

University of Milano  
Bicocca

Master's degree  
in Data Science

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# Laurea Magistrale in DATASCIENCE

- The Master's Degree program in Data Science of the University of Milan Bicocca started on 1 October 2017
- It is the first in Lombardy and Northern Italy to train Data Scientists,
- Profession that is having great development in Italy, and Europe
- The course aims to train a generalist data scientist with a strong focus on practical aspects of the profession, including numerous mandatory hands-on activities (projects) to completion of exams.

Hiring  
rate  
94%



# What does the Data Scientist do

Analyzes and visualizes data for descriptive, predictive, and prescriptive purposes

Extract value from data

Analyzes the events and facts of interest of the organization in which it operates, in the light of data and signals coming from the Web, the Internet of Things and Social Media

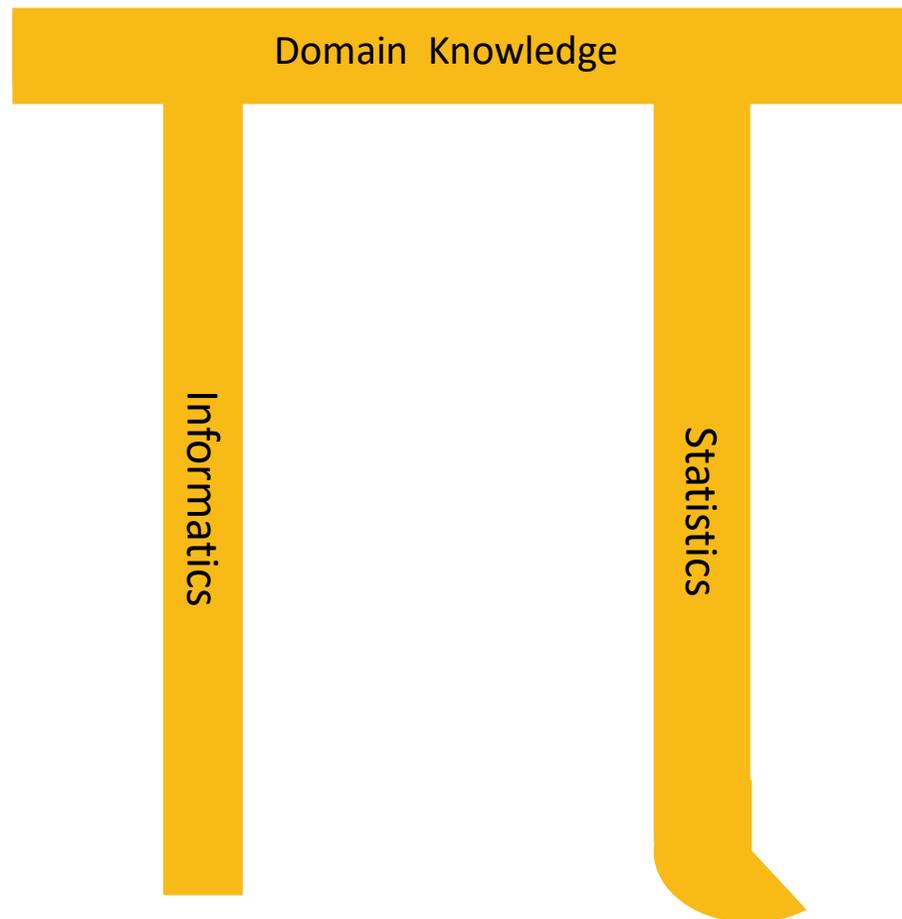


Interacts with the domain specialist in identifying statistical techniques and information technologies for domain analysis

It presents to the decision makers the results of the models it has applied

Acquires, integrates and applies forecasting models on the data of interest

# Educational objectives of the Degree Course



## MODERN DATA SCIENTIST

Data Scientist, the sexiest job of 21st century requires a mixture of multidisciplinary skills ranging from an intersection of mathematics, statistics, computer science, communication and business. Finding a data scientist is hard. Finding people who understand who a data scientist is, is equally hard. So here is a little cheat sheet on who the modern data scientist really is.

