UNIVERSITY OF MILANO-BICOCCA

"GIUSEPPE OCCHIALINI" PHYSICS DEPARTMENT

Interuniversity Master's Degree in

ARTIFICIAL INTELLIGENCE FOR SCIENCE AND TECHNOLOGY

(LM-91 CLASS)

Study Manifesto A. Y. 2022-2023

1. Learning activities

In the academic year 2022-2023, the **first year** of the Master's Degree course in Artificial Intelligence for Science and Technology (Class LM-91 - Techniques and methods for the information society) is activated. The Master's Degree program is jointly organized by the University of Milano-Bicocca, the University of Milan and the University of Pavia.

The learning activities offered according to the Academic Regulations of A. Y. 2022/2023 are listed below.

YEAR I
(For students enrolling in the A. Y. 2022/2023)

Mandatory Courses

learning Activity Code	learning Activity	CFU	Scientific Disciplinary Sector	learning Unit Code	learning Units	CFU	Semester
F9102Q001	**ADVANCED FOUNDATIONS OF MATHEMATICS FOR AI**	**6**	MAT/07	F9102Q001M	ADVANCED FOUNDATIONS OF MATHEMATICS FOR AI	6	First semester
F9102Q002	**ADVANCED FOUNDATIONS OF STATISTICS FOR AI**	**6**	SECS-S/01	F9102Q002M	ADVANCED FOUNDATIONS OF STATISTICS FOR AI	6	First semester
F9102Q003	**ADVANCED FOUNDATIONS OF PHYSICS FOR AI**	**6**	FIS/01	F9102Q003M	ADVANCED FOUNDATIONS OF PHYSICS FOR AI	6	First semester
F9102Q004	**ADVANCED FOUNDATIONS OF ARTIFICIAL INTELLIGENCE**	**12**	ING-INF/05	F9102Q004M	ARTIFICIAL INTELLIGENCE	6	First semester
			INF/01	F9102Q035M	AI FOR SIGNAL AND IMAGE PROCESSING	6	First semester

Optional Courses

Students may choose one of the following Application Areas:

Application Area n. 1: **AI for Industry and Environment**

learning Activity Code	learning Activity	CFU	Scientific Disciplinary Sector	learning Unit Code	learning Units	CFU	Semester
F9102Q007	SYSTEMS FOR INDUSTRY 4.0 AND ENVIRONMENT (IoT)	**6**	ING-INF/05	F9102Q007M	SYSTEMS FOR INDUSTRY 4.0 AND ENVIRONMENT (IoT)	6	Second semester

F9102Q008	ADVANCED DATA MANAGEMENT AND DECISION SUPPORT SYSTEMS	**6**	INF/01	F9102Q008M	ADVANCED DATA MANAGEMENT AND DECISION SUPPORT SYSTEMS	6	Second semester
F9102Q009	ADVANCED ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING	**6**	INF/01	F9102Q009M	ADVANCED ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING	6	Second semester
F9102Q029	SENSING AND VISION FOR INDUSTRY AND ENVIRONMENT	**12**	ING-INF/03	F9102Q029M	INTELLIGENT SENSING AND REMOTE SENSING	6	Second semester
			INF/01	F9102Q030M	VISION FOR INDUSTRY AND ENVIRONMENT	6	Second semester

Application Area n. 2: **Intelligent Embedded Systems**

learning Activity Code	**learning Activity**	**CFU**	**Scientific Disciplinary Sector**	**learning Unit Code**	**learning Units**	**CFU**	**Semester**
F9102Q012	EMBEDDED SYSTEMS ARCHITECTURES AND DESIGN	**6**	ING-INF/05	F9102Q012M	EMBEDDED SYSTEMS ARCHITECTURES AND DESIGN	6	Second semester
F9102Q008	ADVANCED DATA MANAGEMENT AND DECISION SUPPORT SYSTEMS	**6**	INF/01	F9102Q008M	ADVANCED DATA MANAGEMENT AND DECISION SUPPORT SYSTEMS	6	Second semester
F9102Q009	ADVANCED ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING	**6**	INF/01	F9102Q009M	ADVANCED ARTIFICIAL INTELLIGENCE, MACHINE LEARNING AND DEEP LEARNING	6	Second semester
F9102Q030	AMBIENT INTELLIGENCE	**12**	INF/01	F9102Q031M	ADVANCED HUMAN-SYSTEM INTERFACES	6	Second semester
			ING-INF/05	F9102Q032M	AMBIENT INTELLIGENCE AND DOMOTICS	6	Second semester

