



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2019/20
IN
MEDICAL BIOTECHNOLOGY AND MOLECULAR MEDICINE (Classe LM-9)
Immatricolati dall'Anno Accademico 2016/17

HEADING

Degree classification - Denomination and code:	LM-9
Degree title:	Dottore Magistrale
Curricula currently available:	NEUROSCIENCE / MEDICAL AND EXPERIMENTAL ONCOLOGY / MOLECULAR DIAGNOSTICS FOR PERSONALIZED MEDICINE / EXPERIMENTAL IMMUNOLOGY AND TRANSPLANTATIONS
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:	D57

PERSONS/ROLES

Head of Study Programme

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Application and enrolment information and procedures

<http://www.unimi.it/studenti/matricole/77650.htm>

CHARACTERISTICS OF DEGREE PROGRAMME

Introduction

The Master Program in Medical Biotechnology and Molecular Medicine belongs to Class LM-9, Master Programs in Veterinary Pharmaceutical and Medical Biotechnology.

1st year cap on student and student selection based on entrance test will be applied for admission

General and specific learning objectives

The Master Program in Medical Biotechnology and Molecular Medicine is committed to form professionals, provided with a strong technical and theoretical background. The expected evolution of their careers will be to develop scientific methodologies and coordinate research projects in the fields of applied biotechnology and translational medicine. The Master Program will provide students with a strong educational background on the genetic and molecular bases of diseases and the pathophysiological mechanisms that take place in the sick human organism, in order to develop diagnostic and therapeutic strategies based on biotechnology. This knowledge will be integrated with a specific formation in the fields of

informatics, biophysics, nanotechnology and pharmacology. The Master Program is organized in common and curricular learning activities with insights into neuroscience, oncology, molecular diagnostics and immunobiotechnology. As a part of the common course, the students will learn about economic management of a scientific project, with emphasis on the construction of the business plan and cost analysis. The Master Program dedicates a long period of time, almost the entire second year, to laboratory activities in which the student, under the supervision of a tutor, will autonomously develop different experimental approaches in the context of a wider research project. This activity will be finalized to the preparation of the degree program final exam.

Expected learning outcomes

The graduate in the Master Program in Medical Biotechnology and Molecular Medicine is expected in the evolution of his career to be able to coordinate research projects in the field of biotechnology and molecular medicine and to collaborate with physicians in the development of novel and innovative diagnostic and therapeutic strategies.

Professional profile and employment opportunities

Researcher in the fields of medical biotechnology and molecular medicine

Tasks: to develop new experimental models for the study of human diseases, to develop new diagnostic approaches, to identify new therapeutic molecules, to devise innovative drug delivery systems.

Competences: this professional has a strong medical educational background that will allow him to create interfaces with the clinics, being a bridge between the bench side and the bedside. A deep knowledge of the pathogenetic mechanisms of diseases is required in order to apply basic disciplines to the resolution of medical problems.

Employment opportunities: public and private research structures, including University, CNR (National Research Council), Istituto Superiore di Sanità (National Institute for health), Hospitals, private pharmaceutical, diagnostics and biotechnological companies, companies supporting science research (instruments, biotechnological reagents and so on).

Medical Science Liaison (MSL)

Tasks: in the pharmaceutical and biotechnological companies, this new professional has the role of establishing scientific relationships with clinicians, supporting the appropriate use of the drugs of interest for the company.

Competences: this professional has a strong medical and pharmacological background that enable him to talk together with physicians in order to solve clinical problem related to the use of specific drugs.

Employment opportunities: pharmaceutical and biotechnological companies.

Clinical Monitor

Tasks: to coordinate clinical studies.

Competences: strong background in pharmacology and statistics.

Employment opportunities after a specific training course: pharmaceutical and biotechnological companies; CRO (Clinical Research Organization).

Market Access Manager

Tasks: to establish stable relationships with the Regulatory Authorities and, in general, with the Institutions with the aim of promoting the approval and the access to the market of new pharmacological and biotechnological products. To work inside Regulatory Authorities (e.g. AIFA)

Competences: this professional has a background in economy and pharmacology, and a knowledge of ethical issues related to commercialization of drugs.

