



FIB
MASTERS

Master in Data Science (MDS)

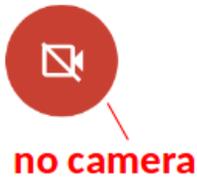
Oscar Romero

Vice-dean of Postgraduate Studies

info.masters@fib.upc.edu

Welcome to FIB Master's Degree Informative Virtual Session

- Please, mute your micro
- Please, turn off your camera
- Only speaker will share screen to present



Do not try to present

- Any question should be via chat but let's do it at the end of the talk



This will open lateral chat



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@mediafib

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FIB:

Facultat d'Informàtica de Barcelona

Universitat Politècnica de Catalunya (UPC-BarcelonaTech)

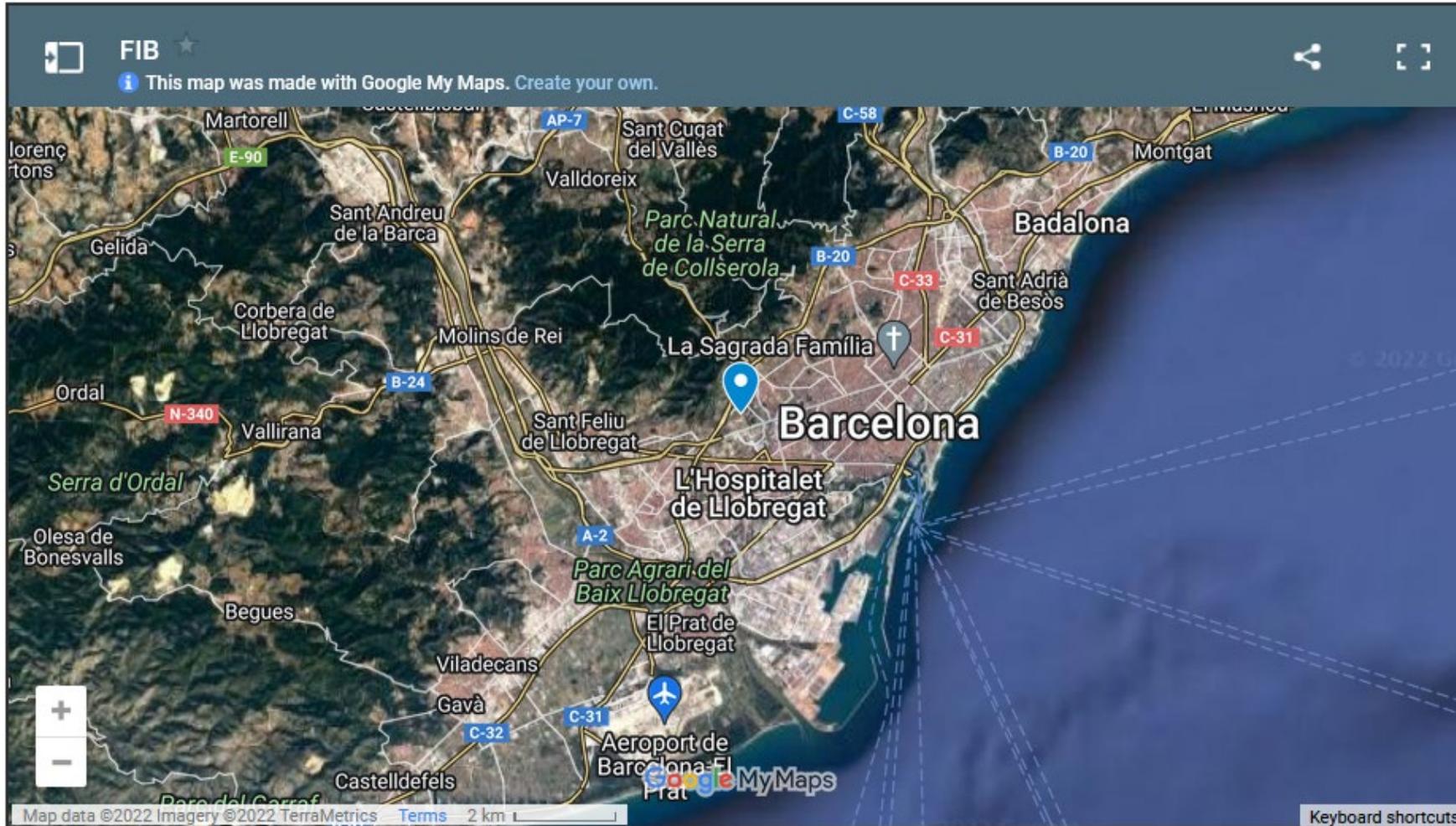
About FIB

The Facultat d'Informàtica de Barcelona (Barcelona School of Informatics) belongs to UPC and it is the reference centre for Informatics studies since its inception in 1976, and the beginning of the educational activities during 1977-1978.

Throughout these 40 years, the faculty has been in charge of the bachelor's degree, diploma courses, technical engineering and master degrees and currently the formal qualifications in the field of Computer Science and related subjects.



FIB: Where?



Address

B6 Building at Campus Nord
Jordi Girona street,1-3
08034 Barcelona

Contact

Email: Info.masters@fib.upc.edu

Web: <http://www.fib.upc.edu/>

Social Networking

<https://www.facebook.com/fib.upc>

https://twitter.com/fib_upc

<https://www.youtube.com/user/mediafib>

<https://www.instagram.com/fib.upc/>

FIB: Mission

- Provide education on **informatics engineering**
 - Promote the dissemination of information technologies to contribute to society improvements
 - Provide a strong background to our students that will be used throughout their professional life
- **Prioritizing lasting concepts**
- Promoting **effective working habits and team working**
- Stimulating their students' **ability of self-sufficiency**

FIB: Our Reputation

International Rankings

- Times Higher Education – Computer Science: 93
 - 1st in Spain
- QS World University Rankings – Computer Science: 51-100
 - 1st in Spain
- US News Best Global Univ. Rankings – Computer Science: 37
 - 1st in Spain

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Master in Data Science

Overview

