UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2020/21
MASTER DEGREE
Pharmaceutical Biotechnology (Classe LM-9)
enrolled from 2014/15 academic year

HEADING

Degree classification - Denomination and code:	LM-9 Pharmaceutical, veterinary and medical biotechnologies
Degree title:	Dottore Magistrale
Curricula currently available:	Biotechnology in drug research and development / Development and production of biotechnological drugs / PHARMACOGENOMICS AND PRECISION THERAPEUTICS
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Years of course currently available:	1st , 2nd
Access procedures:	Open, subject to entry requirements
Course code:	E51

PERSONS/ROLES

Head of Interdepartmental Study Programme

Prof.ssa Laura Calabresi

Tutors - Faculty

TUTOR PER L'ORIENTAMENTO
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TUTOR PER STAGE E TIROCINI
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TUTOR PER LA MOBILITÀ INTERNAZIONALE E L'ERASMUS
prof.ssa Alessandra Polissi alessandra.polissi@unimi.it

Degree Course website

https://www.unimi.it/it/corsi/corsi-di-laurea/biotecnologie-del-farmaco

Via Celoria 18, Milano Phone 02 503 25032 https://www.unimi.it/it/node/360 https://www.unimi.it/it/node/359

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The aim of the master course in Pharmaceutical Biotechnology is to provide knowledge in scientific methodologies for the design, production and characterization of biotechnological drugs. The master course is organized in three programs, two held in Italian and one in English. The first two programs share a common first year, dedicated to the acquisition of basic knowledge, followed by specific pathways oriented (1) to the use of the biotechnologies in identifying new targets and designing new drugs ("Biotecnologie nella ricerca e sviluppo del farmaco") and (2) to the development, production, formulation, and evaluation of biotechnological drugs ("Biotecnologie nella ricerca e sviluppo del farmaco"). The third program, "Pharmacogenomics and Precision Therapeutics", held in English, is more focused to the recent innovative biotechnological drugs, such as cell and gene therapies.

Expected learning outcomes

The Master Course in Pharmaceutical Biotechnology provides deep knowledge in the field of biotechnologies applied to the development of new drugs. The graduates will acquire specific expertise in the areas of: biochemistry, biology, physiology, pathology, cell and molecular biotechnologies, pharmacology, legislation, and pharmaceutical chemistry. The ambition of the Master Course is to provide the students with a multidisciplinary background sufficient to approach the various phases of drug development, from research, production and formulation, to pre-clinical and clinical development and approval.
The graduates will acquire:

- ability to apply the knowledge to the identification of new targets and development of novel drugs;
- ability to face innovative drugs, such as gene and cell therapies;
- ability to apply current methodologies to generate novel protocols, with a problem-solving approach, being able to integrate knowledge obtained during the first level degree with those acquired during the master course.

Professional profile and employment opportunities

The occupational possibilities for the graduates are:
- teaching and research activity in public and private Universities;
- research activity in public research institutes;
- research and development in pharma and biotech companies;
- teaching in secondary schools;
- clinical monitoring.

In addition, graduates will be able to participate in the creation and management of biotech companies in the field of pharmaceutical and diagnostic products.

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING 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 30 different 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.

Study and internships abroad

The Master Course in Pharmaceutical Biotechnology offers its students the opportunity to spend periods of training abroad thanks to the mobility Erasmus programs.

Procedure for the recognition of study periods abroad: each student must propose a Learning Agreement regarding training activities that lead to the recognition of a number of credits adequate to the period spent abroad. Specifically, 20 CFU for a three-month period; 30 CFU for a six-month period; 45 CFU for a nine-month period.

Evaluation of the period spent abroad: the period of study abroad will be recognized as valid after obtaining at least 70% of the credits specified in the learning agreement, while the activity of the thesis or internship will be valid only after acquisition of all credits.

Incentives: for students who have accomplished satisfactorily the training program, additional points are added to the final degree mark. Up to a maximum of 3 points can be added depending on the duration of the study period, the amount of credits attained, and the overall results obtained by the student.

How to participate in Erasmus mobility programs

The students of the University of Milan can participate in mobility programmes, which last 3 to 12 months, through a public selection procedure.

Ad hoc commissions will evaluate:
• 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 generally begins around February each year with the publication of a call for applications specifying the destinations, with the respective programme duration, requirements and online application deadline.

Every year, before the deadline for the call, the University organizes informative meetings to illustrate opportunities and rules for participation to students.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which is 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.

Learn more at https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus

For assistance, please contact:
International Mobility Office
Via Santa Sofia 9 (second floor)

Tel. 02 503 13501-12589-13495-13502
E-mail: mobility.out@unimi.it
Desk opening hours: Monday to Friday 9 am - 12 noon

ACTIVE CURRICULA LIST

Biotechnology in drug research and development Course years currently available: 1st , 2nd
Development and production of biotechnological drugs Course years currently available: 1st , 2nd
PHARMACOGENOMICS AND PRECISION THERAPEUTICS Course years currently available: 1st , 2nd

Procedure for choosing a curriculum

The choice among the three offered curricula must be done at admission. It is possible to change the curriculum only between the two held in Italian, and only before the end of the first semester.