Employment opportunities after a specific training course: pharmaceutical and biotechnological companies; consultant, AIFA (italian agency for drugs).

Medical and scientific communication advisor

Tasks: medical writer; consultant for the development of distance learning modules for the Continuing Medical Education (CME) or other health professionals requiring continuing education. Advisor for pharmaceutical and biotechnological companies in the communication with patient organizations.

Competences: multidisciplinary approaches to medical sciences.

Employment opportunities: medical communication agencies.

The graduates in the Master Program in Medical Biotechnology and Molecular Medicine will have access to PhD programs, second level Master degrees, Specialization School in Medical Genetics, Medical Pharmacology, Clinical Biochemistry, Microbiology and Virology, Nutrition. After the State Board Examination, the graduates can enter into the Professional Register of Biologists (Senior Section).

Programme structure

The planned length of the Master Program in Medical Biotechnology and Molecular Medicine is two years, divided in 6 quarters, during which the student will acquire a total of 120 ects. The first and second quarters include learning activities common to all students, with the aim of providing them with a strong and deep knowledge in the different areas of interest of medical biotechnology. The third quarter is organized in four curricular learning activities, neuroscience, medical and experimental oncology, diagnostics for personalized medicine, experimental immunology and transplantations, with the aim

of integrating the educational background of our graduates with more specific translational and clinical information. At the beginning of the Master Program, each student will choose one of the four curricula. In the fourth quarter, part of the activities will be dedicated to the socio-economic aspects of biotechnology, with emphasis on economy and bioethics. The remaining part of the fourth quarter and the entire fifth and sixth quarters will be dedicated to research activities in selected laboratories, in which the students will be directly in charge for the development of a defined research project, with the aim of generating experimental data that will be used for the preparation of the degree program final exam. The laboratory activities are related to the specific curriculum previously chosen by the student, are compulsory and will be certified by the tutor and by a committee. During the two years, the students will have the opportunity of acquiring 8 ects as electives, chosen among the different proposal of the Course or even other Courses, as long as the electives will be congruent with the objectives of the Master Program.

Conscientious objection policy

In compliance with Act No. 413 of October 12, 1993 "Regulations on conscientious objection to animal experimentation", the Faculty of Medicine recognizes the undisputed right to conscientious objection by students.

Students may be exonerated from the attendance at laboratory exercises in which testing is scheduled on live or dead animals. The achievement of the scientific and practical knowledge for passing the exams will be granted, in accordance with the educational objectives of the specific degree programs, through substitutive methods suggested by the teachers.

Campus

The common learning activities will be held at the Dipartimento di Biotecnologie Mediche e Medicina Traslazionale - Via Vanvitelli, 32 – 20129 Milano.

Curricular learning activities will be held at Dipartimento di Biotecnologie Mediche e Medicina Traslazionale and at Istituto Nazionale per la Cura e lo Studio dei Tumori, via Venezian, 1 – 20133 Milano.

Subjects organisation

Lectures and seminars.

Lecture is the explanation by the teacher of the course about subjects regarded as fundamental for the acquisition of the basic knowledge in a given discipline. Seminars are similar to lectures, but are held by specialists in order to provide a deeper knowledge in certain fields,. The subjects illustrated during seminars are part of the program of the course and are part of the final test.

Laboratory activities.

During laboratory activities the student, under the supervision of a tutor, will autonomously develop different experimental approaches in the context of a wider research project. This activity will be finalized to the preparation of the degree program final exam.

Professionalizing activities. Professionalizing activities are part of the laboratory activities.

Elective training chosen by the Students

The course provides for a training work chosen by the student, distributed throughout the entire course of study.

These selected activities offer the student the opportunity to analyse specific or innovative subjects, choosing from a range of suggestions offered each year by the Faculty. Selected activities may be of different types and attendance is compulsory.

The three types of selected activity are configured-as:

1. seminar type courses;
2. internships;
3. participation in conferences and congresses.

