

MASTER'S DEGREE IN DATA SCIENCE

(LM Data - Data Science class)

Annual Manifesto (Study program) A.Y. 2023-2024

Educational offer

In the Academic Year 2023-2024 of the Master's Degree in Data Science, FDS01Q code, LM Data – Data Science class, the following course years are active:

- first year for students enrolled in the A.Y. 2023-2024, cohort 2023, relevant didactic regulation FDS01Q-23: <https://elearning.unimib.it/course/view.php?id=46143&lang=en>
- second year for students enrolled in the A.Y. 2022-2023, cohort 2022, relevant didactic regulation FDS01Q-22: <https://elearning.unimib.it/course/view.php?id=46143&lang=en>

**Active courses in the A.Y. 2023-24
 (FDS01Q code, LM Data - Data Science class)**

FIRST YEAR (for students enrolling in the A.Y 2023-2024):

Course denomination and code	Course CFU (credits)	Educational activity – typology	SSD (Scientific-Disciplinary Sector)	Module denomination	Module CFU (credits)	Semester
DATA MANAGEMENT AND VISUALIZATION – FDS01Q001	12	Mandatory - Characterizing	INF/01	DATA MANAGEMENT	6	First Semester
			INF/01	DATA VISUALIZATION	6	
FOUNDATIONS OF COMPUTER SCIENCE – FDS01Q009	6	Mandatory to be chosen - Characterizing	INF/01	FOUNDATIONS OF COMPUTER SCIENCE	6	First Semester
FOUNDATIONS OF PROBABILITY AND STATISTICS – FDS01Q006	6	Mandatory to be chosen - Affine/integrative	SECS-S/01	FOUNDATIONS OF PROBABILITY AND STATISTICS	6	First Semester

JURIDICAL AND SOCIAL ISSUES IN INFORMATION SOCIETY – FDS01Q005	6	Mandatory - Characterizing	IUS/09	JURIDICAL AND SOCIAL ISSUES IN INFORMATION SOCIETY	6	First Semester
MACHINE LEARNING AND DECISION MODELS FDS01Q002	12	Mandatory - Characterizing	INF/01	MACHINE LEARNING	6	First Semester
			MAT/09	DECISION MODELS	6	Second Semester
DATA SCIENCE LAB – FDS01Q003	6	Mandatory - Characterizing	SECS-S/01	DATA SCIENCE LAB	6	Second Semester
DATA SEMANTICS – FDS01Q010	6	Mandatory to be chosen - Characterizing	INF/01	DATA SEMANTICS	6	Second Semester
FINANCIAL MARKETS ANALYTICS - FDS01Q007	6	Mandatory to be chosen - Affine/integrative	SECS-S/01	FINANCIAL MARKETS ANALYTICS	6	Second Semester
FOUNDATIONS OF DEEP LEARNING FDS01Q012	6	Mandatory to be chosen - Characterizing	INF/01	FOUNDATIONS OF DEEP LEARNING	6	Second Semester
MARKETING ANALYTICS – FDS01Q008	6	Mandatory to be chosen - Affine/integrative	SECS-P/08	MARKETING ANALYTICS	6	Second Semester
STATISTICAL MODELING – FDS01Q004	6	Mandatory - Characterizing	SECS-S/01	STATISTICAL MODELING	6	Second Semester

SECOND YEAR (for students enrolling in the A.Y 2022-2023):

Course denomination and code	Course CFU (credits)	Educational activity – typology	SSD (Scientific-Disciplinary Sector)	Module denomination	Module CFU (credits)	Semester
BUSINESS INTELLIGENCE	6	Mandatory to be chosen - Characterizing	ING-INF/05	BUSINESS INTELLIGENCE	6	First Semester

– FDS01Q020						
CYBERSECURITY FOR DATA SCIENCE – FDS01Q015	6	Mandatory to be chosen - Characterizing	INF/01	CYBERSECURITY FOR DATA SCIENCE	6	First Semester
DATA SCIENCE LAB IN BIOSCIENCES – FDS01Q025	6	Mandatory to be chosen - Affine/integrative	INF/01	BIG DATA IN BIOTECHNOLOGY & BIOSCIENCES	3	Second Semester
			BIO/05	MAKING SENSE OF BIOLOGICAL DATA	3	