Application Area n. 3: **Sensing and Signal/Image Processing for Healthcare and Environment**

learning Activity Code	**learning Activity**	**CFU**	**Scientific Disciplinary Sector**	**learning Unit Code**	**learning Units**	**CFU**	**Semester**
F9102Q015	ADVANCED COMPUTATIONAL TECHNIQUES FOR BIG IMAGING AND SIGNAL DATA	**6**	INF/01	F9102Q015M	ADVANCED COMPUTATIONAL TECHNIQUES FOR BIG IMAGING AND SIGNAL DATA	6	Second semester
F9102Q016	SIGNAL AND IMAGING ACQUISITION AND MODELLING IN HEALTHCARE	**6**	FIS/07	F9102Q016M	SIGNAL AND IMAGING ACQUISITION AND MODELLING IN HEALTHCARE	6	Second semester
F9102Q017	SIGNAL AND IMAGING ACQUISITION AND MODELLING IN ENVIRONMENT	**6**	FIS/01	F9102Q017M	SIGNAL AND IMAGING ACQUISITION AND MODELLING IN ENVIRONMENT	6	Second semester
F9102Q031	MACHINE LEARNING FOR MODELLING	**12**	INF/01	F9102Q033M	SUPERVISED LEARNING	6	Second semester
			ING-INF/05	F9102Q034M	UNSUPERVISED LEARNING	6	Second semester

Application Area n. 4: **Complex Systems and Quantum Technologies**

learning Activity Code	learning Activity	CFU	Scientific Disciplinary Sector	learning Unit Code	learning Units	CFU	Semester
F9102Q022	AI MODELS FOR PHYSICS	**6**	FIS/02	F9102Q022M	AI MODELS FOR PHYSICS	6	Second semester
F9102Q023	STATISTICAL LEARNING	**6**	INF/01	F9102Q023M	STATISTICAL LEARNING	6	Second semester
F9102Q024	QUANTUM SIMULATION	**6**	FIS/03	F9102Q024M	QUANTUM SIMULATION	6	Second semester
F9102Q031	MACHINE LEARNING FOR MODELLING	**12**	INF/01	F9102Q033M	SUPERVISED LEARNING	6	Second semester
			ING-INF/05	F9102Q034M	UNSUPERVISED LEARNING	6	Second semester

2. Enrolment in Master's Degree programme

In order to be admitted to the Master's Degree Course in Artificial Intelligence for Science and Technology, applicants must hold a university degree or a three-year university diploma, or a qualification obtained abroad and deemed equivalent.

Admission is based on the assessment of the student's educational background, as well as their having completed the minimum 30 CFU from the following subject areas is required: INF/01, ING-INF/05, ING-INF/03, from MAT/01 to MAT/09, from SECS-S/01 to SECS-S/06, from FIS/01 to FIS/08.

Students' educational background will be assessed through an interview, to be conducted by the designated Admissions Committee. The interview is focused on gauging the student's baseline of knowledge in IT, Mathematics, Statistics, and Physics; student understanding will be assessed across the following subject areas:

- IT: computer programming, algorithms, data structure, and elements of artificial intelligence;
- Mathematics: linear algebra, differential and integral calculus in one or more variables, number series;
- Statistics: descriptive statistics, probability, random variables, inference, linear model;
- Physics: elements of statistics, dynamics, energy, thermodynamics, electromagnetics, and optics.

Students who meet the above-described academic requirements, and who have earned a degree qualification with marks at or above 100/110, or those who have earned a Master's Degree in any of the following degree classes, will have the interview component waived: LM-17, LM-18, LM-21, LM-25, LM-27, LM-32, LM-35, LM- 40, LM-44, LM-66, LM-82, LM-91.

The interviews will take place by teleconference, the link to the teleconference will be published in concomitance with the publication of the list of candidates admitted to the interview.

It is also required at least a B2 level of knowledge of the English language. The requirement for English language knowledge will be considered satisfied if the candidate:

a) holds a certification, recognised by the University, issued by an accredited Body, equivalent to level B2 or higher;
b) has earned the Bbetween English B2 Open Badge for the University of Milano-Bicocca, or has passed the Placement test (English B2) for the University of Milan, or those who earned a B2 English certification from the Language Center of the University of Pavia;
c) has completed a degree course entirely or almost entirely taught in the English language.

Application periods and procedures , along with the date of the interviews will be posted on the degree programme's website.

