



**UNIVERSITA' DEGLI STUDI DI MILANO**  
**PROGRAMME DESCRIPTION - ACADEMIC YEAR 2020/21**  
**BACHELOR**  
**Herbal Sciences and Technologies (Classe L-29)**  
**enrolled from 2014/15 academic year**

### HEADING

<b>Degree classification - Denomination and code:</b>	L-29 Pharmacy
<b>Degree title:</b>	Dottore
<b>Length of course:</b>	3 years
<b>Total number of credits required to complete programme:</b>	180
<b>Years of course currently available:</b>	1st , 2nd , 3rd
<b>Access procedures:</b>	Cap on student, student selection based on entrance test
<b>Course code:</b>	K04

### PERSONS/ROLES

#### Head of Interdepartmental Study Programme

Prof.ssa Gelsomina Fico

#### Tutors - Faculty

TUTOR PER I PIANI DI STUDIO

(A-C) Sara Pellegrino 02 503 14468

(D-M) Elena Marcello 02 503 18314

(N-Z) Alessandra Romanelli 02 503 14475

TUTORS PER STAGE E TIROCINI

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#### Degree Course website

<https://ste.cdil.unimi.it/>

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### CHARACTERISTICS OF DEGREE PROGRAMME

## General and specific learning objectives

The course, in line with the provisions of the class of reference, is designed to prepare graduates with good basic and applied knowledge and professional skills in herbal sciences and technology and with the necessary training for access to graduate courses and Masters of cultural relevance.

Graduates will obtain mastery of investigative methods and testing, including aspects of data collection and communication of results, and competence in using advanced texts. They will have operational powers and will be able to perform technical, managerial and professional activities in the processing of medicinal plants in quality management sector, marketing of herbal drugs and their derivatives to be used in the preparation of herbal products, food and cosmetics, ensuring compliance with the provisions from existing national and European laws.

The course includes basic and professional disciplines in the areas of chemistry, phytochemistry, biology, botany, pharmacognosy, pharmacology and concerning technological aspects.

At the end of the course, graduate will have knowledge and skills in:

- recognition, collection and conservation of medicinal plants;
- storage, control, distribution and supply of medicinal plants and their derivatives;
- analyses and determination of active ingredients;
- the biological effects of medicinal plants;
- toxicological aspects of the use of active ingredients and finished products;
- the study, design, management, supervision and conduction of productive processes of plants and their derivatives;
- recognition of herbal drugs, detection of adulterations and contaminations;
- quality control of products based on medicinal plants and derivatives;
- the possible applications of plants and their derived products for health products including food and cosmetics;
- legislation and ethic rules in the field;
- the scientific and technical advice concerning the supervision hygienic issues of plants and their derivatives in Department of the Government, particularly in the Ministries of Health, of Agriculture, Food and Forestry, Trade and Handicraft and Finance;
- the technical scientific and advisory to specialist publishing companies, dissemination of information in the field of medicinal plants and their derivatives.

A graduate in Herbal Science and Technologies possesses good basic knowledge, and knows how to use it along the production chain. He knows the methods of investigation of the sector and is able to use them professionally and to finalize their knowledge of problem solving of the whole supply chain. Is able to obtain the necessary information and to assess the implications in a productive and market context, to implement measures to improve the quality of herbal products. He/She is also able to communicate orally and in writing arguments on issues of competence. Finally, he/she has the tools of cognitive basis for the continuous updating of knowledge, also through the use of new communication technologies.

## Expected learning outcomes

In respect of European principles, outgoing skills, in terms of expected learning outcomes, developed by graduates in Degree Course meet the specific requirements identified by the National Conference of the Presidents of undergraduate courses in Herbal Sciences and Technologies (CONPTER) for class L-29. In particular, according to the system of descriptors of Dublin:

1. Knowledge and skills of understanding post-secondary textbooks and scientific articles, avant-garde included, and international literature on the specific processes concerning transformation of plants and their derivatives; the recognition of herbal drugs, phytochemistry; analyses and dosage of the active ingredients; the biological effects of medicinal plants; the toxicological aspects of the use of active ingredients and finished products; the detection of adulteration and contamination; the quality assurance of products based on medicinal plants and derivatives ; the possible applications of plants and their derivatives for health products, including food and cosmetics;
2. Ability to apply the multidisciplinary knowledge and skills acquired both for designing and supporting arguments to resolve issues concerning the recognition, collection and conservation of medicinal plants, storage, control, distribution and supply of herbs and their derivatives; analysis and determination of active ingredients; knowledge of the biological effects of medicinal plants; knowledge of toxicological aspects of the use of active ingredients and their finished products; the study, design, direction, monitoring, conduction of productive processes of plants and their derivatives; recognition of herbal drugs, the detection of adulteration and contamination; the quality control of products based on medicinal plants and derivatives; the possible applications of plants and their derivatives for health products, including food and cosmetics; marketing at wholesale and retail of medicinal plants and their derivatives; knowledge of the law and ethical rules in the sector, the technical - inherent scientific supervision of medicinal plants and their derivatives at the Department of the Government, particularly in the Ministries of Health, of Agriculture, Food and Forestry, Trade and Handicraft and Finance
3. Autonomy of judgement to collect and to interpret data deemed useful for the resolution of even complex issues in the fields of competence, including reflection on social, scientific and ethical issues related to the use of medicinal plants in different sectors;
4. Ability to communicate information, ideas, problems and solutions in the field of medicinal plants and their derivatives to specialist and non-specialist interlocutors, including technical scientific advisory to publishing companies in the herbal

sector.

5. Capacity of learning by consulting bibliographic databases and other network information, including English, for a continuous updating of knowledge concerning the biological effects of medicinal plants, phytochemistry, recognition of drug plants, analyses and dosage of the active ingredients, toxicological aspects, the processes of plants and their derivatives, quality management of products based on medicinal plants and derivatives, the detection of adulteration and contamination, the possible applications of officinal plants and their derivatives as products for health, including food and cosmetics.

### **Professional profile and employment opportunities**

The graduation in Herbal Sciences and Technologies offers employment opportunities in the professions of the following areas (ISTAT 2007): Tecnici della medicina popolare

### **Notes**

In order to get their degree, students are required to certify their knowledge of the English language at the B1 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 B1 or 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.

The duration of the course in Herbal Sciences and Technologies is 3 years and the number of University Credits (CFU in Italian) required for obtaining the graduation is 180.

The training activities will be organised in semesters and will be organized in different training activities (lectures, exercises, practical activities, laboratory, seminars, apprenticeship), according to the cultural and educational characteristics of individual teaching.

Based on the information contained in the Rules of University Teaching and in the Rules of the Faculty, the commitment time devoted to each CFU will be the following:

- 8 hours devoted to lectures or equivalent educational activities (the remaining hours, up to 25 hours of total credits provided for each, are dedicated to personal study);
- 16 hours devoted to practice or equivalent assisted activities (the remaining hours, up to 25 hours of total planned, are dedicated to personal study and revision);
- 25 hours of individual practice in the laboratory;
- 25 hours of individual study;
- 25 hours of apprenticeship.

Part of the lessons are mono-disciplinary, part are integrated courses, divided into modules. Proof of examination of the integrated courses are conducted as set out in the DD.MM. 16/3/2007.

#### **Foreign Language**

A specific course in English will be organized and a written test will assign the approval. The First Certificate of English or other certifications B2 or higher meet the approval without further testing.

For the foreign language courses will be organised ad hoc. The passing of which, gives rise to scores of approved, takes place following a conversation with the teacher or after approval of a valid certification on the achievement of First Certificate of English, or other equivalent certification level B2 or higher.

#### **Evaluation and exams**

The acquisition by the student of the established credits for each training activity is subject to the passing of an examination, which gives rise to a score in thirtieths, according to the legislation of the University and the Faculty. For integrated courses, divided into modules, a reference teacher is identified who, in agreement with others, chairs over procedures for verifying profit and related records.

#### **Apprenticeship characteristics**

It is advisable to do the apprenticeship during the third year. The credits reserved for the apprenticeship can be acquired - in accordance with the purposes training declared by the student - through a period of stage done at public institutions or private corporations outside the Departments that contribute to the course.

During the final examination, the student will discuss a written report that will have to document all aspects of its activities, and any links with the current state of knowledge in sector of Herbal Sciences and Technologies.

#### **Criteria for admission to the final exam**

To be admitted to the final test before graduation, the student must have acquired all the 177 CFU required by the teaching regulations, except those reserved to the final test.

In the final test, which is a moment of individual training to the completion of the training, the student shows and discusses his apprenticeship, done as specified in art. 4. The final test can be taken in English and final paper may be submitted in the same language.

