UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2021/22
SINGLE-CYCLE DEGREE
Pharmaceutical Chemistry and Technology (Classe LM-13)
enrolled from 2021/22 academic year

HEADING	
Degree classification - Denomination and code:	LM-13 Pharmacy and industrial pharmacy
Degree title:	Dottore Magistrale
Length of course:	5 years
Total number of credits required to complete programme:	300
Years of course currently available:	1st
Access procedures:	Cap on student, student selection based on entrance test
Course code:	E25

PERSONS/ROLES

Head of Interdepartmental Study Programme

Prof.ssa Egle Beccalli, +39 02 503 14479 egle.beccalli@unimi.it Ricevimento studenti: tutti i giorni ore 12.00

Tutors - Faculty

Tutors per l'orientamento e piani di studio:
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Tutors per stage e tirocini:
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Dott. Matteo Cerea, matteo.cerea@unimi.it
Prof. Nico Mitro, nico.mitro@unimi.it
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Degree Course website

https://ctf.cdl.unimi.it/it

Sedi e orari: https://www.unimi.it/it/node/360

Contatti: https://www.unimi.it/it/node/359 Phone 02 503 25032

via Golgi 19 - Edificio 1, ingresso D - 20133 MILANO Phone 02 503 14572 lun, merc, ven 9:30-11:30; mar e gio 13:30-15:30
Email: scienze.farmaco@unimi.it

Tutor per la mobilità internazionale e l'ERASMUS: Prof.ssa Alessandra Romanelli

Via Golgi n. 19 - Corpo A, Milano Phone 02503 14475 Ricevimento studenti: previo appuntamento telefonico
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Tutor per trasferimenti e riconoscimento crediti: Prof.ssa Francesca Selmin

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CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The Master Course in Pharmaceutical Chemistry and Technology aims to train students in chemical, pharmacological, technological and regulatory fields useful to work in positions of responsibility and coordination in all sectors directly or

indirectly related to research and discovery, development, production, quality assurance and marketing of drugs and healthy products.
The course trains for the profession as community and hospital pharmacist as well as for medical information (REP). In particular, the course aims to train professionals able to satisfy the needs and requests of the pharmaceutical, cosmetics, medical devices and food supplements industry, as well as the requests of public and private institutions involved in health research and regulation.
Therefore, such a multidisciplinary degree aims to provide:
1) a preparation on the basic sciences (mathematical, physical, chemical, biological, medical sciences) necessary to acquire solid theoretical and practical skills to support specific disciplines characterizing the course
2) knowledge on medicinal chemistry, biochemistry and pharmacology to allow the design and development of novel biologically active molecules
3) knowledge on pharmaceutical technology to allow the design, the development and the quality control of drug dosage forms and healthy products.
4) knowledge ofnnational and international legislation regarding drugs and healthy products;
5) operational skills, needed to address researches in the fields characterizing the degree course, through educational activities related to the thesis;
6) useful knowledge to carry out professional pharmaceutical services under the National Health Service through the practical training activity, according to 85/432 / EEC law.

Expected learning outcomes

The Course in Pharmaceutical Chemistry and Technology allows the acquisition of the following skills for different professional activities:

1) discovery, synthesis and production of novel biologically active molecules
2) Formulation, production and quality control for drug
3) Formulation, production and quality control for dietetic foods
4) Formulation, production and quality control for cosmetic products
5) Microbiological and physicochemical analyses for mineral waters
6) Handling, storage of drugs during the wholesale stage
7) Preparation, quality control, storage and distribution of drugs in pharmacies and hospitals
8) Dissemination of information and advices concerning health products

Professional profile and employment opportunities

Graduates in Pharmaceutical Chemistry and Technology possess the scientific and theoretical expertise to operate as experts in the field of drug and healthy products (foods for special medical purposes and special diets, cosmetics, herbal, diagnostic, medical devices, etc.) and in related fields and to take on the professional role of pharmacist.

