



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2024/25
IN
BIOMEDICAL OMICS (Classe LM-9)
Enrolled since 2022/23 Academic Year

HEADING

Degree classification - Denomination and code:	LM-9
Degree title:	Dottore Magistrale
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Course years currently available:	1st , 2nd
Access procedures:	Cap on student numbers, student selection based on entrance test
Course code:	D58

PERSONS/ROLES

Head of Study Programme

Prof.ssa Myriam Alcalay

Tutors - Faculty

Academic guidance tutor:

- Prof.ssa Myriam Alcalay
- Prof. Salvatore Pece
- Prof. Diego Pasini
- Dott.ssa Emanuela Colombo
- Dott. Gaetano Ivan Dellino
- Dott. Stefano Santaguida

Degree Course website

<https://bo.cdl.unimi.it>

International Students - Welcome desk:

<https://informastudenti.unimi.it/saw/ess?AUTH=SAML>

Student administrative office:

Email: biomedicalomics@unimi.it

CHARACTERISTICS OF DEGREE PROGRAMME

Introduction

The Master Program in Biomedical Omics belongs to Class LM-9, Master Programs in Veterinary Pharmaceutical and Medical Biotechnology. The Department of Oncology and Hemato-oncology (DIPO) of the University of Milan is the academic institution responsible for the Master Program in Biomedical Omics.

General and specific learning objectives

The advent of technologies that allow the global analysis of biological phenomena (“omics”) has revolutionized the study of human diseases and opened new perspectives in the field of research, diagnosis and therapy, tracing the path for Precision or Personalized Medicine. The central element of Precision Medicine is in fact the quantitative description of biological or clinical phenotypes by high definition omics (genomics, epigenomics, proteomics, metabolomics, microbiomics, digital imaging, radiomics and radiogenomics).

The Master Program in Biomedical Omics aims at providing students with a broad understanding of omics disciplines applied to medicine and first-hand practical experience with different omics techniques. Key competences of graduates include the ability to design experiments, manage the work flow, analyze and interpret omics data, and create applications for future developments in omics approaches.

Expected learning outcomes

Knowledge and understanding

Graduates in Biomedical Omics will have theoretical knowledge and practical experience in omics disciplines applied to the

clinics. Key competences will include the ability to design experiments, manage work flow, analyze and interpret data and devise new strategies for further development of omics approaches. The courses and training activities will provide specific skills in omics disciplines and in the computational approaches that are necessary for the interpretation of results. Graduates will also be familiar with the legal, ethical and decision-making aspects related to the handling of sensitive data.

Applying knowledge and understanding

A key objective of the Master's Degree course in Biomedical Omics is to provide graduates with the full capacity to apply the theoretical knowledge they receive. To achieve this goal, a relevant amount of time will be devoted to practical training and to the experimental thesis deriving from a research project that can be conducted in a national or international, academic or industrial laboratory.

Professional profile and employment opportunities

Graduates in Biomedical Omics will be able to pursue careers as Technologists in Biomedical Omics:

Tasks: Coordination and execution of omics techniques in routine diagnostics or clinical research within hospital laboratories.

Skills:

- i) understanding of the clinical demand underlying the required analyses;
- ii) execution of omics analyses;
- iii) interpretation of results;
- iv) introduction of technological upgrades in the clinical laboratory and development of technology upgrades to adapt standard protocols to local needs.

Employment opportunities: diagnostic laboratories in hospitals and clinical research laboratories.

Graduates will also have the possibility to work in basic research laboratories, in biotechnological development institutes, or to continue their academic training by enrolling in doctoral programs or second-level masters programs, both in Italy and abroad.

Pre-requisites for admission

Access to the Master Program in Biomedical Omics is open to:

- Graduates in classes L-2 (Biotechnology), L-13 (Biological sciences), L-27 (Chemistry), L-29 (Pharmaceutical sciences and technologies), or equivalent foreign qualification for a total of 180 ECTS;
- Graduates in classes other than those listed above provided they have at least 40 ECTS in the following scientific disciplinary sectors: BIO/06, BIO/08, BIO/09, BIO/10, BIO/11, BIO/12, BIO/13, BIO/14, BIO/15, BIO/16, BIO/17, BIO/18, BIO/19, CHIM/01, CHIM/02, CHIM/03, CHIM/06, CHIM/07, CHIM/08, CHIM/09, MED/01, MED/02, MED/03, MED/04, MED/05, MED/07, MED/08, MED/43, MED/44, MED/46, MED/50, SECS - S/01, SECS - S/02.