Similarly, a fourth type of selected activity can be configured:

4. 'summer internships', whose regulation is covered by Art. 8 of the Faculty Regulations on Selected Activities.

The student will mature 1 credit for every three conferences/congresses attended during the chosen course of study for Type 3 activities (attendance at conferences and congresses). The student can acquire a maximum of 1 credit for attending Type 3 activities (attendance at conferences and congresses) during the period of the chosen studies.

At the end of the attendance of the Selected Activity (elective) students who have at least 75% of attendance will receive a certificate and the credits.

The specific regulation of selected activities can be found in the Faculty Regulations on Selected Activities.

Compulsory attendance

The student is required to attend all the teaching activities, with a tolerance of no more than 25% of the hours.

Students are required to sign their attendance at each learning activities. Should the number of absences be higher than 25%, the Teaching Committee will take the necessary measures.

Testing and assessment procedures

Each course has a single exam, which is always individual (art. 22, punto 1, del Regolamento Didattico d'Ateneo), and the score will be expressed in thirtieths (art. 11, comma 7, lettera e) del citato DM 270/2004 e dell'art. 22, punto 7 del Regolamento Didattico di Ateneo)

Degree programme final exam

The final exam consists of: written text, oral presentation and defence of an experimental thesis containing the data obtained

by the student during his attendance to the research lab. The thesis will be elaborated under the supervision of a professor belonging to the Master Program in Medical Biotechnology and Molecular Medicine with the collaboration of a tutor. The committee will take in consideration the quality of the thesis, the quality of the public presentation and the scientific maturity of the candidate during the discussion.

ADMISSION TO MASTERS PROGRAMMES

2 Admission for students from other universities

To be admitted to the entrance test, the candidates have to possess 180 ects obtained in the Bachelor's degree, of which 50 in the following sectors: BIO/09 (Physiology), BIO/10 (Biochemistry), BIO/11 (Molecular biology), BIO/12 (Clinical biochemistry), BIO/13 (Biology), BIO/14 (Pharmacology), BIO/16 (Human anatomy), BIO/18 (Genetics), BIO/19 (General microbiology), MED/01 (Medical statistics), MED/03 (Human genetics), MED/04 (General pathology and immunology), MED/05 (Clinical pathology), MED/06 (Medical oncology), MED/07 (Microbiology), MED/08 (Pathology), MED/09 (Internal medicine), MED/25 (Mental health), MED/26 (Neurology), MED/46 (Laboratory medicine), INF/01 (Informatics), FIS/07 (Medical physics).

In order to profitably follow the learning activities, the candidate should have a good knowledge of spoken and written English. The B2 level is required and the certification has to be provided at the registration of the admission test.

Students waiting for obtaining the Bachelor's Degree, can participate in the admission test "sub iudice". In case of success, they will be accepted only if they will obtain the Bachelor degree by December 31th, also possessing the prerequisite described above.

EXPERIENCE OF STUDY ABROAD AS PART OF THE DEGREE PROGRAM

The University of Milan supports the international mobility of its students, offering the opportunity to spend periods of study and training abroad, a unique opportunity to enrich their curriculum in an international context. To this end, the University adheres to the European Erasmus+ program within which agreements with over 300 universities in over 30 countries have been signed. Under this program, students can attend one of these universities in order to pursue training in substitution of part of the curriculum foreseen by the chosen study course, including internships at companies, research and training centers or other organizations, or even to prepare their thesis. The University also maintains relationships with several other prestigious foreign institutions offering similar opportunities even within higher study levels.

Study and internships abroad

The Master programme in Medical Biotechnology and Molecular Medicine supports cooperation opportunities and mobility with leading international universities, as well as the possibility for students to earn credits through exchange education and training programmes with Partner organizations.

Bilateral agreements with the University of Leuven (Katholieke Universiteit Leuven, Belgium), the LUMC (Leids Universitair Medisch Centrum) of the University of Leiden (Netherlands) and the University of Cantabria (Universidad de Cantabria, Spain) are and have been active for several years in the framework of the Erasmus + programme. In recent years, a growing number of students have developed their professionalism and the European dimension of their training through residence periods abroad. Associated universities represent highly recognized European institutions, featuring reference schools (Master and PhD schools) in biomedical sciences. The students will thus be offered exciting opportunities to enhance their CVs and evaluate their interests in extending their careers in the international setting.