### MATH & STATISTICS

- ☆ Machine learning
- ☆ Statistical modeling
- ☆ Experiment design
- ☆ Bayesian inference
- ☆ Supervised learning: decision trees, random forests, logistic regression
- ☆ Unsupervised learning: clustering, dimensionality reduction
- ☆ Optimization: gradient descent and variants

### PROGRAMMING & DATABASE

- ☆ Computer science fundamentals
- ☆ Scripting language e.g. Python
- ☆ Statistical computing package e.g. R
- ☆ Databases SQL and NoSQL
- ☆ Relational algebra
- ☆ Parallel databases and parallel query processing
- ☆ MapReduce concepts
- ☆ Hadoop and Hive/Pig
- ☆ Custom reducers
- ☆ Experience with xaaS like AWS

### DOMAIN KNOWLEDGE & SOFT SKILLS

- ☆ Passionate about the business
- ☆ Curious about data
- ☆ Influence without authority
- ☆ Hacker mindset
- ☆ Problem solver
- ☆ Strategic, proactive, creative, innovative and collaborative

### COMMUNICATION & VISUALIZATION

- ☆ Able to engage with senior management
- ☆ Story telling skills
- ☆ Translate data-driven insights into decisions and actions
- ☆ Visual art design
- ☆ R packages like ggplot or lattice
- ☆ Knowledge of any of visualization

# Specific professional profiles

## Analytical Data Scientist

Applies, adapts, extends and uses statistical techniques and information technologies for analysis and interpretative and predictive models on business decisions and processes.  
Design the high-level architecture of digital data-driven services

## Business Data Scientist

It identifies solutions based on a high-level knowledge of statistical techniques and information technologies to optimize the value of business decisions and processes.  
It conceives new services based on digital data that optimize the use value for the customer and the exchange value for the provider.



# Enrollment trends

AY	DATA SCIENCE
2017/2018	84
2018/2019	101
2019/2020	139
2020/2021	160
2021/2022	110
2022/2023	160
2023/2024	102

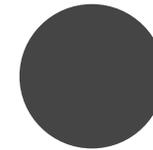
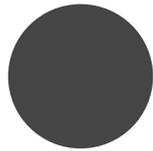
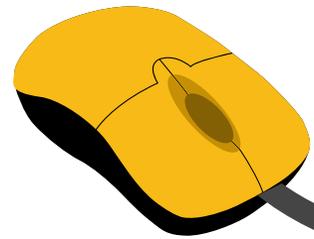
## Students

AY	Woman	Man
2017/2018	17%	83%
2018/2019	20%	80%
2019/2020	22%	78%
2020/2021	34%	66%
2021/2022	30%	70%
2022/2023	35%	65%
2023/2024	30%	70%

