



# MDMC

Master in Data Management  
and Curation

## Shaping Data, Shaping the Future!

### Become an Expert in FAIR Data Management and Curation with Area Science Park & SISSA

*Advanced, hands-on training for the next generation of data professionals, delivered in the heart of Trieste's renowned scientific ecosystem.*

In today's data-driven world, the ability to manage, curate, and leverage data effectively is paramount. Both scientific research and industry increasingly demand professionals skilled in making data Findable, Accessible, Interoperable, and Reusable (FAIR). **Furthermore, in today's AI-driven landscape, mastering data management is absolutely critical to safeguarding the integrity and security of the algorithms we increasingly rely on.**

The one-year **postgraduate specialization course** "Master in Data Management and Curation (MDMC)", a unique joint initiative by Area Science Park and SISSA, is designed to equip you with the advanced, practical skills needed to excel in this critical field.

#### WHY CHOOSING MDMC?

- **Prestigious partnership:** learn from two leading institutions, both founded in Trieste in 1978: [Area Science Park](#), a national public research organisation, which has always been a link between research, innovation and industry, and [SISSA](#), one of the six Italian school of excellence, which is a scientific center of advanced research in mathematics, physics and neuroscience within the national and international academic scene. Both share the scientific objective of doing **frontier research in the field of Artificial Intelligence**. This unique collaboration offers an unparalleled learning environment.
- **Specialized FAIR & Open Science focus:** gain in-depth expertise in FAIR principles and Open Science methodologies, skills highly sought after by research institutions and funding bodies across Europe.
- **Unique hands-on approach:** go beyond theory with our innovative "FAIR-by-design" methodology. Apply your learning during a **six months extensive practical internship** within real, cutting-edge research laboratories and companies.

- **Targeted career outcomes:** prepare for in-demand roles like Data Steward, Data Curator, Data Engineer and Research Data Manager, equipped with the practical experience needed in academia, research infrastructures and private data-intensive organizations.

## COURSE OBJECTIVES

This course program is designed to provide you with both the theoretical foundation and the practical, hands-on skills essential for managing the entire research data lifecycle effectively and responsibly.

Upon successful completion of the Master in Data Management and Curation, you will be able to:

- **Master FAIR principles & Open Science:** deeply understand and advocate for the principles of Findable, Accessible, Interoperable, and Reusable (FAIR) data within the broader context of Open Science methodologies and European initiatives like EOSC (European Open Science Cloud), European Commission funders and others.
- **Implement FAIR-by-design workflows:** design, implement, and manage practical "FAIR-by-design" data workflows and pipelines directly within research environments, ensuring data is managed correctly from collection to publication and beyond.
- **Develop comprehensive Data Management Plans (DMPs):** create, evaluate, and execute robust Data Management Plans tailored to specific research projects, addressing funder requirements and best practices.
- **Manage metadata effectively:** define, create, enrich, and utilize rich metadata using appropriate standards, schemas, ontologies, and vocabularies to ensure data discoverability and interoperability.
- **Utilize Data Management tools & technologies:** gain practical experience with essential tools, software (including Python for data management), database systems, data formats, and potentially cloud environments for data acquisition, curation, analysis, and storage.
- **Curate and preserve research data:** apply best practices for data curation, including data quality assessment, documentation, storage, and long-term preservation strategies using appropriate repositories.
- **Navigate legal & ethical frameworks:** understand and apply principles related to data protection (e.g., GDPR), intellectual property, data licensing, and research ethics, particularly when handling sensitive data.
- **Understand AI fundamentals and applications:** grasp the core concepts of Artificial Intelligence and explore its practical applications in various scientific domains, bridging the gap between AI theory and real-world scientific challenges.

- **Perform foundational Data Analysis:** apply introductory statistical analysis and machine learning concepts to explore and understand research data.
- **Operate as a Data Steward:** be prepared to act as a skilled Data Steward, Data Engineer or Research Data Manager within research institutions or other data-intensive organizations. This professional course provides the opportunity to acquire **robust technical competencies** (e.g., in data handling, metadata management, tool usage) that can be **applied at various levels**, allowing you to tailor your positioning within the Data Steward role based on your career aspirations and the specific needs of the organization.