5 positions are available for the Academic Year 2019-2020. The Master course in Medical Biotechnology and Molecular Medicine offers second year students the possibility to carry out the entire practical training for the preparation of their final thesis work in one of the aforementioned institutions or with other institutions with which an agreement has been established. The student will have to define a research project related to his/her course of studies and curricular training, with the joint agreement of both the Unimi and the foreign tutors. The period abroad amounts to 9 months equivalent to 32 credits. A positive evaluation of the period abroad will be required. The latter should be defined by the tutor in the foreign university, the UNIMI tutor and is subjected to the approval by the Unimi Didactic Council. Erasmus students who obtain outstanding results, proved by an official evaluation letter of the foreign tutor to the President of the Masters Commission, will be rewarded with 1-2 additional points in the final Laurea Grade.

Besides general informative meetings organized by the University, the Degree course in Medical Biotechnology provides specific support to interested students. Furthermore, the international programme provides the possibility to access the Erasmus + programme.

How to participate in Erasmus mobility programs

To gain access to mobility programs for study purposes, lasting 3-12 months, the enrolled students of the University of Milan, not beyond 1 supplementary year of study, must attend a public selection that starts usually around the month of February each year through the presentation of specific competition announcements, which contain information on available destinations, respective duration of the mobility, requirements and deadlines for submitting the online application. Access criteria is a language A2 certification in the language to be spoken during the mobility. The selection, aimed at evaluating the proposed study abroad program of the candidate, knowledge of a foreign language, especially when this is a preferential requirement, and the motivations behind the request, is performed by specially constituted commissions. Each year, before the expiry of the competition announcements, the University organises information sessions for the specific study course or groups of study courses, in order to illustrate to students the opportunities and participation rules. To finance stays abroad

under the Erasmus + program, the European Union assigns to the selected students a scholarship that - while not covering the full cost of living abroad - is a useful contribution for additional costs as travel costs or greater cost of living in the country of destination. The monthly amount of the communitarian scholarship is established annually at national level; additional contributions may be provided to students with disabilities.

In order to enable students in economic disadvantaged conditions to participate in Erasmus+ program, the University of Milan assigns further additional contributions; amount of this contributions and criteria for assigning them are established from year to year. The University of Milan promotes the linguistic preparation of students selected for mobility programs, organising every year intensive courses in the following languages: English, French, German and Spanish.

The University in order to facilitate the organisation of the stay abroad and to guide students in choosing their destination offers a specific support service.

More information in Italian are available on www.unimi.it > Studenti > Studiare all'estero > Erasmus+

For assistance please contact:

Ufficio Accordi e relazioni internazionali

via Festa del Perdono 7 (ground floor)

Tel. 02 503 13501-12589-13495-13502

Fax 02 503 13503

E-mail: mobility.out@unimi.it

Desk opening hour: monday-friday 9 - 12

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

Practical instructions

Italian and European students admitted to attend the Master Program are identified by a graded list determined on the basis of the scores of the admission test. This graded list will be also used for the choice of the curriculum. See below for extra European students*

The date of the entrance test will be communicated later in the announcement of selection published on the website of UNIMI.

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

10

Number of places assigned

65

Entry test method

For Italian, European or equivalent candidates the selection will be on the basis of a competitive written entrance exam. The admission test consists of a written test based on multiple-choice questions. The admission test will be in English and will include 50 questions on topics such as biology, biochemistry, physics, pharmacology, immunology, pathology, genetics.