Data Drives the World!



The role of data in the world economy is out of question

- Data Science is the sector with higher expected growth since 2014 in most developed economies (EU and USA)
- Most optimistic forecasts measure a sustained growth world-wide of around 20% per year
- The most pessimistic measure it around 12%

The European Commission has developed a data-driven economy strategy: Building a European Data Economy.

- In 2019, the data-driven economy whole impact on the economy was valued as 400 Billion Euro (EU+UK), with a yearly growth of 7,6% (much higher than the total IT sector of 4,9%)
- Data professionals represent the 3,6% of the total EU27 workforce, with a 5,5% yearly increase
- The EU identified a gap of 459.000 unfilled positions in the EU27 + UK

The OECD and the European Commission recently stated: *"Big Data and Data Science are key pillars in the 21st century source of growth"* but they also remark *"data-driven innovation is key for growth and well-being"*

sources: IDC, Gartner, Forrester, IBM Quant Crunch Report, Organisation for Economic Co-operation and Development (OECD), European Commission

Will Data Drive the Future World?



The future role of data is also out of question!

The EU Data Market and Data Economy in 2025 (post-covid scenario):

- **Baseline scenario (1,5% GDP cumulative growth):** expected annual growth rate of 5,8% for a total of 550 Billion Euro in the EU27 with a steep increase of its incidence from 2,8% in 2020 to 4% in 2025
- **High growth scenario (+2,1% GDP cumulative growth):** expected annual growth rate of 11,5% for a total of 827 Billion Euro in the EU27 with a steep increase of its incidence from 2,8% in 2020 to 5,9% in 2025
- **Challenge scenario (+0,9% GDP cumulative growth):** expected annual growth rate of 3% for a total of 432 Billion Euro in the EU27 with a steep increase of its incidence from 2,8% in 2020 to 3,3% in 2025

KEY FACT: even in the worst scenario, the unfilled data jobs is estimated to 5,7% of the demand (i.e., 484000 jobs)

In all scenarios, demand will still grow faster than supply

sources: *European Commission*

[/https://data.europa.eu/en/highlights/size-and-trends-eu-data-economy/](https://data.europa.eu/en/highlights/size-and-trends-eu-data-economy)

Why Data is nowadays so relevant?