## Gender

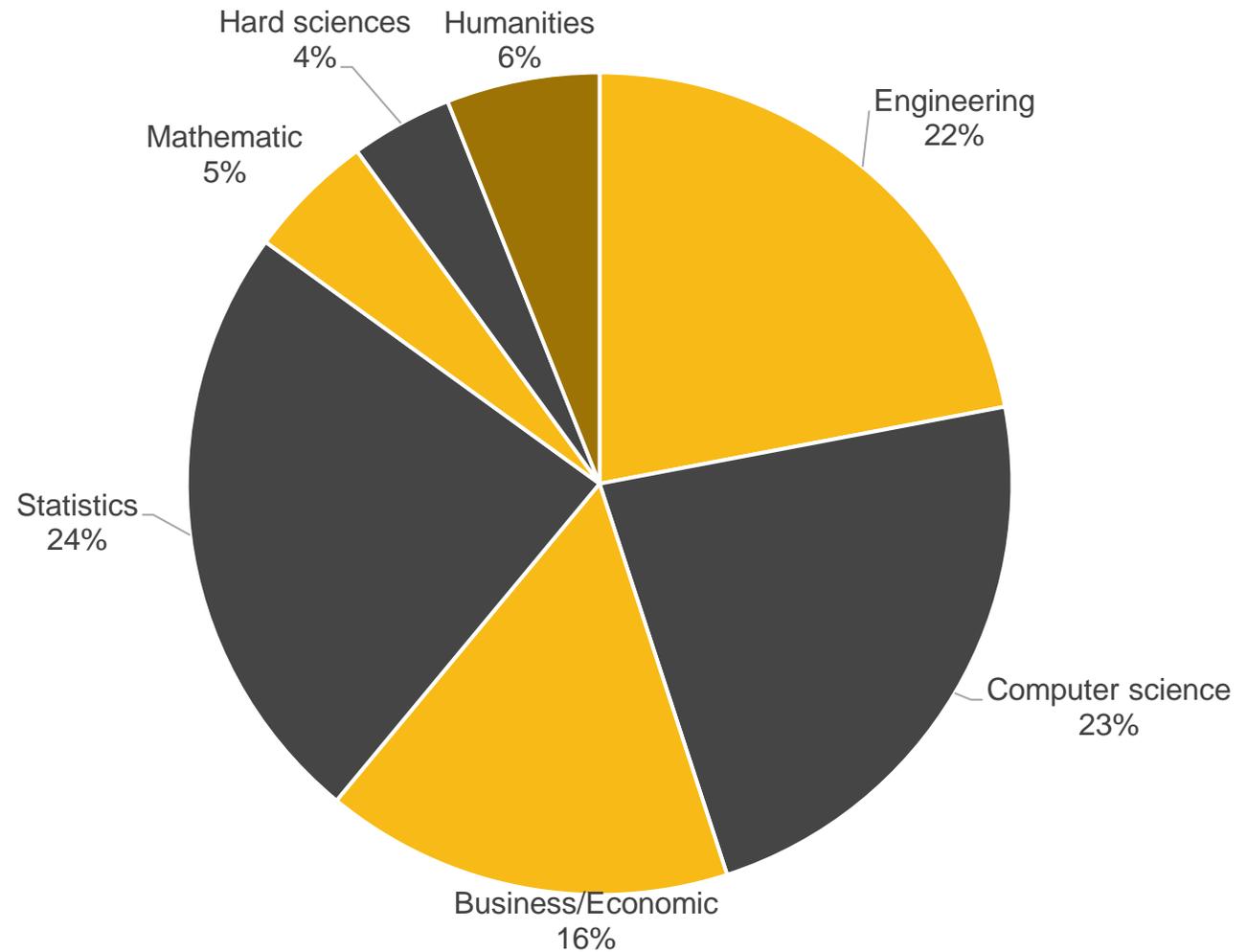
## Geographical origin

AY	Lombardy	Italy	World
2017/2018	72%	25%	3%
2018/2019	69%	29%	2%
2019/2020	63%	37%	0%
2020/2021	70%	30%	0%
2021/2022	64%	36%	0%
2022/2023	52%	38%	10%
2023/2024	42%	22%	36%



# Background

- Strong interdisciplinarity of the students
- Scientific area growth
- Significant presence of three-year graduates in the Economics area
- Humanistic area



# Admission requirements

NEW

## MANDATORY

- At least 30 credits in teachings of the sectors
  - Informatics
  - Computer engineering
  - Statistics
  - Mathematics
  - Physics
- English language proficiency at a level not lower than B2

- Graduated/ing
- in (engineering) computer science, statistics, mathematics and physics
  - degree grade  $\geq 83/110$

- Graduate/ing not in the above list
- at least 6 credits in computer science, computer engineering
  - at least 6 credits in statistics
  - degree grade  $\geq 83/110$

interview



# The three pillars of the course



Since its creation, the master's degree program has been imagined to rest on three pillars



## Teachers

Teachers of various departments for all the disciplinary areas involved. Almost all of the teachers register their lectures



## Students

Students with different cultural backgrounds to enrich common project activities. The attendance of the Labs is mandatory; exceptions may be possible for working students.



## Companies

Companies that collaborate with the Master's degree course by offering internships, data, scholarships and testimonials



# STUDY PLAN

NEW

✓ A graduate in Data Science (Bicocca) must complete the following credits:

- ✓ 15 to 30 CFU in statistics/mathematics (MAT/06-09, SECS-S/01-02)
- ✓ 24 to 42 CFU in (eng) computer science (INF/01, ING-INF/05)
- ✓ 6 to 12 CFU in law/economics/sociology (IUS/9-10, SECS-P/08, SPS/07)

