

Master's degree in Innovation and Research in Informatics (MIRI)

Informatics has become a major driving force in many scientific and technological fields. In fact, current socioeconomic progress cannot be understood without considering access to and exchange of information between people and machines and between systems and institutions. There is a growing need for professionals who have strong drive, talent and solid training as provided by the [master's degree in Innovation and Research in Informatics](#). It is designed to provide a solid background in different aspects of research in the fields of advanced computing, computer graphics and virtual reality, computer networks and distributed systems, high-performance computing and service engineering.

Specialisations

- Advanced Computing
- Computer Graphics and Virtual Reality
- Computer Networks and Distributed Systems
- Data Science and Business Intelligence
- High Performance Computing
- Service Engineering

GENERAL DETAILS

Duration and start date

Two academic years, 120 ECTS credits. Starting September and February

Timetable and delivery

Mornings. 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).

This master's degree was selected in the Masters of Excellence grant programme of the Catalunya-La Pedrera Foundation. More information is available at the [Foundation's website](#).

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

[More information about grants and loans](#)

Language of instruction

English

Location

[Barcelona School of Informatics \(FIB\)](#)

Official degree

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

ADMISSION

General requirements

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

Places

80

Pre-enrolment

Pre-enrolment period open.

[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

Double-degree pathways with foreign universities

- Master's degree in Innovation and Research in Informatics + Master of Science Degree in Computer Engineering (Politecnico di Torino).
- Master's degree in Innovation and Research in Informatics + Maestría en Ciencias en Ingeniería de Cómputo (Instituto Politécnico Nacional, Mexico)

PROFESSIONAL OPPORTUNITIES

Professional opportunities

Graduates of the MIRI will have the ability to analyse and solve complex problems in information technology-related domains. They will thus be qualified to work in any company willing to incorporate emerging technologies in the sector, especially those with R&D centres, in public and private research centres and in university departments, in which they might work on new research and start a doctoral degree.

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.

ORGANISATION

UPC school

[Barcelona School of Informatics \(FIB\)](#)

Academic coordinator

[Daniel Jiménez González](#)

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

Subjects		ECTS credits	Type
Algorithmic Methods for Mathematical Models		6	Compulsory
Algorithms, Data Structures and Databases		6	Optional
Concurrence, Parallelism and Distributed Systems		6	Compulsory
Statistical Modelling and Design of Experiments		6	Compulsory
Techniques and Methodology of Innovation and Research in Informatics		6	Compulsory
Specialisation in Advanced Computing	Randomized Algorithms	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory
Specialisation in Computer Graphics and Virtual Reality	Advanced 3D Modeling	6	Compulsory
	Geometric Tools for Computer Graphics	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
Specialisation in Computer Networks and Distributed Systems	Computer Network Architectures and Network Management	6	Compulsory
	Statistical Analysis of Networks and Systems	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory
Specialisation in Data Mining and Business Intelligence	Data Analysis and Knowledge Discovery	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory
Specialisation in Data Science	Data Analysis and Knowledge Discovery	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory

Subjects		ECTS credits	Type
Specialisation in High Performance Computing	Processor Architecture	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory
Specialisation in Service Engineering	Service Management	6	Compulsory
	Algorithmic Methods for Mathematical Models	6	Compulsory
	Algorithms, Data Structures and Databases	6	Optional
	Concurrence, Parallelism and Distributed Systems	6	Compulsory
	Statistical Modelling and Design of Experiments	6	Compulsory
	Techniques and Methodology of Innovation and Research in Informatics	6	Compulsory
SECOND SEMESTER			
Interdisciplinary Innovation Project		6	Optional
Seminars of Innovation and Research in Informatics		6	Compulsory
Social and Environmental Aspects of Information Technology		3	Optional
Viability of Business Projects		6	Optional
Specialisation in Advanced Computing	Advanced Data Structures	6	Compulsory
	Algorithmics for Data Mining	6	Optional
	Combinatorial Problem Solving	6	Compulsory
	Computational Complexity	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional
Specialisation in Computer Graphics and Virtual Reality	Computer Animation	6	Optional
	Fast Realistic Rendering	6	Compulsory
	Geometry Processing	6	Optional
	Scalable Rendering for Graphics and Game Engines	6	Optional
	Scientific Visualization	6	Optional
	Virtual and Augmented Reality	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional

