UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2025/26
BACHELOR
TOXICOLOGY FOR THE HUMAN AND ENVIRONMENTAL SAFETY
(Classe L-29 R)
Enrolled in academic year 2025/26

HEADING

Degree classification - Denomination and code:	L-29 R
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	1st
Access procedures:	Open, subject to completion of self-assessment test prior to enrolment
Course code:	EAA

PERSONS/ROLES

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Degree Course website

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CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The impact of human activities on the environment and the consequences of environmental conditions on human health are the central issues of the educational objectives of the bachelor's degree in Toxicology for the human and environmental Safety.

This bachelor's programme is designed to train professionals capable of contributing to the improvement of the quality of the environment, through the identification, quantification, monitoring, and prevention of conditions capable of causing damage to human health.

The bachelor's programme in Toxicology for the human and environmental Safety enables students to have knowledge of:

- the chemical-physical characteristics of inorganic and organic molecules and their reactivity, with reference to environmental and toxicological problems
- the cell biology, structure and function of biological molecules and organ pathophysiology
- the mechanism of action of toxic substances and drugs and their effects on human health
- the effect of human activities on the environment and human health
- the quantification of inorganic and organic pollutants in the environment through chemical-analytical methods
- the molecular basis of the main pathologic conditions, with particular attention to those related to environmental toxicity phenomena, including the workplace
- the risk assessment procedures aimed at protecting the health of the population and workers
- the analysis of nutrients, functional components and food contaminants
- the basic experimental models for microbiological and toxicological analyses
- the acquisition, analysis and interpretation of experimental data obtained from chemical or biological analyses
- the English language, to access scientific literature and draw up documents at an international level.

The bachelor's degree in Toxicology for the human and environmental Safety enables graduates to be directly employed in laboratories for chemical and biochemical analysis, organizations or companies dealing with workplace safety, environmental control and remediation, food product safety and control.

In addition, the bachelor's programme is also aimed at providing a solid interdisciplinary knowledge that allows graduates to attend to master's degrees in the biological, biotechnological, food and safety regulatory fields.

Expected learning outcomes

Knowledge and understanding

Through the courses included in the bachelor?s programme, students will acquire:

- basic theoretical knowledge in the chemical, mathematical and physical fields, preparatory to characterizing and professionalizing disciplines
- basic knowledge on structure and function of cells and molecular mechanisms of the main biological processes
- basic knowledge of the human anatomy and physiopathology
- knowledge of the main chemical pollutants of air, water and soil of anthropic origin
- knowledge of the methods and mechanisms underlying the action of drugs and the toxic effects of drugs and xenobiotics
- knowledge on the impact of anthropogenic pollutants on the environment and on the main environmental decontamination and purification strategies
- basic knowledge on obtaining and processing qualitative-quantitative experimental data produced in chemical and biological laboratories
- knowledge of the most used analytical techniques in the chemical, chemical-toxicological and food fields
- knowledge of technical, scientific and regulatory sources in the chemical-toxicological and food fields
- knowledge of technical, scientific and regulatory sources in the field of environmental and health safety

This knowledge will be acquired through lectures, seminars, laboratory exercises, classroom exercises in small groups and exercises with the support of videos, which will allow students to acquire basic, specialist and professional knowledge. Knowledge achievement will be verified through ongoing tests, classroom reports and presentations, written and oral exams.

Applying knowledge and understanding

Furthermore, both through lectures and practical exercises, students will acquire the ability to:

- operate in chemical and biological laboratories safely and in a technically correct manner;
- apply sample treatment methods and instrumental analyses for the identification and quantification of toxic or polluting compounds;
- apply quality and safety standards in chemical-toxicology and food analysis;
- apply basic experimental methodologies in the toxicological/microbiological field;
- find the technical, scientific and regulatory information required in the chemical-toxicological and food fields;
- find the technical, scientific and regulatory information required in the field of environmental and health safety

These skills will be acquired through a training course characterized by highly professionalizing activities which include laboratory exercises, classroom exercises in small groups and experimental internships. Abilities will be verified through ongoing tests, reports and presentations in the classroom, written and oral exams, and the drafting of the final report on the internship experience.

Making judgements

The ability to acquire information and collect and interpret data useful to determine autonomous judgments translates into a correct management of toxicological problems, to protect the environment and guarantee the safety of the population.