The course trains students for the following professions:
- Medicinal Chemist
- Pharmacist and similar professions
- Chemistry and pharmaceutical Company representative
- Pharmacologist
- Regulatory affairs
- Drug safety
- Clinical research marketing and sales support
- Education and training

Notes

In order to get their degree, students are required to certify their knowledge of the English language at the B2 level. This level can be certified in one of the following ways:

· By submitting their language certificate, taken no more than 3
years before its submittal and attesting a B2 o higher level (for the list of the language certificates which are accepted by the University of Milan, please refer to the website: https://www.unimi.it/en/node/297/).
Students can submit their language certificate during the immatriculation procedure.

· By sitting the placement test run by SLAM, during the first year
exclusively, from September to December. Should they not pass the Placement Test, students will have to attend the English language course organized by SLAM. All students who do not have a valid language certificate must sit the Placement Test. Those students who do not sit the Placement test by December or do not pass the end of course test in one of the 6 attempts granted will have to get a language certificate outside the University of Milan within their degree.

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 the 27 EU member countries and other Extra-EU 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

Programs offered:
• Erasmus + Placement Programme, and Erasmus Mundus at Universities/Institutions partners in Europe and in the Balkans;
• stages at i) Departments of Medicine and Pharmacology, University of Minnesota US; ii) Institute of Advanced Energy, Kyoto University, Japan.
Activities: the mobility is directed to attending courses, research internships and training in Hospital Pharmacy.
The Erasmus Programme + Placement offers the opportunity to play an internship abroad in enterprises or other organizations.
Universities and partner Companies offer the opportunity to carry out researches in a wide range of scientific topics characterizing the Course of Study. For detailed informations on the host institution and fields of studies, see the following web site: https://www.unimi.it/en/education/pharmaceutical-chemistry-and-technology.
Procedure for the recognition of abroad studies. Every student must define the activity and the number of CFU in his/her Learning Agreement according to the following rules:
-an academic year: 60 credits;
-an academic semester: 30 credits;
-an academic quarter: 20 CFU.
Thesis/Stage
3 months 20 ECTS (6 ECTS in the student study programme + 14 ECTS complementary)
6 months 30 ECTS (18 in the student study programme + 12 complementary)
9 months 45 CFU (24 in the student study programme + 21 complementary)
Internship in Hospital pharmacy
Internship in Hospital pharmacy could not be longer than for 4-months corresponding to 20 CFU. This activity follows the rules of the prerequisites reported in the Manifesto.
Recognition of the abroad studies: students must acquire at least 70% of the credits specified in the Learning Agreement. For thesis/internship researches, the student must acquire all the credits reported in the Learning Agreement.
Incentives: An additional score (1-3 points depending on the duration of the study period, the amount of credits attained and the obtained results) will be proposed by the tutor and awarded by the thesis committee to the students who have satisfactorily accomplished the training program.

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 generally begins around February each year with the publication of a call for applications specifying the destinations, with the respective programme duration (from 2/3 to 12 months), 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

Contacts: InformaStudenti mobility.out@unimi.it
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity	Ects	Sector
ANALYTICAL CHEMISTRY	6	CHIM/01
Animal Biology and Plant Biology	9	BIO/15, BIO/13
Calculus	7	MAT/05
Computer Science Course	3	INF/01
English proficiency B2 (2 ECTS)	2	ND
General and Inorganic Chemistry and Stoichiometry	10	CHIM/03
Human Anatomy and Physiology	11	BIO/09, BIO/16
Physics	8	FIS/01
Total compulsory credits	56	

2nd COURSE YEAR (available as of academic year 2022/23) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Applied Microbiology	6	BIO/19
Biochemistry	8	BIO/10
DRUG ANALYSIS 1 AND LABORATORY OF DRUG ANALYSIS 1 AND FOOD CHEMISTRY	12	CHIM/10, CHIM/08
General Pathology	6	MED/04
Organic Chemistry 1	10	CHIM/06
PHARMACOGNOSY	8	BIO/14
PHYSICAL CHEMISTRY	6	CHIM/02
QUALITATIVE ANALYSIS OF INORGANIC DRUGS	6	CHIM/08
Total compulsory credits	62	

3rd COURSE YEAR (available as of academic year 2023/24) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Applied Biochemistry	8	BIO/10
Extractive and Synthetic Preparation of Drugs and Laboratory of Extractive and Synthetic Preparation of Drugs	6	CHIM/08
Medicinal Chemistry 1	10	CHIM/08
Organic Chemistry 2 and Organic Chemistry Laboratory	10	CHIM/06
PHARMACOLOGY AND PHARMACOTHERAPY	8	BIO/14
Spectroscopic methods in organic chemistry	7	CHIM/06
Toxicology	8	BIO/14
Total compulsory credits	57	