*For non-EU students resident abroad (applicants for a student visa) the selection will be based on assessment of the personal and scholastic curriculum

1st COURSE YEAR Core/compulsory courses/activities common to all curricula				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
1 trimester	Advanced microscopic techniques and nanotechnology		6	FIS/07
1 trimester	Applied pharmacology to biotechnology		7	BIO/14
1 trimester	Pathogenetic basis of diseases (Total number of ects:12)	General pathology and immunology	6	MED/04
		Internal medicine	6	MED/09
2 trimester	Genetic and molecular bases of diseases (Total number of ects:14)	Biology	8	BIO/13
		Medical genetics	6	MED/03
2 trimester	Human biochemistry		9	BIO/10
2 trimester	Molecular biology applied to biotechnology		7	BIO/11
		Total number of compulsory credits/ects	55	
2nd COURSE YEAR Core/compulsory courses/activities common to all curricula				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
	Degree programme final exam		21	ND
year	Professionalizing training activities		4	ND
1 trimester	Further learning activities (linguistic, informatic, relational)		3	ND
1 trimester	Social aspects of biotechnology (Total number of ects:11)	Economical politics	5	SECS-P/02
		History of medicine	6	MED/02
		Total number of compulsory credits/ects	39	
Further elective courses common to all curricula				
In the first year, the student must gain 4 ects of further electives				
In the second year, the student must gain 4 ects of further electives				

LIST OF CURRENTLY AVAILABLE CURRICULA

NEUROSCIENCE Course years currently available: 1st, 2nd

MEDICAL AND EXPERIMENTAL ONCOLOGY Course years currently available: 1st, 2nd

MOLECULAR DIAGNOSTICS FOR PERSONALIZED MEDICINE Course years currently available: 1st, 2nd

EXPERIMENTAL IMMUNOLOGY AND TRANSPLANTATIONS Course years currently available: 1st, 2nd

CURRICULUM: [D57-A] NEUROSCIENCE

Core learning objectives for the course

To provide our graduates with a strong background in the fields of neurodegenerative and psychiatric diseases, with emphasis on the molecular pathogenesis, the most recent neuroimaging approaches and the pharmacological strategies for their treatment. Graduates will also follow classes of neurology and psychiatry in order to contextualize basic science into a clinical approach.

Expected learning outcomes

Our graduates will acquire competences in the fields of neurobiology, neuropsychopharmacology, neuroimaging, all of which in a clinical perspective, that will allow them to establish interfaces with neurologists and psychiatrists for the development of a translational approach to disease.

Professional profile and employment opportunities

Researcher in the fields of medical biotechnology and molecular medicine

Medical Science Liaison (MSL)

Clinical Monitor

Market Access Manager

Medical and scientific communication advisor

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features NEUROSCIENCE				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
3 trimester	Molecular diagnostics and therapy (Total number of ects:6)	Radiology	1	MED/36
		Neurology	2	MED/26
		Pharmacology	3	BIO/14
3 trimester	Neurobiology (Total number of ects:6)	Neurology	1	MED/26
		Biochemistry	1	BIO/10
		Pharmacology	1	BIO/14
		Physiology	3	BIO/09
3 trimester	Pathogenetic bases of neurological and psychiatric disorders (Total number of ects:6)	Molecular biology	1	BIO/11
		Endocrinology	1	MED/13
		Mental health	2	MED/25
		Neurology	2	MED/26
		Total number of compulsory credits/ects		18

CURRICULUM: [D57-B] MEDICAL AND EXPERIMENTAL ONCOLOGY

Core learning objectives for the course

To provide our graduates with the latest knowledges on the molecular biology of the neoplastic cells and the immunological implications of cancer. Emphasis will be put on the research and development of new diagnostic and therapeutic methodologies. Graduates will also learn about epidemiology and clinics of solid and liquid tumors.

Expected learning outcomes

Our graduates will develop competences in the field of molecular oncology, with a strong background in cancer immunology. They will be able to develop innovative therapeutic strategies.