## WHY MDMC IS UNIQUE

The course “Master in Data Management and Curation” (MDMC) stands apart as a premier program, uniquely positioned at the intersection of cutting-edge research and practical application.

Thanks to the strategic alliance between **Area Science Park** and **SISSA**, and the presence of a vibrant research and innovation ecosystem in the **Friuli Venezia Giulia (FVG)** region, MDMC students benefit from a uniquely fertile ground for developing practical, high-value data skills.

This regional synergy — rich in research institutions, startups, and innovation clusters — makes Trieste the ideal hub to host such a cutting-edge training program.

A core element of our program is the deep dive into FAIR-by-design methodology. Unlike many courses focusing solely on the theory of Open Science or FAIR data, MDMC immerses you in the practical application of these principles to **solve real-world data management challenges**. This is not just about applying rules; it's about architecting data workflows from the ground up to ensure data is Findable, Accessible, Interoperable, and Reusable.

This emerging professional profile in FAIR-by-design Research Data Management and Curation is uniquely characterized by its proactive "FAIR by design" approach, embedding Findable, Accessible, Interoperable, and Reusable principles directly into the research data lifecycle from the outset, rather than as an afterthought. Distinct from traditional data management or curation, it demands deep integration within the research process, a strong focus on *ab initio* semantic and technical interoperability, and a hybrid blend of technical, domain-specific, ethical, and communication skills. This role acts as a strategic enabler, maximizing the value and long-term impact of research data within the modern scientific ecosystem.

Implementing **FAIR-by-design in real-world research settings requires more than technical knowledge – it demands flexibility, creative problem-solving, and adaptability**. You will learn to architect data workflows tailored to specific scientific contexts, moving beyond rigid protocols to

build efficient and sustainable data systems. This fosters a versatile mindset crucial for navigating complex data environments.

Our experience from the pilot edition, where students undertook internships across a wide range of diverse experimental laboratories, provides an invaluable asset. This hands-on engagement with heterogeneous, real-world scenarios has generated a wealth of practical insights and lessons learned that we integrate into the curriculum, enriching the learning experience for all future students.

**Beyond research, the principles and skills mastered in FAIR data management are directly transferable to industrial contexts.** This expertise proves particularly valuable for enhancing common data pipelines (ETL/ELT), as FAIR's focus on rich metadata, interoperability via standardized vocabularies, data quality, and provenance tackles frequent industrial challenges like data integration and complex transformations. Consequently, the ability to design machine-actionable and interoperable data systems offers a significant advantage for streamlining these commercial workflows.

The MDMC program equips you with a unique blend of deep FAIR expertise and a flexible, creative approach to data workflow design. This versatility ensures you can seamlessly adapt your skills to the more defined structures often found in industrial settings. **Graduates are not just FAIR data specialists; they are adaptable data professionals ready to enhance data value and efficiency, whether in advanced research or data-driven industry.**

## ADMISSION REQUIREMENTS (Academic Year 2025-2026)

Admission to the Master in Data Management and Curation – MDMC - for the Academic Year 2025-2026 requires candidates to hold a Bachelor's degree (Laurea Triennale) or a Master's degree (Laurea Magistrale/Specialistica), or an equivalent university degree (e.g., pre-reform Italian Diploma di Laurea).

In addition to the degree qualification, candidates must meet the following minimum requirements by the start date of the lessons to effectively follow the program:

- **English language:** a good proficiency in English is required (CEFR B2 level or higher is strongly recommended), as all lectures and teaching activities will be conducted exclusively in English.
- **Python programming:** basic Python programming skills are required, as detailed in the specifications provided in [Annex 1](#).

- **Mathematical skills:** minimum mathematical knowledge equivalent to that acquired through university-level Calculus 1 and 2 courses (or equivalent).
- **Statistical skills:** basic knowledge of statistics, including elements of probability theory, hypothesis testing techniques, understanding of Bayes' theorem, and statistical model comparison.
- **Technical equipment:** availability and ability to use a personal computer equipped with a functioning Linux operating environment.