4th COURSE YEAR (available as of academic year 2024/25) Core/compulsory courses/activities common

Learning activity	Ects	Sector
DRUG ANALYSIS 2 AND LABORATORY OF DRUG ANALYSIS 2	10	CHIM/08
Medicinal Chemistry 2	10	CHIM/08
Pharmaceutical Technology and Legislation I	9	CHIM/09
Pharmaceutical Technology and Legislation II	9	CHIM/09
Total compulsory credits	38	

Elective courses

Al quarto anno di corso, lo studente dovrà scegliere uno tra i sette profili professionalizzanti, ciascuno di sedici crediti. La segnalazione della preferenza dovrà essere effettuata compilando l'apposito modulo disponibile sul sito o presso la Segreteria Didattica Interdipartimentale e riconsegnando il modulo stesso entro il 17 dicembre 2021. I corsi si svolgono tutti nel secondo semestre del IV anno.

a) Science of drug development profile		
Advanced methodologies in Medicinal Chemistry	8	CHIM/08
Analytical methods in drug discovery and development and validation of analytical procedures in pharmaceutical industry	8	CHIM/08
b) Pharmaceutics and pharmaceutical technology profile		
Advances in Drug Delivery Systems (modules I and II)	8	CHIM/09
Formulation and Regulatory Affairs of Health Products and Pharmaceutical Regulatory Affairs and Patents	8	CHIM/09
c) Experimental pharmacology profile		
Biotechnology in Pharmacology and Biochemistry of informational macromolecules	8	(4) BIO/10, (4) BIO/14
Molecular and Cellular Pharmacology and Experimental Pharmacology	8	BIO/14
d) Pharmacological and therapeutic profile		
Biotechnological drugs: pharmaco-toxicological aspects and Pharmaceutical Regulatory Affairs and Patents	8	(4) BIO/14, (4) CHIM/09
Clinical Pharmacology and Pharmacoepidemiology and Pharmacoeconomics	8	BIO/14
e) Molecular and supramolecular chemistry: analysis and synthesis profile		
Inorganic nanoparticles in life sciences and advanced characterization techniques	8	(4) CHIM/03, (4) CHIM/06
Organometallic chemistry and fine chemical applications	8	(4) CHIM/03, (4) CHIM/06
f) Chemical methods applied to biomolecules profile		

Innovative methods for synthesis and analysis	8	CHIM/06
Synthetic Aspects in Biomolecules Preparation and Application of biomolecules in biological systems studies	8	(4) BIO/10, (4) CHIM/06
g) Endocrinology and metabolism profile		
Endocrinolgy and metabolism	8	MED/13
Nutritional requirement during lifetime and pathological aspects of nutrition	8	(5) BIO/09, (3) MED/05
Nei profili professionalizzanti potrà, in alternativa, essere utilizzato uno dei seguenti insegnamenti (tradurre):		
BIOETHICS	4	MED/02
Clinical Biochemistry and clinical molecular biology	4	BIO/12
Fermentation chemistry and biotechnology	4	CHIM/11
Management company organization	4	SECS-P/10
Statistics for sperimental and technological research	4	SECS-S/02

5th COURSE YEAR (available as of academic year 2025/26) Core/compulsory courses/activities common

Learning activity		Ects	Sector
Industrial Pharmacy and Laboratory of Pharmaceutical Technology		8	CHIM/09
	Total compulsory credits	8	

Elective courses

Lo studente dovrà scegliere un insegnamento, del valore di otto crediti, o due insegnamenti, ciascuno del valore di quattro crediti, tra quelli di seguito elencati. Gli insegnamenti a scelta libera saranno attivati sulla base delle richieste degli studenti. Le eventuali propedeuticità saranno indicate dai docenti titolari dei corsi.