Knowledge of English language is required at B2 level.

Knowledge Assessment

Students meeting the above minimum requirements are invited to an interview for admission (in English) with the Commission for Admittance to the Master, composed by teaching members appointed by the Teaching Board.

The interview, done remotely via electronic devices if necessary, is aimed at verifying the above-mentioned skills.

The overall evaluation will give rise to a score in hundreds, in which they will be attributed:

- up to 25/100 for the degree grade,
- up to 10/100 for the curriculum of studies (type of degree, any free courses attended/passed, other diplomas, etc.),
- up to 65/100 for the outcome of the interview.

The minimum admission score is 60/100. The negative result obtained in the verification tests of personal preparation leads to foreclosure access to the Master's Degree Course for the current year.

Foreign Students

Students must have a Bachelor's degree in one of the disciplines described above (Biotechnology, Biology, Chemistry, Pharmaceutical sciences). The number of hours/credits of the specific courses must be clearly identifiable in the academic curriculum. If this is not possible, documents certifying the students career will be examined by the Faculty to assess if their background complies with the admission requirements.

Programme structure

The Master program in Biomedical Omics is a two-year course, corresponding to four semesters. Students must earn 120 educational credits (CFU = Crediti Formativi Universitari) to complete the Master's degree.

One CFU corresponds to a workload of 25 hours and is calculated as follows:

- lectures: 1 CFU = 8 hours of lectures and 17 hours of independent study;
- practicals: 1 CFU = 16 hours of laboratory activities and 9 hours of independent study;
- experimental projects (thesis work): 1 CFU = 25 hours of laboratory and/or training activities.

All activities of the course will be held in English.

The first year courses will cover: omics technologies and their applications, computational approaches for analysis,

interpretation and management of omics data, legal implications of omics analyses, laboratory management and technology transfer, for a total of 54 CFU. Lectures in omics and computational approaches will be complemented by practical training (6 CFU).

In the second year, students will study the application of omics technologies in diagnostic and clinical settings, experimental design and model systems, and ethical issues concerning the use of omics in a clinical setting (24 CFU).

The second year will be largely dedicated to the production of an experimental thesis (28 CFU) deriving from a research project. The national and international laboratories where students can carry out their thesis projects will be selected on the basis of quality.

Finally, during the course students will gain 8 CFU from any course of their choice offered by the University of Milan.

Conscientious objection policy

The use of animals for teaching purposes is not allowed by law, but can be included in the experimental work performed for thesis preparation. According to Italian law Act No. 413 of October 12, 1993, students have the incontestable right to conscientiously object to participate in any experimental activity using animals. In this case, the Faculty will suggest alternative research projects to ensure degree completion.

Campus

Lectures will be held in the educational center of the European Institute of Oncology. Laboratory activities will be held in the research and clinical laboratories of institutions represented in the Department of Oncology and Hemato-oncology of the University of Milan.

Tutoring

Students will be assigned a tutor upon admission to the course. Tutors will provide students with academic advice, guidance on their course and thesis choices and, if requested, personal advice.

Language test / computer literacy test

To obtain the degree, those who do not hold an Italian high school diploma or bachelor's degree must demonstrate proficiency in Italian at the A2 or higher level per the Common European Framework of Reference for Languages (CEFR). This level must be demonstrated prior to completing the course programme in one of the following ways:

- by submitting a certificate of A2 or higher level issued no more than three years prior to the date of submission. You will find the list of language certificates recognized by the University at: <https://www.unimi.it/en/node/349/>). The language certificate must be submitted to the University Language Centre (SLAM) via the Language Test category of the InformaStudenti service: <https://informastudenti.unimi.it/saw/ess?AUTH=SAML>;
- via an entry-level test administered by SLAM that can be taken only once and is compulsory for all students who do not have a valid language certificate. Those who fail to reach A2 level will have to attend one or more than one 60-hour Italian course(s) geared to their level.

Those who do not take the entry-level test or fail to pass the end-of-course test after six attempts will have to obtain language certification privately in order to earn the 3 credits of Additional language skills: Italian

Compulsory attendance

Students are required to attend to at least 75% of teaching activities.

The experimental project leading to the final dissertation is considered mandatory for the Master Degree.