Independence of judgment in the bachelor?s degree in Toxicology for the human and environmental Safety is acquired by the students through characterizing courses which include individual laboratory activities and through the analysis of scientific articles and technical documents on topics relating to the safety of the human health and the environment. A particularly important moment for the development of independent judgment is also that of the experimental internship.
Independence of judgment is verified through the drafting of reports, oral presentations and exams.

Communication skills
Both written and oral communication skills are stimulated over the three-year period through courses with laboratory activities which involve the preparation of written reports, or the oral presentation of the experimental results obtained, or courses with classroom exercises in which oral presentations are carried out by the students on current topics focused on environmental and health safety. The acquisition and evaluation of the achievement of communication skills are also foreseen through the presentation and defence of the thesis during the graduation session. The ability to communicate in English in the oral and written form (B1 level) on scientific-toxicological topics (scientific English) contributes to the achievement of these objectives.

Learning skills
Several courses of the bachelor?s programme aim to guide students in acquiring the awareness of the need for continuous updating on environmental and health safety issues, both in terms of advancement of knowledge and legislative/regulatory changes. Students are therefore encouraged to carry out bibliographic research and consult websites of regulatory bodies for the protection of the health and the environment. A further moment of growth in terms of learning ability is the experimental internship, in which the students test themselves in a working environment where they are expected to autonomously acquire new skills.
The students then acquire the ability to:
- learn new concepts through scientific articles, databases, technical or regulatory documents
- learn new concepts and/or methodologies and apply them in a working environment.
The achievement of these skills is verified through intermediate tests, discussion of scientific articles, oral and written exams, reports on laboratory exercises, and the drafting of the thesis following the experimental internship.

Professional profile and employment opportunities

Chemical analysts
Function in a work context:
The professionals included here cooperate with specialists in the analysis of solid, liquid and gaseous materials conducted in the context of chemical research; they are involved in the control of production quality, in the control and maintenance of environmental quality, operation and safety standards of equipment, systems and related technical systems. Graduates in Toxicology for the human and environmental Safety can enroll in the Register of Chemists with the professional title of Junior Chemist after passing the specific state exam required.
Skills associated with the function:
Chemical analysts know the main methods and instruments used to carry out analysis protocols. They are able to apply the procedures and protocols of chemical analysis, collaborate with specialists to control the quality of production, control and maintain the standards of environmental quality, operation and safety of the equipment, systems and related technical systems. They are also able to process and interpret the data obtained.
Employment opportunities:
Chemical analyst in laboratories of public and private facilities, universities and research institutions.

Experts in workplace safety
Function in a work context:
The professionals included in this category apply and execute procedures, regulations and technologies to adapt, modify, develop, control and verify the safety of working environments and workers, of machines and their operating procedures.
Skills associated with the function:
Experts in workplace safety are professionals capable of understanding, analysing, and applying knowledge in the field of safety of workplaces and workers.
Employment opportunities:
Prevention and protection service, even covering a managing position, in laboratories of public and private structures, universities, research institutions.

Experts in environmental control and remediation
Function in a work context:
The professionals included in this category assist specialists in the research and in the design, development and evaluation of systems for control, protection and conservation of the environment.
Skills associated with the function:
Experts in environmental control and remediation are professionals capable of applying procedures to control and detect information on types and methods of environmental pollution and on possible causes, adapting and operating with adequate instruments; they are trained to apply procedures, regulations and technologies to control and guarantee the efficiency of

waste collection, selection, treatment and disposal processes; finally, they are able to evaluate and implement programs for the remediation of polluted areas.
Employment opportunities:
Environmental monitoring activities (water, air, soil) and environmental impact and safety assessment in industry. Environmental control and remediation, in laboratories of public and private structures, universities, research institutions and centres focused on toxicological and environmental safety detection.

Biochemical analysts
Function in a work context:
The professionals included in this category select and apply protocols and procedures in production or service activities. They assist specialists in the scientific, healthcare, humanistic, economic and social fields, relating to the quantitative physical, chemical, engineering and natural sciences, life and health sciences.
Skills associated with the function:
Ability to apply and execute scientific protocols relating to the human health care, as well as the diagnosis of animal and plant pathologies. Ability to verify and control the application of safety regulations in public and work environments. Assistance to veterinarians and agronomists in animal and plant care and production, ability to apply and execute scientific protocols in medical analysis laboratories and in agronomic and veterinary laboratories.
Employment opportunities:
Evaluation of the chemical, physical and biological composition of water, natural substances or industrial products, diagnosis of animal/plant pathologies and research in the agronomic and zootechnical fields, in laboratories of public and private facilities, universities, research institutions and in the National Health Service.