Cosmetic Products	8	CHIM/09
Experimental laboratory	8	ND
Heterocyclic compounds and application of organometallic chemistry in synthesis	8	(4) CHIM/03, (4) CHIM/06
Innovative drugs and radiopharmaceuticals	8	CHIM/08
Innovative molecular approaches for the identification of pharmacological targets	8	BIO/10
Methodologies and experimental models for therapy with hormones	8	(4) MED/13, (4) BIO/13
Physiology of Integrated systems I	8	BIO/09
Special Systems Pharmacology	8	BIO/14

End of course requirements

FINAL EXAM	21	NA
FINAL EXAM	4	NA
Professional training in pharmacy (first part)	5	NA
Professional training in pharmacy (second part)	25	NA
Total compulsory credits	55	

COURSE PROGRESSION REQUIREMENTS

The course contains the following obligatory or advised prerequisites

Learning activity	Prescribed foundation courses	O/S
Spectroscopic methods in organic chemistry	Organic Chemistry 1	Core/compulsory
Applied Microbiology	Human Anatomy and Physiology	Core/compulsory
	Animal Biology and Plant Biology	Core/compulsory
General Pathology	Human Anatomy and Physiology	Core/compulsory
	Animal Biology and Plant Biology	Core/compulsory
QUALITATIVE ANALYSIS OF INORGANIC DRUGS	ANALYTICAL CHEMISTRY	Core/compulsory
DRUG ANALYSIS 2 AND LABORATORY OF DRUG ANALYSIS 2	DRUG ANALYSIS 1 AND LABORATORY OF DRUG ANALYSIS 1 AND FOOD CHEMISTRY	Core/compulsory
Medicinal Chemistry 1	Organic Chemistry 1	Core/compulsory
Medicinal Chemistry 2	Medicinal Chemistry 1	Core/compulsory
	Organic Chemistry 2 and Organic Chemistry Laboratory	Core/compulsory
Extractive and Synthetic Preparation of Drugs and Laboratory of Extractive and Synthetic Preparation of Drugs	Organic Chemistry 1	Core/compulsory
Pharmaceutical Technology and Legislation I	Physics	Core/compulsory
	Organic Chemistry 1	Core/compulsory
	PHARMACOLOGY AND PHARMACOTHERAPY	Core/compulsory
	DRUG ANALYSIS 1 AND LABORATORY OF DRUG ANALYSIS 1 AND FOOD CHEMISTRY	Core/compulsory
Pharmaceutical Technology and Legislation II	Physics	Core/compulsory
	Organic Chemistry 1	Core/compulsory
	PHARMACOLOGY AND PHARMACOTHERAPY	Core/compulsory
	DRUG ANALYSIS 1 AND LABORATORY OF DRUG ANALYSIS 1 AND FOOD CHEMISTRY	Core/compulsory
Industrial Pharmacy and Laboratory of Pharmaceutical Technology	Pharmaceutical Technology and Legislation I	Core/compulsory
Biochemistry	Human Anatomy and Physiology	Core/compulsory
	Organic Chemistry 1	Recommended

Physics	Calculus	Recommended
Human Anatomy and Physiology	Animal Biology and Plant Biology	Recommended
Toxicology	PHARMACOGNOSY	Core/compulsory
Applied Biochemistry	Biochemistry	Core/compulsory
	Organic Chemistry 1	Core/compulsory
ANALYTICAL CHEMISTRY	General and Inorganic Chemistry and Stoichiometry	Recommended
Organic Chemistry 1	General and Inorganic Chemistry and Stoichiometry	Core/compulsory
PHARMACOLOGY AND PHARMACOTHERAPY	General Pathology	Core/compulsory
	Biochemistry	Core/compulsory
	PHARMACOGNOSY	Core/compulsory
Organic Chemistry 2 and Organic Chemistry Laboratory	Organic Chemistry 1	Core/compulsory
DRUG ANALYSIS 1 AND LABORATORY OF DRUG ANALYSIS 1 AND FOOD CHEMISTRY	ANALYTICAL CHEMISTRY	Core/compulsory
	Organic Chemistry 1	Recommended
PHARMACOGNOSY	Human Anatomy and Physiology	Core/compulsory
	Animal Biology and Plant Biology	Core/compulsory
PHYSICAL CHEMISTRY	General and Inorganic Chemistry and Stoichiometry	Core/compulsory