## **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 Bachelor's school in Herbal Sciences and Technologies offers to its students the opportunity to spend periods of study and training abroad through mobility programs mainly represented by Erasmus +. The geographical areas in which reside the European Universities partners of the international training program are mainly Spain, Germany, Poland and the Netherlands. Students may also apply for the destinations specified in the call of Agricultural Sciences and Technologies. Mobility is directed to the study (frequency to courses) and to a training period that may be the subject of the thesis. Universities with which Agreements were established offer courses and training periods in pharmacology, phytochemistry, microbiology and pathology. Each student is assisted by one of the teacher of the course as an internal tutor.

Recognition of study periods abroad:

Each student, depending on the period of time spent abroad, should propose a Learning Agreement providing an adequate number of credits for his/her study or training:

- An academic year: 60 credits;
- An academic semester: 30 credits;
- An academic quarter: 20 CFU

For study programs, students must acquire at least 70% of the credits specified in the Learning Agreement. For the training period the student must acquire all the credits specified by the Learning Agreement. Additional score to the degree mark will be added to students who have fulfilled the study or training programs. This score ranges from a minimum of 1 to a maximum of 3 points (depending on the duration of the training period, the amount of credits obtained and the overall result achieved) and will be proposed by the tutor to the Commission of the final exam.

### **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](mailto:mobility.out@unimi.it)

Desk opening hours: Monday to Friday 9 am - 12 noon

<b>1st COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Biology	6	BIO/13
Chemical Toxicology Analysis	7	CHIM/08
English assessment B1 (3 ECTS)	3	ND
General and Inorganic Chemistry	6	CHIM/03
Human physiology and basic anatomy	9	BIO/09
Mathematics and Informatics	7	MAT/09, MAT/01, MAT/02, MAT/03, INF/01, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08
Organic Chemistry	7	CHIM/06
Plant Biology and Pharmaceutical botany	12	BIO/15
Total compulsory credits	57	
<b>2nd COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Agricultural biochemistry and physiology of medicinal plants	6	AGR/13
Biochemistry and Human nutrition	12	(7) BIO/10, (5) BIO/09
Chemistry of natural organic compounds and foods	11	(6) CHIM/10, (5) CHIM/06
General Pathology and Pathophysiology	6	MED/04
PHARMACOGNOSY 1	6	BIO/15
Pharmacology and Toxicology	10	BIO/14
Phytopharmaceuticals: Chemistry and Analysis	8	CHIM/08
Total compulsory credits	59	
<b>3rd COURSE YEAR Core/compulsory courses/activities common</b>		
<b>Learning activity</b>	<b>Ects</b>	<b>Sector</b>
Advanced analysis of active principles in herbal drugs	8	CHIM/08
Experimental models and use of herbal drugs	11	(5) BIO/15, (6) BIO/14
FORMULATION AND LEGISLATION OF COSMETIC PRODUCTS	6	CHIM/09
FORMULATION AND LEGISLATION OF HEALTH PRODUCTS	6	CHIM/09
PHARMACOGNOSY 2	6	BIO/15
Total compulsory credits	37	
<b>Elective courses</b>		
<b>The number of CFU reserved for activities to be chosen by the student is 12. Notwithstanding the complete freedom of choice among all the teachings activated in University, provided it is consistent with the training project, the Manifesto will report a list of optional courses specially activated for this Bachelor.</b>		
Active molecules from natural sources as Pharmacological Tools	3	BIO/14
Aromatic and Medicinal Plant Cultivation	3	AGR/04
Dietary products	3	CHIM/10
Fermentation chemistry	3	CHIM/11
Medicinal plants and their recognition	3	BIO/15
Natural antioxidants, vitamins and phytosterols	3	BIO/14
Physiology of the skin	3	BIO/09
Phytotherapy for the skin	3	BIO/14
Poisonous plants and allergens	3	BIO/14
PRINCIPLES OF DIETETICS	3	BIO/09
<b>End of course requirements</b>		
FINAL EXAM	3	NA
Practical training	12	NA
Total compulsory credits	15	

## COURSE PROGRESSION REQUIREMENTS

The frequency to the laboratories of chemical and toxicological analysis, CI-chemistry, Chemistry, biochemistry and physiology of officinal plants (Md. Chemistry of organic natural products), and Phytopharmaceutical chemistry and analysis, Advanced analysis of active principles of vegetable drugs, CI- Formulation and legislation of health and cosmetic products (Md. Health products), CI- Formulation and legislation of health and cosmetic products (Md. Cosmetic products), CI-quality and safety (Mod Microbiology) is compulsory and will lead to registration of frequency signature.