3. Credits transfer procedures

Transfer students from other Master's Degree programmes, or students who took a leave of absence or previously withdrew from University, or those holding another Master's Degree, must submit an application for their earlier credits to be recognised, whether for admission or transfer purposes. The Academic Council will determine whether to award a student full or partial credit for the exams completed.

For any transfer into another Master's Degree course within the LM-91 class, the portion of credits relating to the same subject area which are directly awarded to the student shall not be fewer than 50% of the credits earned (Ministerial Decree of 16 March 2007).
According to Ministerial Decree no. 270/2004 and Law 240/2010, Universities may recognise as university credits individually certified professional knowledge and skills in accordance with the relevant regulations, as well as other knowledge and skills acquired in post-secondary activities in which the university has contributed to the design and implementation, up to a maximum of 12 credits, between undergraduate and postgraduate courses in total.
Any activities for which university credits have been awarded for purposes of matriculation into the degree programme cannot be reapplied to earn credits toward the Master's Degree.

No transfer students will be admitted into the second year of the programme for the 2022/2023 academic year.

Information on how to submit transfer applications is published on the following webpage: https://www.unimib.it/servizi/segreterie-studenti/passaggi-trasferimenti-e-rinunce

4. Class schedules

First semester classes will take place in the following period: **26 September 2022 - 20 December 2022**
Second semester classes will take place in the following period: **01 March 2023 - 02 June 2023**

Class schedules will be published in the following website:
https://gestioneorari.didattica.unimib.it/PortaleStudentiUnimib/

5. Learning activities schedules

The learning activities schedules (Syllabi) are available on the University's e-learning platform at the following link: https://elearning.unimib.it/course/index.php?categoryid=9164

6. Learning methods

The educational programme comprises in-person lectures, exercises, and laboratory activities.
The acquisition of knowledge and skills by the student is assessed in university credits (CFU). One (1) credit corresponds to an average time commitment for a student of the course of 25 hours, including the educational activities carried out by the Master's Degree course and the commitment reserved for personal study or other individual educational activities. To earn one (1) credit, students must attend eight (8) hours of lectures, twelve (12) hours of exercises, or complete twelve (12) laboratory hours.

The credits corresponding to each type of course are assigned to the student after passing the exam or following another method of verifying the preparation and skills acquired.

7. Assessment methods

Examinations involve the awarding of grades on a thirty-point scale and may take place in oral/written form, according to the University academic regulations and the Student Regulations for the University of Milano-Bicocca. No written exam will be solely multiple choice.

More information on the assessments for each learning activity can be found in the respective Syllabus. Syllabi are posted on the degree course webpage, in the "Courses" section.

Internship activities and assessments on language proficiency are taken on a pass/fail basis.

Learning activities will take place at the physical sites of the University of Milano-Bicocca, Milan (UNIMI) and Pavia, according to alternation rules that will soon be published on the course website.

The exams calendar, times and location are published at:
http://gestioneorari.didattica.unimib.it/PortaleStudentiUnimib.

Registration to take exams is carried out via the Segreterie On Line webpage.

8. The study plan

A study plan is a set of compulsory learning activities, optional activities and elective activities chosen independently by the student in accordance with the Teaching Regulations of the Course. The student is assigned a study plan upon enrolment for the first year, which is the statutory plan. Then the student must submit his/her own study plan with indication of the optional and elective activities. The study plan is approved by the Teaching Coordination Council. The methods and deadlines for submitting the study plan are defined by the University. The student's right to take exams related to learning activities is subject to the presence of the activity in the last approved study plan.

Please refer to the University Regulations for Students for anything not provided for herein (https://www.unimib.it/sites/default/files/allegati/regolamento_studenti_2019_con_decreto.pdf).

Further information will be published at: https://www.unimib.it/servizi/segreterie-studenti/piani-degli-studi/area-scienze

Please refer to the Academic Regulations (A. Y. 2022-2023) for the learning activities planned for the 2nd year of the course. These activities will be activated in the A.Y. 2023-2024.

9. Contacts

Teaching secretary office of the programme:
Università degli Studi di Milano-Bicocca
Dipartimento di Fisica "Giuseppe Occhialini"
Piazza della Scienza 3, 20126 Milan
E-mail address: AI4ST@unimib.it

For information on admission, transfer and other administrative questions please write to: segr.studenti.scienze@unimib.it

For the University procedures and deadlines relating to registration/enrolment, transfer, presentation of study plans, please see the website www.unimib.it.

For all information about didactic issues please visit the webpage of the degree course: https://elearning.unimib.it/course/index.php?categoryid=9164