

# Master's degree in Statistics and Operations Research

The aim of the **UPC-UB interuniversity master's degree in Statistics and Operations Research** ([master's degree website](#)) is to provide graduates with advanced knowledge of the theory and methods of current statistics and operations research. Integrated into multidisciplinary working groups, students who successfully complete this master's degree course will be able to apply the skills acquired in areas such as healthcare, services, industry, business, science and government agencies. They will also be provided with research-focused training to help them gain access to the doctoral degree.

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## GENERAL DETAILS

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### Duration and start date

1.5 academic year, 90 ECTS credits. Starting September

### Timetable and delivery

Afternoons. Face-to-face

### Fees and grants

Approximate fees for the master's degree, excluding other costs, €2,490 (€3,735 for non-EU residents).

[More information about fees and payment options](#)

[More information about grants and loans](#)

### Language of instruction

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

### Location

[School of Mathematics and Statistics \(FME\)](#)

Faculty of Economics and Business (UB)

### 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](#)

### Specific requirements

The content of the degree is appropriate for graduates of bachelor's degrees that include statistics or operations research subjects. Candidates will ideally have taken a bachelor's degree and will be interested in solving problems, have an aptitude for mathematics and be skilled communicators. The academic structure of the master's degree includes homogenisation courses in the first semester and the possibility of taking specific pathways in accordance with prior learning. The aim is to promote the entry of students from different academic backgrounds. Holders of the following qualifications may be considered:

- Bachelor's degree in Statistics
- Bachelor's degree in Mathematics
- Bachelor's degree in Biology/Physics/Biotechnology
- Bachelor's degree in Economics/Actuarial Sciences

- Bachelor's or pre-EHEA degree in Industrial Engineering or other engineering fields
- Bachelor's degree in Informatics Engineering
- Bachelor's degree in Psychology/Sociology
- Diploma in Statistics, taking a minimum of 30 credits in the form of bridging courses.

### Admission criteria

To decide on whether students are suitable for the master's degree in Statistics and Operations Engineering, their curriculum vitae and prior training will be considered, together with their stated interests, in order to guarantee that the aims of the Master's Degree can be fulfilled in a reasonable time and with a reasonable degree of effort.

The elements that will be taken into account for this evaluation will be:

- Weighting of the academic record.
  - Applicants should attach a scanned copy of their curriculum vitae, an official academic certificate issued by their school of origin stating the weighted mark of their academic transcript (NPE) on a scale of 1 to 10.
  - If when pre-enrolment takes place the student has not yet finished their course of studies, the certificate should refer to courses taken and passed up to the date of issue of the certificate.
  - If no certifying document is attached, the NPE will be taken to be 5.
- Accredited education.
  - Applicants should specify the academic qualification they have obtained or they expect to have obtained when enrolling.
  - If this qualification has already been obtained, a scanned copy of either the certificate or the receipt for payment for this certificate should be attached to the applicant's curriculum vitae.
  - The original of the certificate or the receipt must be presented on formal enrolment in the course.
- Aspects of the curriculum vitae related to statistics and/or operations research in the professional, teaching or scientific spheres.
- In particular, prior academic training, qualifications obtained and professional experience will be taken into account.
- Knowledge of English.
  - This knowledge will be accredited by attaching a scanned version of the highest level qualification or certificate obtained to the applicant's curriculum vitae.
  - Without this accreditation, this item will not be taken into account when evaluating the student's application.
- Dedication to the course of studies and whether it is to be combined with a job.

### Places

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### 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](#).

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## PROFESSIONAL OPPORTUNITIES

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### Professional opportunities

Graduates of this master's degree will be experts who may be employed in healthcare, services, industry and business. They will apply the theory and methods of statistics and operations research in fields such as biostatistics, data engineering, marketing and finance, industrial statistics, optimisation in engineering and industry, and applications in transport engineering.