DATA SCIENCE LAB IN BUSINESS AND MARKETING - FDS01Q027	6	Mandatory to be chosen - Affine/integrative	SECS-S/03	BIG DATA IN BUSINESS, ECONOMICS AND SOCIETY	3	Second Semester
			M-PSI/03	BIG DATA IN BEHAVIOURAL PSYCHOLOGY	3	
DATA SCIENCE LAB IN ENVIRONMENT AND PHYSICS - FDS01Q024	6	Mandatory to be chosen - Affine/integrative	GEO/04	BIG DATA IN GEOGRAPHIC INFORMATION SYSTEMS	3	Second Semester
			FIS/01	BIG DATA MANAGEMENT AND ANALYSIS IN PHYSICS RESEARCH	3	
DATA SCIENCE LAB IN MEDICINE – FDS01Q026	6	Mandatory to be chosen - Affine/integrative	MED/01	BIG DATA IN HEALTH CARE	3	Second Semester
			ING-INF/06	MEDICAL IMAGING & BIG DATA	3	
DATA SCIENCE LAB IN PUBLIC POLICIES AND SERVICES – FDS01Q028	6	Mandatory to be chosen - Affine/integrative	MED/01	BIG DATA IN PUBLIC HEALTH	3	Second Semester
			ING-INF/05	DATA IN PUBLIC AND SOCIAL SERVICES	3	
DATA SCIENCE LAB	6	Mandatory to be chosen - Affine/integrative	INF/01	DATA SCIENCE LAB	6	Second Semester

ON SMART CITIES – FDS01Q029				ON SMART CITIES		
DIGITAL SIGNAL AND IMAGE MANAGEMENT – FDS01Q017	6	Mandatory to be chosen - Characterizing	INF/01	DIGITAL SIGNAL AND IMAGE MANAGEMENT	6	First Semester
ECONOMICS FOR DATA SCIENCE – FDS01Q021	6	Mandatory to be chosen - Affine/integrative	SECS-P/06	BIG DATA IN ECONOMICS	3	Second Semester
			SECS-P/06	DIGITAL ECONOMY	3	
HIGH DIMENSIONAL DATA ANALYSIS – FDS01Q022	6	Mandatory to be chosen - Affine/integrative	SECS-S/03	HIGH DIMENSIONAL DATA ANALYSIS	6	First Semester
NATURAL LANGUAGE PROCESSING - FDS01Q011	6	Mandatory to be chosen - Characterizing	INF/01	NATURAL LANGUAGE PROCESSING	6	Second Semester
SERVICE SCIENCE – FDS01Q019	6	Mandatory to be chosen - Characterizing	ING-INF/05	SERVICE SCIENCE	6	First Semester
SOCIAL MEDIA ANALYTICS – FDS01Q018	6	Mandatory to be chosen - Characterizing	INF/01	SOCIAL MEDIA ANALYTICS	6	First Semester
STREAMING DATA MANAGEMENT AND TIME SERIES ANALYSIS – FDS01Q023	6	Mandatory to be chosen - Affine/integrative	SECS-S/03	STREAMING DATA MANAGEMENT AND TIME SERIES ANALYSIS	6	First Semester
TECHNOLOGICAL INFRASTRUCTURES FOR DATA SCIENCE – FDS01Q016	6	Mandatory to be chosen - Characterizing	INF/01	TECHNOLOGICAL INFRASTRUCTURES FOR DATA SCIENCE	6	First Semester
TEXT MINING AND SEARCH – FDS01Q013	6	Mandatory - Characterizing	INF/01	TEXT MINING AND SEARCH	6	First Semester

All courses are taught in English

The following activities complete the path:

- Free-choice activities to be chosen by the student: 12 CFU
- Traineeship: 6 CFU
- Further linguistic knowledge/Further skills for job placement: 3 CFU.