Testing and assessment procedures

Each course is followed by an exam, usually a written or an oral test (or a combination). Course exams must be passed, with grades calculated on a 30-point scale, to obtain course credits, with 18/30 being the minimum pass grade. Credits for a course are only granted upon passing the corresponding exam. Courses can be taught by more than one instructor: in this case, only one lecturer will be responsible for the final assessment of the student.

<https://bo.cdl.unimi.it/en/study/exams>

Study plan definition and submission for approval

<https://bo.cdl.unimi.it/en/study-plan-submission>

Degree programme final exam

The final exam consists of the presentation and discussion of an experimental thesis based on data obtained by the student in a research or clinical omics laboratory. The thesis will be elaborated under the supervision of a Faculty member of the Biomedical Omics Master Program with the collaboration of the tutor. A committee of 5 Faculty members will evaluate the thesis dissertation and assign a score of maximum 10 points. The final grade will derive from the weighted average of the grades in the lecture courses, calculated on a scale of 110, to which the points of the final dissertation will be added.

Lecture timetable

<https://bo.cdl.unimi.it/en/study/course-timetable>

EXPERIENCE OF STUDY ABROAD AS PART OF THE DEGREE PROGRAM

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organizations.

Similar international mobility opportunities are provided outside Europe, through agreements with a number of prestigious institutions.

How to participate in Erasmus mobility programs

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.

Ad hoc commissions will evaluate:

- Academic career
- the candidate's proposed study programme abroad
- his/her foreign language proficiency
- the reasons behind his/her application

Call for applications and informative meetings

The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-institutional agreement or to find a traineeship position on their own.

The University organizes informative meetings to illustrate mobility opportunities and rules for participation.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which may be supplemented by the University funding for disadvantaged students.

Language courses

Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).

<https://www.unimi.it/en/node/8/>

Learn more at <https://www.unimi.it/en/node/274/>

For assistance, please contact:

International Mobility Office

Via Santa Sofia 9 (second floor)

Tel. 02 503 13501-12589-13495-13502

Contacts: InformaStudenti; mobility.out@unimi.it

Student Desk booking through InformaStudenti

ADMISSION CRITERIA: 1ST YEAR CAP ON STUDENT, STUDENT SELECTION BASED ON ENTRANCE TEST

Links to enrolment information and procedures

<https://www.unimi.it/it/studiare/frequentare-un-corso-di-laurea/iscriversi/iscriversi-un-corso-magistrale>

Practical instructions

Italian and foreign students will be selected based on the score of the admission test, which will be held in September. The date of the entrance test will be published on the website of UniMi.

More information can also be found in the Departmental website: <http://www.dipo.unimi.it>

N° of places reserved to non-EU students resident abroad

5

Number of places assigned

30

Entry test method

The selection will be based on the results of written examination consisting of multiple-choice questions on topics such as molecular biology, biochemistry, genetics and statistics.

1st COURSE YEAR Core/compulsory courses/activities				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector

year	Practical laboratory activities		6	NA
1 semester	Genomics an Epigenomics (Total number of ects:12)	Genomics	6	BIO/10, BIO/11, MED/04
		Epigenomics	6	BIO/10, BIO/11, MED/04
1 semester	High-throughput_screenings		6	BIO/11, MED/04
1 semester	Proteomics		6	BIO/10
1 semester	Radiomics		6	MED/04, MED/36
2 semester	Computational approaches for omics data		12	ING-INF/05, INF/01
2 semester	Legislation, management and technology transfer (Total number of ects:12)	Legislation and technology transfer	6	MED/43
		Laboratory Management	6	MED/46
		Total number of compulsory credits/ects	60	

2nd COURSE YEAR Core/compulsory courses/activities

Scheduling	Learning activity	Module/teaching unit	Ects	Sector
1 semester	Clinical Omics		6	MED/15, MED/11, MED/06
1 semester	Ethics and decision-making		6	M-PSI/01
1 semester	Experimental_design		6	BIO/11, MED/04, BIO/13
1 semester	Omics in diagnostics		6	MED/03, MED/08
		Total number of compulsory credits/ects	24	

Elective courses

8 CFU from courses of their choice offered by the University of Milan during the second year.

	Additional Language Skills: Italian (3 ECTS)		3	ND
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End of course requirements

	Final exam		28	NA
		Total number of compulsory credits/ects	28	