## HOW TO APPLY

Applications for the Academic Year 2025-2026 must be completed and submitted **exclusively** through the dedicated online platform, accessible at the following link:

<https://pica.cineca.it/sissa/sissa-ilas-mdmc-2025>

**The application will be open from april 29th to june 10th.**

The online procedure requires uploading the following mandatory documents:

- **Letter of motivation:** a document outlining the candidate's reasons for interest in the MDMC Master and their professional goals (150 - 1500 characters).
- **Identity document:** a copy (front and back) of a valid identity document (ID card or passport).
- **Curriculum Vitae:** an updated CV detailing the candidate's educational background and any professional experience.

Applications submitted through other channels will not be considered.

For information regarding the application procedure, please contact [ILAS at SISSA](#)

## SELECTION, FEES, AND FINANCIAL AID

For the Academic Year 2025-2026, the Master in Data Management and Curation (MDMC) will admit a **maximum of 15 participants**.

The standard tuition fee for the Master is **€4.500,00**.

The selection process will be based on the evaluation of qualifications (CV, academic background and motivation letter) submitted with the application. The selection committee may also invite



candidates for an individual online interview to further assess their preparation, skills, and motivation. At the end of the process, a **final ranking** of admitted candidates will be established.

Based on the position in this final ranking, the following **financial aid packages** are available:

- **Candidates ranked 1st to 5th:** Will be exempt from paying the **full tuition fee** (value € 4.500,00).
- **Candidates ranked 1st to 4th:** will receive a **financial contribution of € 3.000,00<sup>1</sup>** [gross amount] to support attendance during the lecture period in Trieste (indicatively mid-September to mid-December 2025).

For admitted candidates ranked from 6th to 15th, the standard tuition fee of €4.500,00 will apply. Further details on fee payment procedures and timelines, and on the disbursement of the financial contribution, will be specified directly to the recipients.

## STRUCTURE AND SCIENTIFIC PROGRAMME OF MDMC

### • Program Overview

The ***Master in Data Management and Curation – MDMC*** - is a **postgraduate specialization course** designed to equip students with advanced skills in managing the full research data lifecycle — from acquisition, cleaning, and analysis, to storage, preservation, publication and beyond

The MDMC responds to the growing demand for professionals who can ensure that data are managed according to the FAIR principles (Findable, Accessible, Interoperable, and Reusable).

These principles are essential for fostering open science, enhancing data quality and integrity, and maximizing the reuse of research results across domains.

Uniquely focused on the complexities of research data, MDMC emphasizes real-world application through a hands-on **internship and a thesis project**, enabling students to design and implement automated FAIR-by-design data workflows in active scientific environments.

**The skills and tools developed during the MDMC are also highly transferable to industrial settings.** The methodologies used to make research data FAIR-by-design closely align with the techniques adopted in industries for designing robust ETL/ELT (Extract, Transform, Load) pipelines.

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<sup>1</sup> To be eligible for the financial contribution of € 3.000,00, it is necessary to be unemployed or without a job. Enrollment in a university degree or PhD is compatible with receiving the financial contribution. If one or more of the first four candidates is found to be ineligible, the ranking will be adjusted to include the next candidate in line.

Both rely on structured metadata, quality control, traceability, and semantic interoperability to ensure data can be efficiently integrated, transformed, and reused.

This cross-sector applicability opens career opportunities not only in academia and research infrastructures but also in industry roles related to data governance, data engineering, business intelligence, and beyond.

### Examples of **where FAIR Expertise Meets Industry Needs**

MDMC graduates are well-prepared to contribute to roles in sectors such as:

- **Pharmaceutical & Life Sciences:** Clinical data standardization, regulatory compliance
- **Manufacturing & IoT:** Sensor data ingestion, real-time monitoring pipelines
- **Energy & Utilities:** Environmental data curation
- **AI/Data Platforms:** Enabling machine-actionable datasets

### • **Scientific Curriculum**

The 2025–2026 edition introduces new modules on Artificial Intelligence and Machine Learning, tailored to data challenges in scientific research (e.g., image classification, background removal).