ITALIAN students can choose between:

- "further skills for job placement" 3 CFU, by participating in the University activities concerning I-Bicocca project (I-Bicocca Silver 1 CFU, I-Bicocca Gold 2 CFU, I-Bicocca Platinum 3 CFU) as mentioned at the webpage <https://ibicocca.unimib.it/>, or in other activities described in the E-learning webpage of the Program ([e-Learning - UNIMIB: All courses | e-Learning - UNIMIB](#)) or

- "further linguistic knowledge" 3 CFU, by passing the University test about level B2 proficiency of a foreign language other than English, to be chosen among French, Spanish or German, or by passing the University test of level C1 proficiency of English.

Italian students who already have a certification issued by the University or by Bodies accepted by the University, certifying linguistic knowledge of a level equal to or higher than B2 for the French, Spanish or German languages, or certifying linguistic knowledge of a level equal to or higher than C1 for the English language, will be entitled to exemption from the test and recognition of the required credits.

FOREIGN students must instead necessarily obtain 3 credits of "further linguistic knowledge", by passing a University test to verify their knowledge of the Italian language at level A2. Foreign students who already have certifications issued by the University or by Bodies accepted by the University, certifying knowledge of the Italian language at level A2 or higher, will be entitled to exemption from the test and recognition of the required credits.

Information regarding the methods for carrying out the tests or the acquisition of credits is defined at University level and will be available on the University website, at <https://www.unimib.it/didattica/opportunita/lingue-unimib>

- Final exam: 21 CFU.

Enrolment in the program

The Master's Degree programme is addressed to students who have:

- a Bachelor's Degree (or a three-year university diploma), or a Master's Degree or a foreign academic qualification recognised as appropriate by the University, as long as they have gained at least 30 CFUs in the following academic disciplines:
 - INF/01;
 - ING-INF/0;
 - from SECS-S/01 to SECS-S/06;
 - from MAT/01 to MAT/09;
 - from FIS/01 to FIS/08;

- English language proficiency at a level not lower than B2 (Common European Framework).

Once verified the access curricular requirements, the admission to the program is subordinated to the assessment of personal preparation of students as follows:

- 1) The assessment of the personal preparation will be made exclusively by interview for candidates:
 - a) who achieved, or are obtaining, a Bachelor's Degree belonging to the following classes: L-31 (Computer Science), L-8 (Information Technology Engineering), L-41 (Statistics), L-30 (Physics), L-35 (Mathematics) or or an equivalent foreign qualification recognised as appropriate by the University, in compliance with ministerial regulations on the subject and in application on the bilateral agreements in force. For graduate students a grade of 90/110 or higher is required for the test exemption, for graduating students at least a 24.5 point average is requested (weighted average of marks obtained in examinations and their value in CFUs);
 - b) who achieved or are obtaining a Bachelor's Degree belonging to a class other than those indicated above. For graduate candidates at least a grade of 90/110 is required. Graduating applicants must have achieved at least a 24.5 grade point average (weighted average of marks obtained in examinations and their value in CFUs). Candidates must have obtained, within the total 30 CFUs in the academic disciplines:
 - at least 6 CFUs in at least one of the following academic disciplines: SECS-S/01 to SECS-S/06, MAT/06 and MAT/09;
 - at least 6 CFUs in at least one of the following academic disciplines: INF/01 or ING-INF/05.
- 2) The assessment of the adequacy of personal preparation will be carried out through tests and interviews for those who do NOT fall into one of the two categories indicated above. The multiple choice test is carried out in English and is structured in two sets of questions that must be answered within 60 minutes: 20 questions related to basic Computer Science and 20 questions related to basic Statistics. The test final score is determined as follows:
 - 1 point for each correct answer;
 - 0.25 for each wrong answer;
 - 0 points for each unanswered question.

Students who achieve a final score of at least 22, scoring at least 9 points for each set of questions are admitted to the interview.

During the interview the examination committee may recommend readings to deepen specific topics.

