UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2022/23
BACHELOR
Chemistry (Classe L-27)
Students enrolled from the academic year 2022-2023

HEADING

Degree classification - Denomination and code:	L-27 Chemistry
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:	Cap on student, student selection based on entrance test
Course code:	F5X

PERSONS/ROLES

Head of Study Programme
Prof. Luigi Falciola

Degree Course website
https://chimica.cdl.unimi.it/it

Department of Chemistry
Via Golgi, 19 - 20133 MILANO http://www.chimica.unimi.it

Department of chemistry teaching office
Via Golgi, 19 - 20133 MILANO Phone 02 50314419 dal lunedì al venerdì ore 10.00-12.00, in altri orari su appuntamento
Email: didattica.dipchi@unimi.it

DSA and disability tutors
Mariangela Longhi Phone 02503 14226 https://www.unimi.it/it/ugov/person/mariangela-longhi Email: mariangela.longhi@unimi.it

Entrance guidance tutors
Francesca Tessore Phone 02503 14398 https://www.unimi.it/it/ugov/person/francesca-tessore Email: francesca.tessore@unimi.it

Erasmus and international mobility tutor
Emma Gallo Phone 02503 14374 Email: emma.gallo@unimi.it

Internship tutor
Paola Fermo Phone 02503 14246 https://www.unimi.it/it/ugov/person/paola-fermo Email: paola.fermo@unimi.it

Referent of the Quality Management System (QA) of The Bachelor's degree
Alessandra Puglisi Phone 02503 14189 https://www.unimi.it/it/ugov/person/alessandra-puglisi Email: alessandra.puglisi@unimi.it

Student administration offices
Via Celoria, 18 - 20133 MILANO Phone 0250325032 https://www.unimi.it/it/node/360 https://www.unimi.it/it/node/359/

Study plan, transfer and credit recognition tutor
Pierluigi Mercandelli Phone 02503 14447 Email: pierluigi.mercandelli@unimi.it

Tutor for teaching support
Alberto Vertova Phone 02503 14232 Email: tutoring.chimica@unimi.it

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives
The course aims to achieve the following training objectives:
- provide adequate knowledge of the different sectors of chemistry, in the basic, theoretical, experimental and applicative

aspects and an adequate basic preparation in mathematical and physical disciplines;
- provide adequate mastery in the use of chemical knowledge in relation to other scientific and technical disciplines;
- provide a good knowledge of experimental laboratory methods;
- provide adequate basic knowledge of a chemical nature, useful for insertion in work activities that require familiarity with the scientific method;
- develop the ability to apply innovative methods and techniques and to use complex equipment;
- develop the ability to adapt to the evolution of the discipline, to interact with culturally contiguous professionals and to continue studies in Master's Degree courses.

Expected learning outcomes

- Acquisition of theoretical and operational skills with reference to the main sectors of chemistry and safety standards to be implemented in chemical laboratories.
- Ability to collect, analyze and process data obtained in the laboratory, to perform experimental procedures and to draw up reports in this regard, to safely use and dispose of chemicals correctly.
- Conscious autonomy of judgment: ability to interpret experimental laboratory data, conduct experiments, propose solutions to analytical problems, place specific chemical knowledge in their relations with other disciplines, retrieval and screening of sources of information, data and chemical literature.

Graduates in Chemistry must be able to communicate the results of their analyses and evaluations clearly and effectively using word processing systems and modern multimedia presentation techniques, even in the most widespread language in the international working contexts of reference (English), for the preparation of laboratory course reports and internship activities. They must also be able to work in groups and to operate independently.
The expected learning outcomes are: the acquisition of adequate skills for the development and updating of skills with regard to bibliographic searches, databases and other information on the net, the acquisition of autonomy that allows to consult advanced textbooks and specialized journals in the research sectors of chemistry and scientific disciplines, and the ability to promptly enter the world of work.

Professional profile and employment opportunities

Graduates will possess knowledge suitable for carrying out professional activities and related functions in the following occupational areas:
- in chemical and pharmaceutical research
- in the fields of synthesis of new products and new materials, applying the disciplinary methods of investigation acquired
- in the realization, analysis and characterization of new products
- in the experimentation of new technologies
- in the study of solutions for product improvement, analysis, synthesis and characterization

Employment opportunities are in the chemical industry, with particular regard to fine chemicals, the pharmaceutical industry and research and development laboratories, both in the public and private sectors and in particular in public and private research institutions, analyze, control and quality certification laboratories and industries and work environments that require basic knowledge in the chemical sectors.
The course prepares for the professions of Chemist, Researcher in chemical and pharmaceutical sciences, Chemical laboratory graduate technician and scientific informant and popularizer.
For the graduate of this class is expected to enroll in the Register of the National Federation of the Orders of Chemists and Physicists as Junior Chemist, after passing the State Exam.