Subjects		ECTS credits	Type
Specialisation in Computer Networks and Distributed Systems	Cloud Computing	6	Optional
	Cloud Computing and Big Data Analytics	6	Optional
	Decentralized Systems	6	Optional
	Mechanisms and Game Theory in Networks	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional
Specialisation in Data Mining and Business Intelligence	Algorithmics for Data Mining	6	Optional
	Data Warehousing	6	Compulsory
	Machine Learning	6	Compulsory
	Multivariate Analysis	6	Compulsory
	Open Data	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
Specialisation in Data Science	Advanced Human Language Technologies	5	Optional
	Algorithmics for Data Mining	6	Optional
	Big Data Management	6	Optional
	Data Warehousing	6	Compulsory
	Machine Learning	6	Compulsory
	Multivariate Analysis	6	Compulsory
	Open Data	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional
Specialisation in High Performance Computing	Advanced Processor Architecture	6	Optional
	Multiprocessors Architecture	6	Compulsory
	Operating Systems	6	Compulsory
	Parallel Programming Tools and Models	6	Optional
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional

Subjects		ECTS credits	Type
Specialisation in Service Engineering	Data Warehousing	6	Optional
	E-Business	6	Compulsory
	Requirements Engineering for Services	6	Compulsory
	Service Oriented Architecture	6	Compulsory
	Interdisciplinary Innovation Project	6	Optional
	Seminars of Innovation and Research in Informatics	6	Compulsory
	Social and Environmental Aspects of Information Technology	3	Optional
	Viability of Business Projects	6	Optional
THIRD SEMESTER			
Specialisation in Advanced Computing	Algorithmic Game Theory	6	Optional
	Algorithms for VLSI	6	Optional
	Complex and Social Networks	6	Optional
Specialisation in Computer Networks and Distributed Systems	Future Internet Networks	6	Optional
	Internet Applications and Security	6	Optional
	Stochastic Network Modelling	6	Compulsory
Specialisation in Data Mining and Business Intelligence	Advanced Natural Language Processing	6	Optional
	Advanced Statistical Modelling	6	Optional
	Bioinformatics and Statistical Genetics	6	Optional
	Business Intelligence Project	6	Optional
	Information Retrieval	6	Optional
	Kernel-Based Machine Learning and Multivariate Modelling	6	Optional
	Optimization Techniques for Data Mining	6	Optional
	Service Oriented Business Intelligence	6	Optional
	Statistical Natural Language Processing	6	Optional
Specialisation in Data Science	Advanced Natural Language Processing	6	Optional
	Advanced Statistical Modelling	6	Optional
	Bioinformatics and Statistical Genetics	6	Optional
	Information Retrieval	6	Optional
	Kernel-Based Machine Learning and Multivariate Modelling	6	Optional
	Optimization Techniques for Data Mining	6	Optional
	Service Oriented Business Intelligence	6	Optional
	Statistical Natural Language Processing	6	Optional
Specialisation in High Performance Computing	Compilers for High Performance Computers	6	Optional
	Nanoelectronic Circuit Design	6	Optional
	Processor Design	6	Optional
	Supercomputers Architecture	6	Optional
	Supercomputing for Challenging Applications	6	Optional

Subjects		ECTS credits	Type
Specialisation in Service Engineering	Advanced Software Engineering	6	Optional
	Design and Evaluation of Web-Based Systems	6	Optional
	Service Innovation Based on Information Technologies	6	Optional
	Service Oriented Business Intelligence	6	Optional
	Web Services	6	Optional
FOURTH SEMESTER			
Specialisation in Advanced Computing	Master's Thesis	30	Compulsory
Specialisation in Computer Graphics and Virtual Reality	Master's Thesis	30	Compulsory
Specialisation in Computer Networks and Distributed Systems	Master's Thesis	30	Compulsory
Specialisation in Data Mining and Business Intelligence	Master's Thesis	30	Compulsory
Specialisation in Data Science	Master's Thesis	30	Compulsory
Specialisation in High Performance Computing	Master's Thesis	30	Compulsory
Specialisation in Service Engineering	Master's Thesis	30	Compulsory