Knowledge of the English language at a level equal to or higher than B2 can be verified with one of the following alternatives:

- a certification issued by the University or a certifying Body recognised by our University equivalent to level B2;
- the Bbetween English B2 Open Badge awarded by the University of Milano-Bicocca;
- an exam of at least 4 CFUs passed during previous University careers in one of the following academic disciplines: L-LIN/10, L-LIN/11, L-LIN/12;
- degree program if entirely or almost entirely taught in the English language.

Eligible applicants will be informed whether they have to take the test or are exempted.

Candidates who have successfully passed the test, or were exempted, will be contacted to attend the interview. In the days following the interview, the admitted students list will be published at the webpage <https://elearning.unimib.it/course/view.php?id=46152> and at the University program webpage <https://www.unimib.it/graduate/data-science>. Starting from the days following the publication of admitted students list, it will be possible to proceed with enrolment in the program.

CFU transfer and recognition modalities

In case of transfer, the student can request recognition of training credits acquired in the previous course of study. Recognition is carried out by a special commission, appointed by the Teaching Coordination Council, on the basis of the conformity between the contents of the course of origin and those of the course to which one wishes to access. Partial recognition of a course is allowed.

In case of transfer of the student from another master's degree program belonging to the LM Data - Data Science class, the number of credits relating to the same scientific-disciplinary sector, directly recognized to the student, cannot be less than 50% of the credits already gained (according to the Ministerial Decree of 16 March 2007).

It is possible to recognize the professional knowledge and skills certified individually as university training, as well as skills acquired in post-secondary level training activities where the university has contributed for a maximum of 12 CFU, overall between bachelor's and master's degrees. This recognition is subject to the approval of the competent bodies. Activities already recognized for the purposes of attributing university credits within bachelor's degree programs cannot be recognized again as credits for master's degree programs.

Information regarding the modalities for submitting transfer applications is published at the webpage: <https://www.unimib.it/servizi/segreteria-studenti/passaggi-trasferimenti-e-rinunce>.

Students who intend to make an incoming transfer/passage must comply firstly with the indications provided by the art. 6 "Admission methods" of the 2023-2024 teaching regulations of the master's degree course in Data Science available on the page: <https://elearning.unimib.it/course/view.php?id=46143>, since the application for evaluation of curricular requirements and the test and subsequent interview is mandatory in case of transfers and incoming passages, too.

Organization of didactic activities

The teaching activities are organized in course lessons. A course normally includes lectures, exercises and laboratory activities for which the following correspondences apply:

1 CFU of frontal lectures: 7-8 hours;

1 CFU of exercises: 10 - 12 hours;

1 CFU of laboratory activities: 9 - 12 hours.

The CFU represents the student's learning work, including the training activities implemented by the Master's degree program and the commitment reserved for personal study or other individual

training activities. 1 CFU corresponds to 25 hours of total work, distributed between hours of lessons, laboratories and individual study.

Frequency

Attendance is mandatory for at least 75% of the laboratory hours, with the possibility of individual exemption for justified justification.

Attendance at lectures and exercises is not mandatory, but is highly recommended.

Lesson times, office hours and contact details of the course teachers

Teaching activities are scheduled over two semesters:

1° semester

- start of lessons: 25 September 2023
- end of lessons: 12 January 2024

2° semester

- start of lessons: 04 March 2024
- end of lessons: 07 June 2024

Lessons schedule will be published at the webpage https://gestioneorari.didattica.unimib.it/PortaleStudentiUnimib/?view=home&include=homepage&_lang=en

Professors' contacts are published at the webpage <https://en.unimib.it/people-search>.
Concerning hours at the office to meet the professors, please contact them by email.

Courses syllabus

The teaching programs ("syllabus") and other useful information on the organization of teaching activities can be consulted at the following web page <https://elearning.unimib.it/course/index.php?categoryid=9172&lang=en> "Courses".

Study plan presentation

The study plan is the set of compulsory training activities, compulsory activities chosen from within a list of proposed courses and teaching activities freely chosen by the student in accordance with the teaching regulations of the master's degree program.