Professional profile and employment opportunities

Researcher in the fields of medical biotechnology and molecular medicine

Medical Science Liaison (MSL)

Clinical Monitor

Market Access Manager

Medical and scientific communication advisor

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features MEDICAL AND EXPERIMENTAL ONCOLOGY				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
3 trimester	Cancer immunology (ONC) (Total number of ects:6)	General pathology and immunology	2	MED/04
		Medical oncology	2	MED/06
		Blood diseases	2	MED/15
3 trimester	Epidemiology, pathogenesis and diagnostics of cancer (Total number of ects:6)	Medical statistics	1	MED/01
		General pathology and immunology	1	MED/04

		Medical Oncology	2	MED/06
		Blood diseases	2	MED/15
3 trimester	Research and development of new diagnostic and therapeutic methodologies (Total number of ects:6)	Pathology	1	MED/08
		Radiology	1	MED/36
		Blood diseases	2	MED/15
		Molecular biology	2	BIO/11
		Total number of compulsory credits/ects	18	

CURRICULUM: [D57-C] MOLECULAR DIAGNOSTICS FOR PERSONALIZED MEDICINE

Core learning objectives for the course

To provide our graduates with a strong background in the latest diagnostic approaches based on biotechnology, molecular biology and genetics. The aim is to form professionals able to interact with clinicians for the definition of personalized therapeutic strategies. We also intend to give our graduates a background in the regulatory issues related to the data and laboratory management.

Expected learning outcomes

Our graduates will possess competences in different fields of molecular diagnostics such as genetics, microbiology, clinical biochemistry, forensic medicine and reproductive medicine.

Professional profile and employment opportunities

Researcher in the fields of medical biotechnology and molecular medicine
 Medical Science Liaison (MSL)
 Clinical Monitor
 Market Access Manager
 Medical and scientific communication advisor

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features MOLECULAR DIAGNOSTICS FOR PERSONALIZED MEDICINE				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
3 trimester	Advanced techniques in medical biotechnology (Total number of ects:6)	Molecular biology	1	BIO/11
		Obstetrics and gynecology	1	MED/40
		Biology	2	BIO/13
		Biochemistry	2	BIO/10
3 trimester	Data and laboratory management (Total number of ects:6)	Medical statistics	1	MED/01
		Laboratory medicine	1	MED/46
		Clinical pathology	2	MED/05
		Forensic medicine	2	MED/43
3 trimester	Molecular diagnostics (Total number of ects:6)	Clinical biochemistry	2	BIO/12
		Human genetics	2	MED/03
		Microbiology	2	MED/07
		Total number of compulsory credits/ects	18	

CURRICULUM: [D57-D] EXPERIMENTAL IMMUNOLOGY AND TRANSPLANTATIONS

Core learning objectives for the course

To provide our graduates with an advanced formation in immunology with emphasis on the manipulation of the immune system for therapeutic purposes. In this perspective they will learn about cancer immunology. Graduates will also receive a strong background in regenerative medicine and transplantations, with emphasis on biomaterials and stem cells.

Expected learning outcomes

Our graduates will possess deep knowledges on the physiology and pathology of immune system and on the principles of regenerative medicine and transplantations.

Professional profile and employment opportunities

Researcher in the fields of medical biotechnology and molecular medicine
 Medical Science Liaison (MSL)
 Clinical Monitor
 Market Access Manager
 Medical and scientific communication advisor

1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features EXPERIMENTAL IMMUNOLOGY AND TRANSPLANTATIONS				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
3 trimester	Cancer immunology (IMM) (Total number of ects:6)	General pathology and immunology	2	MED/04
		Medical oncology	2	MED/06
		Blood diseases	2	MED/15
3 trimester	Experimental immunology and immunobiotechnology (Total number of ects:6)	General pathology and immunology	1	MED/04
		Rheumatology	1	MED/16
		Laboratory medicine	2	MED/46
		Domestic animal infectious diseases	2	VET/05

3 trimester	Transplantation and tissue engineering (Total number of ects:6)	Forensic medicine	1	MED/43
		Industrial bioengineering	1	ING-IND/34
		Blood diseases	1	MED/15
		General surgery	3	MED/18
		Total number of compulsory credits/ects	18	

COURSE PROGRESSION REQUIREMENTS

In order to start the laboratory activity, the student has to pass 7 exams: the 6 common exams of the first two quarters and, afterwards, 1 exam out of his specific curriculum.