- Data Science is instrumental: i.e., traversal to any sector and it will even further affect and accelerate transformation in all sectors:
 - Improve health care
 - Create safer and cleaner transport systems
 - Generate new products and services
 - Reduce the costs of public services
 - Improve sustainability and energy efficiency
 - ... among many other examples!
- New sectors have emerged overriding the prevalence of traditional strategies: *e-health, smart cities, smart spaces, e-banking, new videogame industry, industry 4.0, etc.*

The Bad News...

- Current reports alert about the gap between demand and supply of **skilful data scientists**. Main reports¹ blame the current rigid educative offer as main source of problems and demand:

*A **data scientist** must follow a multidisciplinary education covering all the relevant aspects of data science: **data management**, **data analytics** and basics on **business aspects***

"Data scientists must be able to write code and create systems"

- ¹Sources: European Commission, the Big Data Value Association (BDVA) and the Quant Crunch Report (USA-based), including a statement from Facebook, Google and main data-driven companies

But Again Good News

- The current scenario is also an opportunity for those with a comprehensive education on the field:
 - Harvard Business Report: *"Data Scientist is the sexiest job of the 21st Century"*
 - Salaries in Big Data / Data Science are 50% and 70% (depending on the source) higher than in any other IT sector
 - Inherent innovative and research-oriented work

FIB's Data Science Master

The FIB's Data Science Master fosters students with a multidisciplinary education meeting the skills need to become a successful data scientist

- Learning Outcomes:

- Identify and apply the most suitable data management methods and processes to manage the whole data lifecycle, including structured and unstructured data
- Identify and apply data analysis, knowledge extraction and data visualization of data collected in disparate heterogeneous formats
- Define, design and implement complex systems that cover all phases of a data science project
- Design and execute data science projects in specific domains in an innovative manner

Master in Data Science: Syllabus

<https://masters.fib.upc.edu/masters/master-data-science>

The Data Science master is fully aligned with the Big Data Management and Analytics (BDMA) master funded by the European Commission

<https://bdma.ulb.ac.be/>

Exemplary Master Theses

Building a 4D MRI blood-flow velocity fields statistical model

- **Author:** Hongping Feng
- **Abstract:** *Cardiovascular disease is a major cause of death worldwide. The diagnosis and prognosis is traditionally based on morphology and function; hemodynamic behaviour influences pathogenesis but it is hardly included in current clinical workflow due to lack of insight and standardization. This project aims at building a 4D MRI blood-flow velocity fields statistical model with methods such as PCA on 3D volume dataset*

Wind Pattern Analysis Applied to Coastal Areas

- **Author:** Mouad Moussabbih
- **Abstract:** *In the framework of the Tokyo 2020 Olympic Games Weather Project, a big amount of data have been and are currently collected on the sea through real time sensors during trainings and racings and are being stored into a cloud database. The collaboration with UPC is aimed at developing a data analysis methodology able to support sailors decisions during Olympic Games races*

Traffic Forecasting in Smart Cities

- **Author:** Juan José Vázquez Giménez
- **Abstract:** *For some time now, traffic forecasting has been a well-known problem in the inter-urban context. However, due to the limited amount of available data, researchers have been less focused on solving the problem in urban areas. Currently, we consider that the explosion of data due to increasing ICT (Information and Communications Technology) penetration in Smart Cities provides the suitable framework to exploit the potential of the forecasting methods. Thus, this master thesis will focus on the urban traffic forecast problem through the use of new data sources*