**The MDMC is a full-time 10 months program, which consists of 1500 hours of training activities, corresponding to 60 ECTS credits, and includes:**

#### ○ **Classroom lectures (10 ECTS – 250 hours)**

8 weeks of intensive classes from mid September to mid December 2025, delivered in person in Trieste (Area Science Park and SISSA campuses):

TRAINING MODULES	HOURS
Introduction to Open Science	3
Scholarly Publishing	6
Research Data Management & FAIR Data	12
Scientific Programming Environment	24
Cloud Data Environment	15
Python for Data	36
Data Infrastructure	30
Data Management Tools	30
Introduction to AI	30
Machine Learning for Scientific Applications	30

<b>External Speaker Seminars</b>	24
<b>Specialized Workshops</b>	10

Courses will be delivered by an international faculty composed by local data experts complemented by international well-renowned experts in the field.

○ **Internship (20 ECTS – ~500 hours)**

A six-month internship (from January to June 2026) in partner laboratories, where students will work on experimental data collection and develop their own FAIR-by-design thesis project. Internships are supervised and provide hands-on experience in real scientific contexts.

○ **Project Work (5 ECTS – 125 hours)**

Each student will deliver a final project (thesis) detailing the design and implementation of a FAIR-by-design data pipeline developed during their internship.

○ **Individual Study (25 ECTS – 625 hours)**

Time allocated for self-study, assignment preparation, and thesis writing.

○ **Summary Table of Hours and ECTS Credits**

PROGRAM COMPONENT	HOURS	ECTS CREDITS
Classroom lectures	250	10
Internship	500	20
Final Project (Thesis)	125	5
Individual Study	625	25
<b>Total</b>	<b>1500</b>	<b>60</b>

○ **Duration and Modality**

- **Total Duration: 10 months, from September 15, 2025 to June 30, 2026**
- **Teaching Language: English**
- **Teaching Mode: In-person, with some remote sessions during the internship period**
- **Location of in-presence lectures: Trieste – Area Science Park & SISSA**



## • Internship Opportunities

A distinctive feature of the MDMC program is its **extensive six-month internship**, during which students gain hands-on experience by working directly within research laboratories and data-intensive environments.

## • Real-world Projects Across Italy

In the 2024–2025 edition, MDMC students completed internships at prestigious institutions across Italy, including:

- Several laboratories of the **National Research Council (CNR)** nationwide
- **University of Milan (UniMi)**
- **Politecnico di Milano (PoliMi)**
- **University of Salento**
- **University of Salerno**
- The **Data Engineering Lab** at **Area Science Park** in Trieste

These experiences allowed students to apply FAIR-by-design data management practices in a wide range of scientific and organizational contexts, from materials science to life sciences and beyond.

## • Ongoing and New Collaborations

For the 2025–2026 edition, the MDMC will consolidate collaborations with many of these hosts and also establish **new partnerships**, including:

- **Neuroscience laboratories at SISSA**, where students will support data curation for high-impact experimental research
- **SISSA Medialab**, a cutting-edge company developing digital infrastructures for scientific publishing and open science
- **New industrial partners**, eager to support MDMC's training mission by hosting internships aligned with data governance and FAIR principles

*Internships are carefully supervised and matched to each student's interests and background, with the goal of developing a personalized thesis project applying FAIR-by-design principles to real data challenges.*

## Ready to Shape the Future of Data?

[Apply now!](#)

*For further information, contact us sending an email to [MDMC](#).*

The course is part of the [NFFA-DI](#) project, which has received financial support from Italy's National Recovery and Resilience Plan (PNRR), Mission 4 "Education and Research" – Component 2 "From Research to Business" – Investment Line 3.1 "Fund for the implementation of an integrated system of research and innovation infrastructures", funded by the European Union – NextGenerationEU.



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