The students are automatically assigned a study plan upon enrollment in the first year, which constitutes the statutory study plan. Subsequently, the students must present their own study plan with an indication of the compulsory and freely chosen activities.

The study plan is approved by the Teaching Coordination Council. The methods and deadlines for submitting the plan are defined by the University.

The student's right to take verification exams relating to a teaching activity is subject to the presence of the activity itself in the last approved study plan. For anything not covered, please refer to the University Regulations for students.

More information on the webpage <https://www.unimib.it/servizi/segreteria-studenti/piani-degli-studi> .

Exams modalities

The courses are divided between two semesters as established by the teaching calendar. For each course there are 5 exam sessions, distributed between June-July, September, January-February. The validity of the exam program is limited to the academic year in which the course is provided.

Each course corresponds to an exam which involves the acquisition of the credits attributed to the course. A course can include multiple modules which give rise to a single integrated exam. The exams give rise to an evaluation out of thirty. The exams can be oral and/or written. Partial intermediate exams valid for passing the exam may be scheduled during the course.

Details on the method of verification and evaluation of each individual course included in the study plan are available in the course syllabus available on the e-learning site of the Degree Course under the heading "COURSES" <https://elearning.unimib.it/course/index.php?categoryid=9172>

Registration for exams is mandatory and takes place online <https://s3w.si.unimib.it/Home.do>

The calendar of exam dates is shown in the public section (you must access it WITHOUT logging in) "Exam notice board" of the website https://s3w.si.unimib.it/ListaAppelliOfferta.do?menu_opened_cod=menu_link-navbox_didattica_Esami and in the web agenda which can be consulted on the following webpage <https://gestioneorari.didattica.unimib.it/PortaleStudentiUnimib/?view=home&include=homepage&lang=en>

Supernumerary “extra” credits (11 May 2020 Academic Senate approval)

In derogation of the provisions of the art. 22 paragraph 3) of the University Didactic Regulations in force, the Academic Senate, with approval dated 11 May 2020, has provided also for students enrolled in master's degree courses, the possibility of including activities in supernumerary up to 16 ECTS in their study plan, starting from the 2019/2020 academic year.

The 16 extra credits can be acquired through the recognition of exams taken for teaching purposes, in Erasmus or through transversal activities offered by the University.

The credits and the grades obtained for the additional courses are not included in the calculation for the average of the exam grades, but they are recorded in the student career and will be reported in the Diploma Supplement.

Final exam

The final exam consists in the presentation of an original thesis in English by the student under the guidance of a supervisor.

The thesis will concern a project or research activity or case analysis. The final exam aims at verifying the overall quality of the work carried out, the candidate's ability to communicate, justifying and identifying logical connections between different scientific topics, the mastery of the topics and tools used, as well as the ability to operate independently in the field of organizations that use data science tools.

The thesis work can also be carried out as part of the internship.

For anything not detailed in this paragraph and for the complete calendar of master's degree sessions, please refer to the following webpage:

<https://elearning.unimib.it/enrol/index.php?id=46141&lang=en>

Contacts

Master's degree program site: Department of Computer science, Systems and Communication (Abacus U14 building), Viale Sarca, 336 – 20126 Milan

President of the Teaching Coordination Council: prof. Andrea Maurino.

Other reference teachers of the Master's degree program: prof. Claudio Ferretti (traineeship referent), prof. Gianluca Della Vedova (Didactic Commission president), prof. Elisabetta Fersini (International mobility coordinator), prof. Marco Viviani (orientation referent).

Teaching Services office - Sciences:

segreteria.didattica@disco.unimib.it
orientamento.datascience@unimib.it

Master's degree program websites:

<https://elearning.unimib.it/course/index.php?categoryid=9172>
<https://www.unimib.it/graduate/data-science>

For further information, please refer to the Academic Regulations for the academic year of enrollment which can be consulted on the web page

<https://elearning.unimib.it/course/view.php?id=46143>