Data Science Tools to Detect the Intention of the User to Perform a Step with a Lower-limb Robotic Exoskeleton

- **Author:** Vicent Pérez Gregori
- **Abstract:** *Detecting the step moment has a key role in providing a more versatile human-machine interaction encouraging patients suffering from spinal cord injuries to use these kinds of devices to walk again.*
- *This challenge has been faced using two approaches, one consisting in an autotuning of the step initiation parameter using the angular velocity signal of the thigh segment. The latter, based on finding an alternative method to detect the user's intention of performing a step using Data Science techniques*

On Explainability of Deep Neural Networks

- **Author:** Álvaro Parafita
- **Abstract:** *Deep Neural Networks have attained state-of-the-art performance in most Machine Learning fields during the recent years. However, it is still hard to ascertain what function each layer of neuron performs or the reasoning behind each prediction. This problem is especially relevant for sensitive applications, such as medical image recognition, where model interpretability is a definite requirement. This project will evaluate the latest advances in deep learning interpretability and aim to find alternatives to the current attribution and feature visualization strategies*

Model-Agnostic Process Modelling

- **Author:** Josep Sànchez Ferreres
- **Abstract:** *Business process management is a widely employed discipline in modern organizations. however, most organizations do not see the benefits of using formal modelling languages to document processes and, thus, are unable to benefit from the most recent advances in the field.*
- *in this master thesis, we will explore the possibility of using natural language descriptions of processes as a formalism-agnostic process modelling language. to that end, a reasoning framework for annotated textual descriptions will be developed, in order to extract rich descriptions of processes from plain text. these annotations can then be automatically derived using natural language processing techniques, with additional human refinement if necessary*

The While and the Afterwards

- Around 80% of the students work or do research while studying
 - Many of them in research centres / research groups
 - Strong connections with companies in Barcelona (regular job offers)
 - 99% of alumni was working in less than 3 months after finishing the studies
 - Alumni spread all over the world
- Strong internationalisation
 - Less than 45% of the students come from Barcelona or its area
 - Around 30% of students involved in international mobility

Note: Data from the MIRI-DS and BDMA master students

The While and the Afterwards

- Usual Job positions:
 - Data Scientist
 - Data Analyst
 - (Chief) Data Officer
 - Data Engineer
 - Knowledge Engineer
 - Data Architect
 - Data Researcher
 - Digital Transformation Leader
 - Etc.

Internships

Internships

- *Convenis de col·laboració universitat – empresa (CCE):*
<https://www.fib.upc.edu/en/companies/industrial-practices>

Industrial Practices

Home » Companies » Industrial Practices

Industrial Practices ▾

Offers list

Posting offers

Job Placements ▶

FIB Visiona

Sponsorship ▶



Information for companies



Information for students



Regulations

Internships for students become a training activity under the supervision of the Faculty, the goal of which is to apply and complete the academic formation acquired, encouraging the professional skills that prepare for professional activities which facilitate the employment of them.

The framework of these activities is called educational cooperation agreements, regulated by [Royal Decree 592/2014](#) which regulates the external academic practices of college students.

Internships

CCE can be established with companies having an Industrial Agreement with FIB

- Extracurricular Practices:
 - NO Elective credits
 - Except for the Master Thesis: modality B or D

Mobility and Internationalisation

Mobility and Internationalisation

Plenty of options! **189 agreements with 181 universities in 41 countries**

- Study abroad (one or two semesters)
 - Conditions (max ECTS): MDS (30+30)
 - Mobility programs (many with scholarships)
 - CERN
 - Erasmus+
 - Latin America, USA and Canada
 - National Institute of Informatics (NII) Tokyo
 - China
- Internship abroad
 - Ever-open calls: Erasmus+, IAESTE, AIESEC, Entrypark
 - Academic institutions
 - Industry
- Other activities (summer schools, short stays...)