Experts in food safety and control
Function in a work context:
The professionals included in this category select and apply defined and predetermined protocols and procedures in production or service activities. Their tasks consist of assisting specialists in the scientific and healthcare fields and in supervising, controlling, planning, and ensuring the correct functioning of production processes.
Skills associated with the function:
Assistance to specialists, in conducting tests and analyses on the quality of products intended for human and animal consumption, to certify their quality, genetic derivation and production technology, to improve the food processing and production chains.
Employment opportunities:
Employment in the field of plant and animal biotechnology, oenology, merchandise, in the food and bio-food sector, and in the quality control of the food industry.

Initial knowledge required

Admission requirements
To be admitted to the bachelor's program, a secondary school diploma or other qualifications obtained abroad, recognized as suitable, are required.
Admission requires adequate knowledge and skills to follow the bachelor's program successfully at the time of enrollment. These knowledge areas include fundamentals of basic mathematical calculations, physics, cell biology and general chemistry, logical skills, the ability to express oneself orally and in writing without hesitation or errors, a reasonable general culture, and adequate language skills at the B1 level.

Admission assessment
The possession of these requirements will be verified through a mandatory, but not selective, assessment test TOLC-S or TOLC-F, to be taken before enrollment. The TOLC-S and TOLC-F can be taken at the University of Milan or any other location listed on the calendar available on the page https://testcisia.it/calendario.php
Registration procedures and deadlines will be indicated in the competition notice that will be published on the University website at the page https://www.unimi.it/en/node/13253

Additional learning requirements (OFA) and remedial activities

Mathematics OFA
Students admitted to the bachelor's program but who score 10 or less in Basic Mathematics in the TOLC-S, or 4 or less in the TOLC-F, will be assigned Additional Educational Obligations (OFA). The OFA will consist of online activities provided during the period October-December, followed by a remedial test in which the student must show evidence of improved preparation. In the absence of this evidence, the student will not be allowed to take any second-year exams until they have passed the Mathematics and Statistics exam.
For more information, visit the page https://tops.cdl.unimi.it/it/studiare/le-matricole

OFA B1 Language Test

To fulfill the OFA in English and take the English language exam included in the study plan, a knowledge of English at the B1 level of the Common European Framework of Reference for Languages (CEFR) is required. This level can be certified in the following ways:
• by submitting a language certification obtained no more than 3 years before the date of its submission, at the B1 level or higher (for the list of language certifications recognized by the University, refer to the website: https://www.unimi.it/en/node/39322). The certification must be uploaded at the time of enrollment, or later, on the portal http://studente.unimi.it/uploadCertificazioniLingue;
• by taking a Placement Test, administered by the University's Language Center SLAM exclusively during the first year, from October to December. If the test is not passed, it will be necessary to attend the courses provided by the SLAM Center. The Placement Test is mandatory for those who do not have a valid certification. Those who do not take the Placement Test by December or do not pass the final test of the course within 6 attempts must obtain a certification privately to fulfill the OFA and take the English language exam.

For the teaching of computer science, it should be noted that no credits are recognized for the possession of the ECDL certificate.

Compulsory attendance

Attendance at lessons is strongly recommended. Attendance at classroom and laboratory exercises is mandatory. By agreement with the teachers, students enrolled in possession of a chemical expert diploma can be exempted from the General chemistry laboratory.

Working students
Working students can take advantage of the possibility of part-time enrolment offered by the University. For information, consult https://www.unimi.it/en/node/113/
Working students adopting the part-time enrolment offered by the University must agree with the teachers on their relative path attendance at workshops. For those students working in laboratories in which techniques covered by the degree course laboratories are used, a partial/total exemption from laboratory attendance is provided, in agreement with the teacher. To take advantage of these benefits, the student must send at the beginning of the year, via InformaStudenti, in the "Lesson times/locations and teaching organization" section, a certification on company letterhead certifying the contract and working hours.