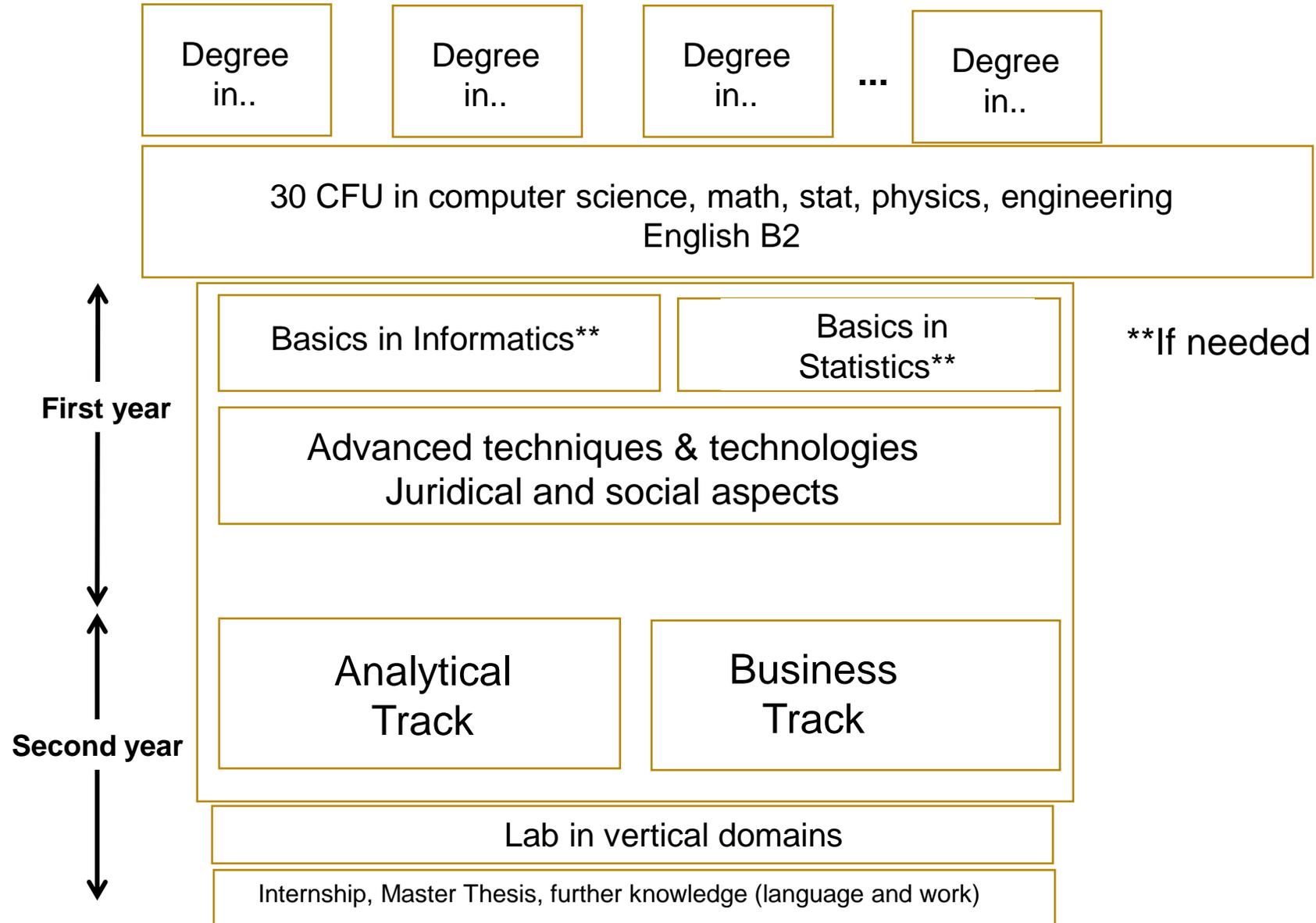
- ✓ 12 to 24 CFU in related supplementary courses (SEC-S, INF, ING-INF, FIS, BIO...)
- ✓ 8 to 16 CFU of free choice

- ✓ 6 CFU for internship
- ✓ 3 additional credits for transitioning into the workplace/languages
- ✓ 21 CFU for the master thesis

120 credits



# Course organization



# Course organization

**1 of 3 computer science**

- Foundations of Computer Science
- Data Semantics
- Foundation of Deep Learning
- Green Computing **NEW**

- 12 CS Data management and visualization
- 6 Statistics Data Science Lab

6 CS + 6 math  
**Machine Learning & Decision Models**

6 ius **Juridical & Social Issues in Information Society**

6 Statistics  
**Statistical modelling**

**1 of 3 statistics**

- Foundations of Probability and Statistics
- Marketing Analytics
- Financial Markets Analytics

6 CS  
**Text mining and search**

**1 of 3 statistics**

- High dimensional data analysis

- Streaming data management and time series analysis

- Economics for Data Science

**Analytical track**

**Business Track**

**1 of 3 CS**

- Cybersecurity for data science
- Digital Signal and Image Management
- Technological infrastructures for DS
- NLP
- Reinforcement learning **NEW**

**1 of 3 computer science**

- Social Media Analytics
- Service Science
- Business Intelligence and big data analytics

**1 of 6 any**

- DS Lab in Environment & Physics
  - Big Data in Geographic Information Systems
  - Big data management and analysis in physics research
- DS Lab in Biosciences
  - Big data in biotechnology & biosciences
  - Making sense of biological data
- DS Lab in Medicine
  - Big Data in Health Care
  - Medical imaging & big data
- Data Science Lab on Smart Cities
- DS Lab in Business & Marketing
  - Big data in Business, Economic and Society
  - Big data in Behavioural Psychology
- DS Lab in Public Policies & Services
  - Big Data in Public Health
  - Data in Public and Social Services