Mobility and Internationalisation

<https://www.fib.upc.edu/en/mobility>

Mobility

Home » Mobility

MOVING

Knowing a new university, discovering a new country or improving your language skills are some of the advantages of the mobility programs offered by FIB.

Personal experiences that will allow you to stay in foreign universities and intern at businesses worldwide.



Incoming



Outgoing



Double degrees



International Partnerships

Mobility and Internationalisation

- Mobility calendar: <https://www.fib.upc.edu/en/mobility/outgoing/mobility-calendar>

Mobility Calendar

Home » Mobility » Outgoing » Mobility Calendar

Mobility Calendar	Calls	Periods
Information Sessions	! Google Summer of Code	📅 04 Apr 22 - 19 Apr 22
Mobility experiences	! Place application for foreign universities: programa Erasmus+, Latin America, CINDA, Canada, Russia, Taiwan and China (2nd call)	📅 13 Sep 22 - 18 Sep 22
Study abroad ▶	✘ Place application for foreign universities: Erasmus+, Latin America, Russia, Taiwan, China and double degrees	📅 18 Feb 22 - 03 Mar 22
Internship abroad	✘ Application for a place at Spanish universities in the SICUE programme	📅 11 Feb 22 - 25 Feb 22
Other activities abroad	✘ Application for mobility in the US	📅 01 Dec 21 - 21 Jan 22
	✘ Application for a mobility place with the programme UNITECH	📅 17 Dec 21 - 18 Jan 22
	✘ Vulcanus programme	📅 02 Nov 21 - 14 Jan 22
	✘ Application for the National Institute of Informatics (NII) in Tokyo - 1st call	📅 13 Sep 21 - 20 Sep 21
	✘ iWeek a Paris	📅 17 Dec 19 - 28 Jan 20
	✘ Application for the National Institute of Informatics (NII) in Tokyo - 2nd call	📅 06 Sep 19 - 10 Oct 19

Opened ✓ To be open ! Closed ✘

Mobility and Internationalisation

- Information Sessions: <https://www.fib.upc.edu/en/mobility/outgoing/information-sessions>

Mobility information session 2021-2022

For mobility stays during the academic
year 2022-2023

1st semester

Wednesday, 17 November 2021

In this first session we will inform on the various mobility programs, but we will focus on those whose call is in December-January and on the stays at US universities. Information sessions will be recorded.

Place: <https://meet.google.com/dwj-zygt-wkp>

- Morning session: **12:00 pm**



2nd semester

Wednesday, 16 February 2022

In this second session we will inform on the various mobility programs, but we will focus on Erasmus+, SICUE and double degree calls. Information sessions will be recorded.

Place: <https://meet.google.com/mip-zfid-fte>

- Morning session: **12:00 pm**



Still have doubts?
Contact us at:
rel.int@fib.upc.edu

Research and Innovation

Research and Innovation

- UPC is a leading research institution
 - Top university obtaining H2020 projects: <https://www.upc.edu/en/press-room/news/the-upc-is-still-the-top-spanish-university-in-obtaining-funds-from-the-h2020-programme>
 - Start-ups, spin-offs, innovation and technology transfer: <https://www.upc.edu/en/r-d-i/innovation>
 - UPC's centre for Development Cooperation: <https://www.upc.edu/ccd/en>
- Complement your time during the masters with added-value tasks!
- One strong aspect of our masters is that our teaching staff are also **researchers** with wide experience on the topics they teach
 - Belong to different departments and research groups
 - Have strong networks with researchers all over the world
 - You may want to do research under international mobility
- Formalise your research experience with **research grants** or **CCE agreements**
- Areas covered by our research groups:
 - Mathematics (MA)
 - Business Administration (OE)
 - Computer Architecture (AC)
 - Physics (FIS)
 - Services and Information Systems Engineering (ESSI)
 - Computer Science (CS)
 - Statistics and Operational Research (EIO)
 - Systems Engineering, Automatic Control and Industrial Informatics (ESAI)