Access to the laboratory of CI-chemistry, biochemistry and physiology of plants (Md. Chemistry of natural organic substances) is subject to passing the general and inorganic chemistry.

Access to the laboratory of Phytopharmaceutical chemistry and analysis is subject to the signing of frequency of Chemical and toxicological analysis laboratory and overcome exams of general and inorganic chemistry and organic chemistry.

Access to Advanced analysis of active principles of vegetable drugs, is conditional on the acquisition of signature frequency of Phytopharmaceutical chemistry and analysis laboratory and passing Organic Chemistry.

<b>Learning activity</b>	<b>Prescribed foundation courses</b>	<b>O/S</b>
Pharmacology and Toxicology	General and Inorganic Chemistry	Core/compulsory
	General Pathology and Pathophysiology	Recommended
	Biochemistry and Human nutrition	Recommended
	Biology	Core/compulsory
	Human physiology and basic anatomy	Core/compulsory
	Organic Chemistry	Core/compulsory
Advanced analysis of active principles in herbal drugs	General and Inorganic Chemistry	Core/compulsory
	Chemical Toxicology Analysis	Core/compulsory
	Organic Chemistry	Core/compulsory
	Phytopharmaceuticals: Chemistry and Analysis	Core/compulsory
Chemical Toxicology Analysis	General and Inorganic Chemistry	Recommended
Experimental models and use of herbal drugs	General and Inorganic Chemistry	Core/compulsory
	Pharmacology and Toxicology	Core/compulsory
	General Pathology and Pathophysiology	Core/compulsory
	Biochemistry and Human nutrition	Core/compulsory
	Plant Biology and Pharmaceutical botany	Core/compulsory
	Biology	Core/compulsory
	Human physiology and basic anatomy	Core/compulsory
	Organic Chemistry	Core/compulsory
FORMULATION AND LEGISLATION OF COSMETIC PRODUCTS	General and Inorganic Chemistry	Core/compulsory
	Chemical Toxicology Analysis	Core/compulsory
	FORMULATION AND LEGISLATION OF HEALTH PRODUCTS	Recommended
	Plant Biology and Pharmaceutical botany	Core/compulsory
	Organic Chemistry	Core/compulsory
	Phytopharmaceuticals: Chemistry and Analysis	Core/compulsory
	PHARMACOGNOSY 1	Core/compulsory
FORMULATION AND LEGISLATION OF HEALTH PRODUCTS	General and Inorganic Chemistry	Core/compulsory
	Chemical Toxicology Analysis	Core/compulsory
	Plant Biology and Pharmaceutical botany	Core/compulsory
	Organic Chemistry	Core/compulsory
	Mathematics and Informatics	Core/compulsory
	Phytopharmaceuticals: Chemistry and Analysis	Core/compulsory
	PHARMACOGNOSY 1	Core/compulsory
Agricultural biochemistry and physiology of medicinal plants	General and Inorganic Chemistry	Core/compulsory
	Biochemistry and Human nutrition	Recommended
	Chemistry of natural organic compounds and foods	Recommended
	Plant Biology and Pharmaceutical botany	Core/compulsory
	Organic Chemistry	Core/compulsory
General Pathology and Pathophysiology	Human physiology and basic anatomy	Core/compulsory
Biochemistry and Human nutrition	General and Inorganic Chemistry	Core/compulsory
	Biology	Core/compulsory
	Human physiology and basic anatomy	Core/compulsory
	Organic Chemistry	Core/compulsory
Chemistry of natural organic compounds and foods	General and Inorganic Chemistry	Core/compulsory
	Organic Chemistry	Core/compulsory
Organic Chemistry	General and Inorganic Chemistry	Recommended
Phytopharmaceuticals: Chemistry and Analysis	General and Inorganic Chemistry	Core/compulsory
	Chemical Toxicology Analysis	Core/compulsory
	Organic Chemistry	Core/compulsory
PHARMACOGNOSY 1	Plant Biology and Pharmaceutical botany	Core/compulsory
PHARMACOGNOSY 2	Pharmacology and Toxicology	Core/compulsory
	Plant Biology and Pharmaceutical botany	Core/compulsory
	PHARMACOGNOSY 1	Core/compulsory