness.
- An awareness of the role of engineering in today's world.

### In the industrial field:

On completion of the course, students will be able to:

- Understand the needs of the sector of healthcare products.
- Know the EU directives and the corresponding Royal Decrees on designing and/or developing healthcare products, in order to guarantee the quality, safety and effectiveness of such products.
- Lead design and/or production projects in the R&D departments of healthcare product manufacturers.
- Carry out the technical management of the quality, safety and effectiveness of healthcare products.
- Be responsible for the company's healthcare products in the hospital environment. Give training and support

for these products to healthcare personnel.

In the **healthcare field**:

On completion of the course, students will be able to:

- Know the criteria for the appropriate use of healthcare equipment and its rationalisation, which is closely linked to greater efficiency of processes and an improvement in the quality of healthcare.
- Have a working knowledge of new equipment related to the new forms of healthcare (telemedicine for home healthcare, expert monitoring systems, etc.).
- Acquire and update healthcare equipment in accordance with established criteria.
- Use the technological equipment of healthcare products.
- Carry out maintenance of healthcare facilities and products.
- Distinguish, from the viewpoint of health centres, the most appropriate policies for healthcare equipment and facilities.

In the **research field**:

On completion of the course, students will be able to:

- Understand the methodology used in R&D activities in companies and in public and private science and technology research centres and groups.
- Lead a project to develop new healthcare products.
- Give technical advice to hospital centres or to companies in the healthcare sector.
- Certify and assess healthcare products and facilities.

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## ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

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### UPC school

[Barcelona School of Industrial Engineering \(ETSEIB\)](#)

### Participating institutions

[Universitat Politècnica de Catalunya \(UPC\)](#)

[Universitat de Barcelona \(UB\)](#) - **coordinating** university

### Academic coordinator

[Montserrat Vallverdú Ferrer](#)

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## CURRICULUM

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