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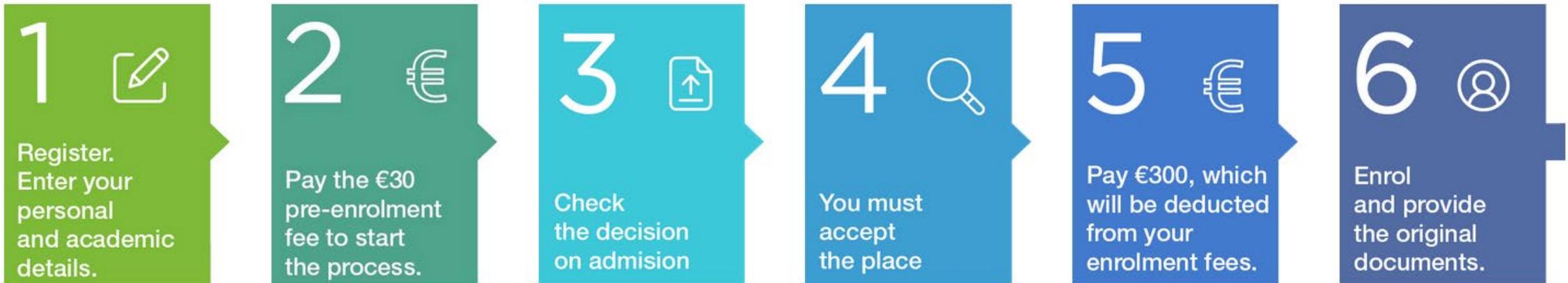
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Enrolment Procedure

Procedure

Interested in one of our masters? This is the procedure to follow

The admission process, step by step



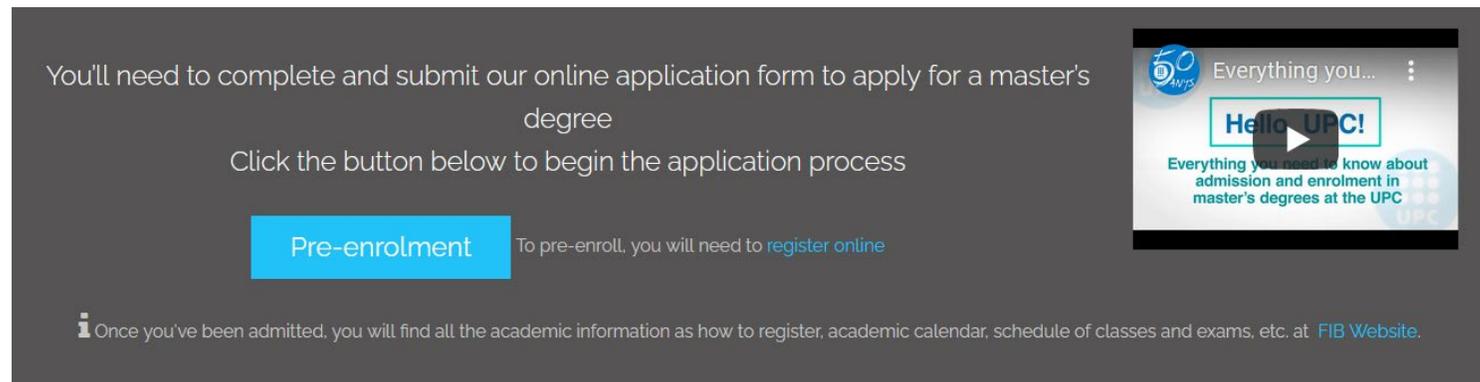
<https://www.upc.edu/en/masters/access-admission-enrolment>