### 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.

### **Basic competencies**

- Graduates of this degree will have acquired the knowledge that serves as a basis or opportunity for developing and applying original ideas, often in a research context.
- They will know how to apply the knowledge acquired and their problem-solving abilities in new or unfamiliar settings within wider (or multidisciplinary) contexts related to their field of study.
- They will be able to integrate their knowledge and deal with the complexity of making judgements on the basis of information that, although incomplete or limited, includes reflection on the social and ethical responsibilities related to the application of their knowledge and judgements.
- They will be able to clearly and unambiguously communicate their conclusions—and the knowledge and reasons that support them—to specialised and non-specialised audiences.
- They will have acquired learning skills that will enable them to continue studying in a largely self-directed or autonomous manner.

### **Generic competencies**

- A capacity for carrying out activities that involve applying theoretical and methodological knowledge and statistical and operations research techniques using teamwork and other skills expected of graduates.
- A capacity for identifying the most appropriate statistical and operations research methods for analysing the information that is available at any given moment, in order to respond to problems and dilemmas that arise and to inform decision making.
- An awareness of the need to observe professional ethics and rules on data and statistical secrecy protection.

### **Specific competencies**

- A capacity for designing and managing the gathering, coding, handling, storage and processing of information.
- A capacity for mastering the terminology belonging to a field in which statistical and operations research models and methods are applied to solve real problems.
- A capacity for formulating, analysing and validating models that are applicable to practical problems. A capacity for selecting the most appropriate statistical and operations research method or technique for applying models to concrete situations or problems.
- A capacity for using various inference procedures to answer questions, identifying the properties of different estimation methods and their advantages and disadvantages and adapting these methods to a concrete situation in a specific context.
- A capacity for formulating and solving real decision-making problems in various areas of application and selecting the most appropriate method and optimisation algorithm in each case.
- A capacity for choosing the most suitable software to carry out the calculations necessary to solve a problem.
- A capacity for understanding advanced statistics and operations research articles. Familiarity with research procedures for the production and transmission of new knowledge.
- A capacity for discussing the validity, scope and relevance of solutions and presenting and defending their conclusions.
- A capacity for implementing statistics and operations research algorithms.

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## **ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS**

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### **UPC school**

[School of Mathematics and Statistics \(FME\)](#)

### **Participating institutions**

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

### **Academic coordinator**

[Marta Pérez Casany \(UPC\)](#)

**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](#)

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**CURRICULUM**

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<b>Subjects</b>	<b>ECTS credits</b>	<b>Type</b>
<b>FIRST SEMESTER</b>		
Advanced Statistical Inference	5	Optional
Continuous Optimisation	5	Optional
Econometric Analysis	5	Optional
Foundations of Statistical Inference	5	Optional
Foundations of Bioinformatics	5	Optional
Lifetime Data Analysis	5	Optional
Linear and Generalized Linear Models	5	Optional
Mathematics	5	Optional
Models and Methods From Operations Research	5	Compulsory
Optimization in Data Science	5	Optional
Optimization in Energy Systems and Markets	5	Optional
Risk Quantification	5	Optional
Simulation	5	Optional
Spatial Epidemiology	5	Optional
Statistical Software: R and SAS	5	Compulsory
Statistics for Business Management	5	Optional
<b>SECOND SEMESTER</b>		
Actuarial Statistics	5	Optional
Advanced Topics in Survival Analysis	5	Optional
Bayesian Analysis	5	Optional
Clinical Trials	5	Optional
Discrete Network Models	5	Optional
Epidemiology	5	Optional
Financial Statistics	5	Optional
Genetic Epidemiology	5	Optional
Large Scale Optimization	5	Optional
Longitudinal Data Analysis	5	Optional
Machine Learning	7.5	Optional
Multivariate Data Analysis	5	Optional

<b>Subjects</b>	<b>ECTS credits</b>	<b>Type</b>
Omics Data Analysis	5	Optional
Probability and Stochastic Processes	5	Optional
Quantitative Marketing Techniques	5	Optional
Simulation for Business Decision Making	5	Optional
Social Indicators	5	Optional
Statistical Learning	5	Optional
Statistical Learning with Deep Artificial Neural Networks	5	Optional
Statistical Methods in Clinical Research	5	Optional
Statistical Programming and Databases	5	Optional
Stochastic Programming	5	Optional
Time Series	5	Optional
<b>THIRD SEMESTER</b>		
Master's Thesis	30	Project