Internship criteria

To complete the established cultural and professional training, every student must carry out a 6-month practical internship period in companies, public entities and public or private research laboratories, which will account for 9 credits (ECTS). The start of the internship is possible after the acquisition of 118 credits (ECTS). The degree programme, through the COSP, stipulates specific agreements with the external facilities that host the interns. The internship can be carried out abroad as part of the Erasmus program (see section Experience of study abroad as part of the training program) and the written report in this case will be written in English.
Specific procedures for activating the internship can be found at the link: https://tops.cdl.unimi.it/it/studiare/stage-e-tirocini .

Degree programme final exams

The bachelor’s degree in Toxicology for human and environmental Safety is awarded after passing a final exam, which constitutes an individual formative moment completing the course of study. The final exam primarily involves the preparation of a written report that contextualizes and describes the results of the internship activities carried out by the student in the fields of chemical and biological sciences, with a particular focus on health and environmental safety. The student then orally presents the results described in the report to the Graduation Committee. Both the written report and the oral presentation can be done in either Italian or English.
Supervisors and tutors of the internship activities of each graduate become part of the Graduation Committee as Advisor and Co-advisor, respectively. Advisors can be Full or Associate Professors, Researchers, and Contract Lecturers at the Faculty of Scienze del Farmaco, to which the bachelor’s degree belongs. If the internship was conducted at companies, universities, or research centers outside the University, the tutors who supervised the graduates take on the role of Co-advisor.

Starting from the base score calculated by the student offices from the exam grades (weighted average of the grades obtained multiplied by 11/3), the following can be added:
• up to 10 points for the experimental internship;
• 1 point for graduating on time;
• up to 1 point for exams taken abroad within the Erasmus program;
• 1 point for an experimental internship carried out within the framework of institutional mobility projects abroad.
To be considered for honors, students must achieve a score of at least 102.00 (not rounded up), derived from the sum of (i) the weighted average of the grades of the exams as processed by the student offices and (ii) any additional points for graduating on time, exams taken abroad with Erasmus programs, and experimental internships carried out abroad.

Notes

Additional Learning Requirements (OFA) B1
In order to fulfil the Additional Learning Requirement (Obbligo Formativo Aggiuntivo ? OFA) for English and sit the

English-language exam required by the study plan, students must achieve B1 proficiency per the Common European Framework of Reference for Languages (CEFR). This proficiency level may be certified as follows:
- By submitting a language certificate attesting B1 or higher level in English and issued no more than three years before the date of submission. You will find the list of language certificates recognized by the University at: https://www.unimi.it/en/node/39322. The certificate must be uploaded during the enrolment procedure, or subsequently to the portal http://studente.unimi.it/uploadCertificazioniLingue;
- By taking a placement test offered by the University Language Centre (SLAM) between October and December of the first year. Students who fail the test will be required to take a SLAM course.
The placement test is mandatory for all those who do not hold a valid certificate attesting to B1 or higher level.
Those who have not taken the placement test by the end of December or fail the end-of-course exam six times must obtain the necessary certification privately in order to fulfil the OFA and sit the English exam.

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 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 organisations.

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

The University of Milan is a member of the 4EU+ European University Alliance that brings together eight public multidisciplinary universities: University of Milan, Charles University of Prague, Heidelberg University, Paris-Panthéon-Assas University, Sorbonne University of Paris, University of Copenhagen, University of Geneva, and University of Warsaw. The 4EU+ Alliance offers integrated educational pathways and programmes to promote the international mobility of students (physical, blended and virtual).

Study and internships abroad

Students are encouraged to carry out periods of study abroad, based on conventional exchange agreements with foreign universities.
Each student can take advantage of Erasmus mobility, for periods of 3 or 6 months. To be eligible for the annual mobility programs, students regularly enrolled at the University of Milan must participate in a public selection procedure that is published on the University's website.
More information is available at https://www.unimi.it/en/node/274/ and for selection procedure you can consult the link https://www.unimi.it/en/node/277/

Each student, depending on the period spent abroad must propose a Learning Agreement that includes educational activities for an appropriate number of CFUs:
- one academic year: 60 CFUs;
- one academic semester: 30 CFUs
- one academic trimester: 20 CFU.