Important Dates

- **Pre-enrolment:** From 1st March to 27th May 2022
- Two (three) **admission** periods:
 - ~~First period:~~
 - ~~Deadline to apply: 22nd April 2022~~
 - ~~Tentative admission notification: 29th April 2022~~
 - Second period:
 - Deadline to apply: 27th May 2022
 - Tentative admission notification: 3rd June 2022
 - *Third period:*
 - *Not guaranteed, only if seats available*
 - *Tentative deadline: 30th June*
 - *Tentative admission notification: 7th July*
- Check the **admission** criteria at: <https://masters.fib.upc.edu/masters/master-data-science>

Pre-enrolment

- Start the procedure from the masters.fib.upc.edu website. Look for your favourite master, scroll down and look for the **pre-enrolment** button as shown below



- To pre-enrol follow the instructions
 - Provide the required documentation to evaluate your admission
 - Pay 30,21€ (tax) – **Important:** the button to pay does not appear until you enter all required fields

You can learn more about the pre-enrolment process here:
<https://www.upc.edu/en/masters/access-admission-enrolment/pre-enrolment>

Admission

- Depending on your pre-enrolment data your application will be evaluated within the first or second period
- Evaluation outcome: **accept, reject, postpone (1st round) or waiting list (2nd round)**
 - First period:
 - Deadline to apply: 22nd April 2022
 - Tentative admission notification: **29th April 2022 (accept, postpone, reject)**
 - Second period:
 - Deadline to apply: 27th May 2022
 - Tentative admission notification: **3rd June 2022 (accept, waiting list, reject)**
- **Accepted** applications are contacted and informed about all relevant academic information as how to **register**, academic calendar, schedule of classes and exams, etc.
 - All this information is already available at [FIB Website](#)
 - Before registration, you must pay 300€ (tax) to guarantee your place (this money is later deduced from the registration cost)
- **Postponed** applications get their final decision during the second period
- **Waiting list** applications are contacted in order if drop outs happen
- **Rejected** applications are not accepted to follow that program

Prices

Prices 2021/22 for European Union applicants

- MDS: 27,67€ / ECTS

Prices 2021/22 for Non-European Union applicants

- MDS: 41,05€ / ECTS

Note: prices for 2022/2023 will be published in July. Once published, UPC list the prices here: <https://www.upc.edu/sga/ca/matricula/preus/PreusMaster>

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Grants and Aids

- Find all details at: <https://masters.fib.upc.edu/grants-and-financial-aid>

General information

There are multiple ways to fund your studies at the **Universitat Politècnica de Catalunya** - BarcelonaTech (UPC). Grants, scholarships, mobility grants and loans are offered by the University and other bodies.

[Complete information about grants and financial aid at the UPC.](#)

Below you will find information on specific scholarships and grants that you can apply for at the FIB. **It is necessary to have applied for admission in the corresponding Master to qualify for any of them.**

Grants

Accenture - Barcelona Digital Talent grants (2021-2022)	▼
Seidor grants (2021-2022)	▼
NTT DATA (everis) (2021-2022)	▼
"Nacho Navarro" grants (2021/2022)	▼
FIB Visiona - FIB grants (MEI, MIRI and MAI) - 2020-2021	▼
Fundació Catalunya-La Pedrera (MAI)	▼
Fundació Catalunya-La Pedrera (MIRI)	▼

Scholarships

ARCO Scholarships for MIRI Students	▼
CBA scholarships in AI for networking for MIRI Students	▼
inLab FIB	▼
McAfee Academic Grants - Catalunya (McAfee) scholarships for MIRI students	▼

Grants and Aids

- Becas del Ministerio de Educación 2022/23
 - If you plan to study a master, apply! (**even if you are not sure what and where**)
 - In September you will be asked to provide information of the master chosen
 - Period to apply: from 30th March to 12th May (way earlier than in previous years)
- Further details:
<https://www.upc.edu/sga/es/Becas/BecasEstudio/BecaMEyFP22>
- Support to the process (UPC video):
<https://www.youtube.com/watch?v=BsQoHywfrl4>

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Social Life

- FIB promotes social activities: <https://www.fib.upc.edu/en/fib/university-life>



Implica't



Viu la FIB



Game Jam Barcelona @ UPC

Una Game Jam és una trobada dedicada al ràpid prototipatge de videojocs. Els participants dissenyen un joc i el desenvolupen en un temps limitat, 48 hores 'non stop'.