CURRICULUM: [E51-C] Biotechnology in drug research and development

Qualifying Training Objectives

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Skills acquired

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Professional profile and employment possibilities

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1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Biotechnology in drug research and development

Learning activity		Ects	Sector
Biology of development and differentiation		6	BIO/13
Biotechnology in Pharmacology		8	BIO/14
Metabolic and Functional Biochemistry		6	BIO/10
Molecular basis of hormone and drug action		8	MED/13, BIO/14
MOLECULAR VIROLOGY		6	BIO/19, MED/07
Pathophysiology		6	MED/04
Physiology of Integrated systems		6	BIO/09
Purification and formulation of biotechnological drug products		8	CHIM/09, CHIM/08
Structural Bioinformatics and Molecular Modeling		10	BIO/10, CHIM/06, CHIM/08
	Total compulsory credits	64	

2nd COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Biotechnology in drug research and development

Learning activity		Ects	Sector
Advanced course in Biotechnology and Pharmacology		7	BIO/14
Innovative biotechnological drugs		9	(3) CHIM/06, (6) BIO/14, (6) CHIM/08
	Total compulsory credits	16	

Further elective courses Curriculum-specific features Biotechnology in drug research and development

Experimental laboratory of Biotechnology		9	ND

End of course requirements Curriculum-specific features Biotechnology in drug research and development

FINAL EXAM		21	ND
Lab training		10	ND
	Total compulsory credits	31	

CURRICULUM: [E51-D] Development and production of biotechnological drugs

Qualifying Training Objectives

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Skills acquired

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Professional profile and employment possibilities

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1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Development and production of biotechnological drugs			
Learning activity		**Ects**	**Sector**
Biology of development and differentiation		6	BIO/13
Biotechnology in Pharmacology		8	BIO/14
Clinical Pharmacology and Applied Biochemistry		9	MED/03, BIO/10, BIO/14
Metabolic and Functional Biochemistry		6	BIO/10
MOLECULAR VIROLOGY		6	BIO/19, MED/07
Pathophysiology		6	MED/04
Physiology of Integrated systems		6	BIO/09
Preparation and development of drugs with biotechnological methods		9	CHIM/11, CHIM/08
Purification and formulation of biotechnological drug products		8	CHIM/09, CHIM/08
	Total compulsory credits	64	

2nd COURSE YEAR Core/compulsory courses/activities Curriculum-specific features Development and production of biotechnological drugs			
Learning activity		**Ects**	**Sector**
Manufacturing of biotechnological drug products		7	CHIM/09
Quality control and analysis for biopharmaceuticals		9	(6) BIO/14, (3) CHIM/06, (6) CHIM/08
	Total compulsory credits	16	

Further elective courses Curriculum-specific features Development and production of biotechnological drugs			
Experimental laboratory of Biotechnology		9	ND

End of course requirements Curriculum-specific features Development and production of biotechnological drugs			
FINAL EXAM		21	ND
Lab training		10	ND
	Total compulsory credits	31	

CURRICULUM: [E51-E] PHARMACOGENOMICS AND PRECISION THERAPEUTICS

Qualifying Training Objectives

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Skills acquired

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Professional profile and employment possibilities

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1st COURSE YEAR Core/compulsory courses/activities Curriculum-specific features PHARMACOGENOMICS AND PRECISION THERAPEUTICS			
Learning activity		**Ects**	**Sector**
Bioinformatics and molecular modeling		8	BIO/10, CHIM/06, CHIM/08
Communicable and non-communicable diseases		8	MED/04, BIO/19
Integrated systems physiology		6	BIO/09
Molecular biochemistry and functional biology		10	BIO/10, BIO/13
Omics: from bench to bedside		6	BIO/10, MED/04
Pharmacogenomics, clinical pharmacology, and orphan drugs		7	BIO/14
Protein engineering, drug delivery and regulatory aspects		11	CHIM/09, CHIM/08
	Total compulsory credits	56	

2nd COURSE YEAR Core/compulsory courses/activities Curriculum-specific features PHARMACOGENOMICS AND PRECISION THERAPEUTICS			
Learning activity		**Ects**	**Sector**
Biomarkers: from identification to exploitation		10	(4) MED/13, (6) BIO/14, (6) CHIM/08
Cell therapy and gene silencing		7	BIO/19, BIO/14,

			BIO/13
Nanotechnology based medicinal products		7	CHIM/06, BIO/14, CHIM/09
	Total compulsory credits	24	

Further elective courses Curriculum-specific features PHARMACOGENOMICS AND PRECISION THERAPEUTICS			
Experimental Laboratory of Biotechnology		9	ND
End of course requirements Curriculum-specific features PHARMACOGENOMICS AND PRECISION THERAPEUTICS			
Final Exam		21	ND
Lab Training		10	ND
	Total compulsory credits	31	