Students must acquire at least 70% of the CFUs indicated in the Learning Agreement. For thesis/internship activities, fulfillment implies that the student has acquired all the CFUs indicated in the Learning Agreement.
For students who have satisfactorily completed the educational program, incentives are provided to be paid in additional score to the graduation grade. This score ranges from a minimum of 1 to a maximum of 3 points (depending on the duration of the study period, the amount of CFUs achieved and the overall result obtained), which, upon the proposal of the responsible Lecturer will be awarded by the Graduation Committee

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 organises 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;
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity	Ects	Sector
Analytical chemistry	6	CHIM/01
Calculus and Statistics	6	MAT/07
General Chemistry	8	CHIM/03
Human Anatomy and General Biology	12	(4) BIO/16, (8) BIO/13
Organic Chemistry	8	CHIM/06
Physics and Informatics	6	(3) FIS/07, (3) INF/01
Physiology	6	BIO/09
Scientific English	3	L-LIN/12
Total compulsory credits	55	

2nd COURSE YEAR (available as of academic year 2026/27) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Biochemistry	8	BIO/10
Chemical and Toxicological Analysis	11	CHIM/08
Environmental chemistry	8	CHIM/06
General Pathology	6	MED/04
Microbiology and Hygiene	8	BIO/19
Pharmacology 1 and Pharmacology 2	8	BIO/14
Toxicology 1	8	BIO/14
Total compulsory credits	57	

3rd COURSE YEAR (available as of academic year 2027/28) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Biotechnology 1 and Biotechnology 2	8	BIO/14
Food Chemistry	10	CHIM/10
Safety in the manufacture of health products and Applied chemical-toxicological analysis	14	(3) CHIM/09, (11) CHIM/08
Toxicology 2	12	BIO/14
Total compulsory credits	44	

Further elective courses

During the second and third year, the student must acquire 12 credits (ECTS) in educational activities freely chosen from those offered by the University, as long as they are consistent with their study plan. For this purpose, the bachelor's degree course will make the following courses available starting from the academic year 26/27.

Biochemical-molecular mechanisms of action of pollutants on human health	6	BIO/10
Detection of contaminants in food matrices: methodological and regulatory aspects	6	CHIM/10
Effect of pollutants on developmental anatomy and physiology	6	(3) BIO/09, (3) BIO/16
Effects of environmental pollutants and endocrine disruptors on the health of living beings	6	(3) MED/13, (3) BIO/14
Environmental impact analysis and procedures of anthropogenic pollutants	6	(3) ICAR/03, (3) BIO/14
Environmental toxicology	6	BIO/14

Experimental methodologies and models in occupational toxicology		6	BIO/14
Pharmacological and toxicological activities of naturally occurring substances		6	BIO/14
End of course requirements			
Final exam		3	NA
Stage		9	NA
	Total compulsory credits	12	

COURSE PROGRESSION REQUIREMENTS

The acquisition of credits related to Analytical Chemistry is a prerequisite to the practical activities (laboratory) of Chemical and Toxicological Analysis.

The acquisition of credits related to Organic Chemistry is a prerequisite to the practical activities (laboratory) of Applied Chemical-Toxicological Analysis.

Learning activity	**Prescribed foundation courses**	**O/S**
Biochemistry	Human Anatomy and General Biology	Core/compulsory
	Organic Chemistry	Core/compulsory
General Pathology	Physiology	Core/compulsory
Toxicology 1	Physiology	Core/compulsory
Chemical and Toxicological Analysis	Analytical chemistry	Core/compulsory
	Physics and Informatics	Core/compulsory
Environmental chemistry	Organic Chemistry	Core/compulsory
	Physics and Informatics	Core/compulsory
Microbiology and Hygiene	Human Anatomy and General Biology	Core/compulsory
	General Chemistry	Core/compulsory
Food Chemistry	Biochemistry	Core/compulsory
	Chemical and Toxicological Analysis	Core/compulsory
Safety in the manufacture of health products and Applied chemical-toxicological analysis	Chemical and Toxicological Analysis	Core/compulsory
	Organic Chemistry	Core/compulsory
Toxicology 2	Toxicology 1	Core/compulsory
Biotechnology 1 and Biotechnology 2	Biochemistry	Core/compulsory
	Pharmacology 1 and Pharmacology 2	Core/compulsory
Analytical chemistry	General Chemistry	Core/compulsory
Organic Chemistry	General Chemistry	Core/compulsory
Physiology	Human Anatomy and General Biology	Core/compulsory
Pharmacology 1 and Pharmacology 2	Physiology	Core/compulsory