La Game Jam Barcelona@UPC és una de les més de 600 Game Jam que formen part de la Global Game Jam. Totes les Game Jam tenen lloc simultàniament el mateix cap de setmana a tot el món. La de Barcelona@UPC va celebrar la seva primera edició el gener del 2011 i cada any omple totes les places disponibles.

El dia d'inici s'acostumen a fer activitats, tallers i conferències. Tot seguit s'organitzen els grups. Una vegada que cada equip ha decidit sobre quina idea treballar, comença una carrera a contra rellotge per aconseguir que funcioni el prototip del joc abans que s'exhaureixi el temps.

Organització: Video Games Association d'estudiants de la Facultat d'Informàtica de Barcelona (VGAFIB)
 Web: Game Jam @UPC
 Quan es fa: Última setmana de gener

Hack UPC

Hack UPC ha estat el primer hackathon organitzat per estudiants universitaris a Espanya. La primera edició va tenir lloc el febrer de 2016 i va aplegar més de 500 estudiants internacionals arribats d'arreu del món. A cada edició es programen moltes activitats en paral·lel per aprendre noves tecnologies i divertir-se.

Una part de la diversió d'un hackathon és conèixer gent nova. Al començament de l'esdeveniment es dedica un temps perquè tothom pugui reunir-se i formar equips.

Web, mòbil, hardware, tot està sobre la taula. Els projectes es jutgen a partir de la creativitat, la dificultat tècnica, el poliment i la utilitat per un panell de juts de la indústria i de la Facultat d'Informàtica.

Social Life

WiDS: Women in Data Science Barcelona 2021

Women in Data Science is taking place in Barcelona next June 22nd.

#bitsx
lamarató

Last preparations of the WiDS – Women in Data Science, Barcelona 2021, do not miss it! It will be very

where you can register without any cost and you can check the

Secretary of State for Digital Strategy.



A screenshot of the FIB Visiona website. The header includes the logo and navigation links like 'Home » Companies » FIB Visiona'. The main content area features a list of categories: 'Industrial Practices', 'Job Placements', 'FIB Visiona', and 'Sponsorship'. A detailed description of the FIB Visiona initiative is visible, explaining it as a set of activities for students to interact with companies. A blue button labeled 'FIB Visiona' is at the bottom of the text block.

A banner for the 'European Big Data Analytics Summer School (eBDA)' held from July 5-10, 2020, in Cesena, Italy. The background shows a building at night.

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FAQs

- **If I'm finishing my undergraduate studies this year, can I apply to a master?**

Of course! You can be admitted. You only need to finish on time your registration in September. Indeed, if you finalize your bachelor thesis in October you can yet be admitted in our masters. Contact us for more details.

- **Can I work and study at the same time?**

Of course! there are several opportunities to do extracurricular practices in companies that, in turn, may help you to obtain elective ECTS for some of our masters.

- **What about next academic course and covid-19?**

Our objective are 100% face-to-face lectures. If not possible due to public health recommendations, we will maximise face-to-face / hybrid lectures.

- **For new incoming students... what about enrolment?**

Registration has been online in the last courses. If you require to hand in some documentation you can do later before the lectures start

Contact Information and Tutoring

- MDS Coordinator (academic): Oscar Romero (fib.vd.postgrau@upc.edu)
- Masters Information (administrative): info.masters@fib.upc.edu

Each MDS student is assigned to a tutor upon enrollment



FIB
MASTERS

Do you have further questions?
Do not hesitate to contact us at
info.masters@fib.upc.edu