Master's degree in Data Science

The **master's degree in Data Science** aims to create a benchmark for excellence in the field of data science. This eminently interdisciplinary degree is based on two distinct pillars that are equally essential to data science: data management and data analytics. The degree thus provides a holistic view of the field that also covers cross-disciplinary topics such as ethics and entrepreneurship. The degree aims to produce highly qualified professionals who have a strong ability to innovate in data management and data analytics. Graduates with these skills are in high demand in both the academic sector and industry. The master's degree also seeks to generate synergies and to foster the exchange of information and experiences in order to nurture the education, research and innovation triangle, which is vitally important in data science.

GENERAL DETAILS

Duration and start date

Two academic years, 120 ECTS credits. Starting September

Timetable and delivery

Face-to-face

Fees and grants

Approximate fees for the master's degree, **excluding other costs** (does not include non-teaching academic fees and issuing of the degree certificate):
€3,320 (€12,662 for non-EU residents).
More information about fees and payment options
More information about grants and loans

Language of instruction

English

Information on language use in the classroom and students' language rights.

Location

Barcelona School of Informatics (FIB)

ADMISSION

General requirements

Academic requirements for admission to master's degrees

Specific requirements

Since this master's degree is taught entirely in English, applicants must **certify a B2 level (CEFR) of English (or equivalent)**.

Direct admission

The recommended entrance qualifications for the master's degree are the following:

- Bachelor's or pre-EHEA degree in Informatics Engineering
- Bachelor's or pre-EHEA degree in Mathematics

The following qualifications are considered related as they ensure a sound knowledge of informatics and mathematics:

- Bachelor's degree in Physics (or equivalent)
- Bachelor's degree in Statistics (or equivalent)
- Bachelor's degree in Telecommunications Science and Technology, Telecommunications Technologies and Services Engineering or Electronic Engineering and Telecommunications (or equivalent)
- Bachelor's degree in Civil Engineering (or equivalent)
- Bachelor's degree in Industrial Technology Engineering or Industrial Electronics and Automatic Control Engineering (or equivalent)

Holders of recently introduced degrees that are closely related to data science will be considered. Such degrees include:

- Bachelor’s degree in Bioinformatics (or equivalent)
- Bachelor’s degree in Artificial Intelligence (or equivalent)
- Bachelor’s degree in Data Science and Engineering (or equivalent)

In the case of related degrees, priority will be given to students who have followed a curriculum that ensures a thorough knowledge of mathematics and informatics. In addition, given the highly international character of the master’s degrees offered by the Barcelona School of Informatics (FIB) and this master’s degree in particular, degrees held by foreign students that are equivalent to those listed above will be considered.

Places

40

Pre-enrolment

Pre-enrolment period open.
Expected deadline: 26/05/2024.
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.

DOUBLE-DEGREE AGREEMENTS

With universities around the world

- Master's degree in Data Science + Master of Science degree in Data Science (Dipartimento di Matematica “Tullio Levi-Civita”, Università degli Studi di Padova, Padova, Italy)
- Master's degree in Data Science + Degre of Engineer in Informatics applied to Health *(*École d'Ingénieurs-ISIS, Institut National Universitaire Jean-François Champollion (INU Champollion), Albi, France)

PROFESSIONAL OPPORTUNITIES

Professional opportunities

Graduates work in data management and data analytics. The main positions related to work in these fields are the following:

- Data scientist
- Data engineer
- Data specialist
- Data administrator
- Systems architect
- Systems analyst
- Digital transformation leader (DTL)
- Chief information officer (CIO)
- Chief data officer (CDO)

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

- The ability to develop efficient algorithms based on knowledge and understanding of the theory of computational complexity and the main data structures in the field of data science.
- The ability to apply the basic principles of data management and processing to problems in the field of data science.
- The ability to apply data integration methods to solve data science problems in heterogeneous environments.
- The ability to apply scalable methods for storage and parallel processing of data, including continuous data

flows, after identifying the most suitable approaches for tackling a particular data science problem.
- The ability to model, design and implement complex data systems, including data visualisation.
- The ability to design data science processes and to apply scientific methods to draw conclusions about populations and take decisions accordingly, based on structured or unstructured data, including data that may be stored in heterogeneous formats.
- The ability to identify the limitations imposed by data quality when tackling data science problems and to apply techniques to reduce their impact.
- The ability to extract information from structured and unstructured data, taking into account their multivariate nature.
- The ability to apply appropriate methods for analysing other types of formats, such as processes and graphs, in the field of data science.
- The ability to identify machine learning and statistical modelling methods for solving a specific data science problem and to apply them in a rigorous manner.
- The ability to analyse and extract knowledge from unstructured information by applying natural language processing techniques and through the use of text and image mining.
- The ability to apply data science methods to multidisciplinary projects to solve problems in new or unfamiliar domains, selecting approaches that are economically viable, socially acceptable and in accordance with current legislation.
- The ability to identify the main data ethics and privacy issues affecting data science projects (in terms of both data management and data analytics) and to develop and implement appropriate measures to mitigate related threats.
- The ability to carry out and present and defend before an examination committee an original, individual piece of work consisting of a comprehensive data science engineering project that synthesises the competencies acquired on the degree.

ORGANISATION: ACADEMIC CALENDAR AND REGULATIONS

UPC school

Barcelona School of Informatics (FIB)

Academic coordinator

Òscar Romero Moral

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

Subjects	ECTS credits	Type
FIRST SEMESTER		
Algorithms, Data Structures and Databases	6	Compulsory
Data Warehousing	6	Compulsory
Multivariate Analysis	6	Compulsory
Process-Oriented Data Science	6	Compulsory
Statistical Inference and Modelling	6	Compulsory
SECOND SEMESTER		
Advanced Statistical Modelling	6	Optional
Algorithmics for Data Mining	6	Optional

Subjects	ECTS credits	Type
Big Data Management	6	Compulsory
Bioinformatics and Statistical Genetics	6	Optional
Cloud Computing and Big Data Analytics	6	Optional
Complex and Social Networks	6	Optional
Data Management for Transportation	4	Optional
Debates on Ethics of Data Science	3	Optional
Human Language Engineering	4.5	Optional
Interdisciplinary Innovation Project	6	Optional
Machine Learning	6	Compulsory
Mining Unstructured Data	6	Compulsory
Optimization Techniques for Data Mining	6	Optional
Semantic Data Management	6	Compulsory
Techniques and Methodology of Innovation and Research in Informatics	6	Optional
Viability of Business Projects	6	Optional
THIRD SEMESTER		
Advanced Machine Learning	6	Optional
Advanced Multivariate Analysis	6	Optional
Data Analysis and Knowledge Discovery	6	Optional
Data Visualization	6	Optional
Information Retrieval and Recommender Systems	6	Optional
Machine Learning Systems in Production (Mlops)	6	Optional
FOURTH SEMESTER		
Master's Thesis	30	Project