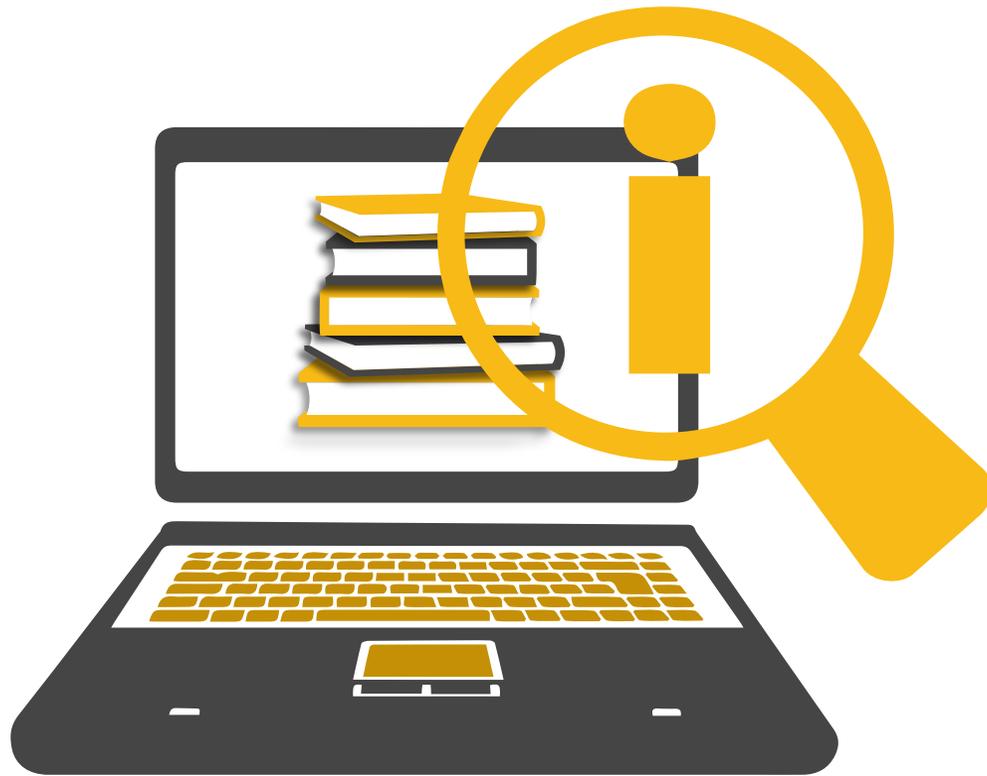
First year

Second year



# Virtual labs

- The teaching projects can be carried out on your own devices
- For special needs, courses can activate virtual laboratories on the Microsoft Azure platform
- For special needs, courses can activate virtual laboratories on the Microsoft Azure platform
- No need to change your devices





# Internationalization

## LANGUAGE

The course is delivered in English

## Erasmus

Numerous exchange agreements with various offices throughout Europe and outside Europe



# Cosa fanno i nostri studenti



<http://www.infodata.ilsole24ore.com>

# Inter data challenge



28/02/24

Milano

# FC INTERNAZIONALE DATA SCIENCE CHALLENGE



# Knime challenge



Sicuro | <https://www.kaggle.com/host/business>

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Overview Business Recruiting Research [Get started](#)

## How would a world-class algorithm change your business?

Find out with Kaggle.

Our supervised machine learning competitions get the most accurate algorithms possible from your data so you're making decisions with confidence.

### How it works

**Define**  
Identify a valuable machine learning problem that you have the data for.

**Scope**  
Work with us to refine the problem statement and finalize the dataset.

**Create**  
Collaborate with us as we build out

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5464	36.50	Blue	20160502	USA
3657	80.00	Green	20160501	USA
6547	32.00	Red	20160430	UK

# Application deadlines for the A.Y. 2024/2025

- Students of non-EU countries requiring VISA:
  - from March 18 to May 03, 2024 (to be confirmed)
- Italian and European students + students of non-EU countries legally resident in Italy:
  - from May 13 to June 03, 2024
  - from June 05 to August 30, 2024



The call for the next Academic Year 2024-2025 will be published in the next few weeks at the webpage:

<https://www.unimib.it/graduate/data-science> "Admission and enrollment" section (please do not consider the current documentation, since it is referred to the A.Y. 2023/2024).

The document will include all relevant details (requirements, admission modalities, official deadlines, interview dates, submission instructions)

**orientamento.datascience@disco.unimib.it**



That's all folks!