Initial knowledge required

Qualifications and knowledge required for admission
Applicants to the Bachelor's degree programme in Chemistry must hold a high-school diploma or an equivalent international qualification pursuant to Ministerial Decree no. 270 of 22 October 2004.
Other requirements include basic knowledge of mathematics and chemistry, as well as the ability to make simple logical deductions according to levels of competence not higher than those achieved through upper secondary-school education.
Admission assessment
Admission into the Bachelor's degree programme in Chemistry is capped at the local level in order to meet high-quality teaching standards relative to the available resources. There are 130 places available for the first year of the programme. You may sit for the entrance test (TOLC -Test On Line CISIA) at the University of Milan or any other member university of CISIA (Consortium of Inter-University Integrated Access Systems). Register to the TOLC test on the CISIA website (www.cisiaonline.it).
The test required for admission to the degree programme in Chemistry is TOLC-S, consisting of the following sections: Basic mathematics (20 questions - 50 minutes), Reasoning and Problems (10 questions - 20 minutes), Reading comprehension (10 questions - 20 minutes), Basic sciences (chemistry, physics and geology - 10 questions - 20 minutes). Each question has 5 answer options, of which only one is correct.
Score: +1 for a correct answer, -0.25 for a wrong answer, 0 for a no answer.
For more information on test structure and topics, visit: https://www.cisiaonline.it/en/area-tematica-tolc-scienze/struttura-della-prova-e-syllabus/
The TOLC test includes an additional English section, consisting of 30 questions to be answered in 15 minutes. The score in this section does not affect the merit ranking, nor does it replace the for-credit assessment of English language proficiency

required by the degree programme (see the language assessment section). However, it is a student self-assessment.
Students who have taken the TOLC-S test and intend to access the Bachelor's degree programme in Chemistry of the University of Milan MUST ALSO enrol in the selection process to be included in the merit ranking based on the test score. Winners may enrol by the deadlines set out in the call for applications.
The selection is divided into several time windows beginning in spring and ending in early September. For more details on calls, deadlines and rankings, visit https://www.unimi.it/en/study/bachelor-and-master-study/degree-programme-enrolment/enrolment-first-degree-programme
Admission of transfer or graduate students
Students already enrolled in a degree programme at the University of Milan, or another University, as well as graduate students, can only be waived from the test requirement if they meet the requirements for admission to years following Year I (of the programme edition for students who first enrolled up to A.Y. 2021-2022), i.e. they have earned at least 30 CFU for first-year exams, of which 9 available as transfer credits for the Fundamentals of Mathematics exam.
To this end, they will have to submit a specific request for prior assessment of their academic records using the online service as shown in the call for applications. Applicants must submit their transcript of records
(including subject areas, credits and grades, course syllabi). For more details, please refer to the call for applications.
The application will be reviewed by the degree programme's Transfer Board. Any applicants who cannot be admitted to years following the first will have to take the test and rank high enough to be admitted to the programme.
The assessment application, with the transcript of records, must be submitted by the date that will be stated in the call and posted to the programme website.
The outcome will be notified via e-mail.
Students admitted to years subsequent to the first may enrol in compliance with the deadlines and procedures specified in the call for applications.
Students admitted to the first year will have to take the test and apply for admission, as per the call.
Similarly, all applications for exam equivalence/transfer credits must attach exam syllabi in order to expedite procedures.
Additional learning requirements (OFA) and remedial activities
Students who have not achieved at least 10 points in the basic mathematics module of TOLC-S will have to fulfil additional learning requirements (OFA).
Students with additional learning requirements will have to carry out remedial activities organised by the University in the period October-December, and then take a test to prove they have filled their gaps. Otherwise, they may not sit any first-year exams before passing the Fundamentals of Calculus exam, with the exclusion of the 3 credits for English language proficiency.

Compulsory attendance

Attendance is mandatory for laboratory activities, and strongly recommended in all other cases.

Internship criteria

Students are required to undertake a final internship (12 credits) as specified below. There are two different kinds of internship:
1) On-campus internship: a chemistry-specific activity carried out by the student at the Department of Chemistry of the University of Milan or the Departments connected to the Faculty of Science and Technology of the University of Milan under the guidance of a supervisor, and possibly a co-supervisor.
2) Off-campus internship: a chemistry-specific activity carried out by the student at the Departments connected to other Faculties of the University of Milan, or at public or private institutions or companies, under the guidance of an external supervisor and an internal supervisor. To start the internship, the student must have earned at least 126 CFU.
You can apply until the 1st day of any month to start the internship on the 20th of the same month - subject to the Academic Board's approval - with the exception of August.
Applications must be submitted to the academic office of the Department of Chemistry following the instructions and using the form available at https://chimica.cdl.unimi.it/it/studiare/stage-e-tirocini
For internships at other institutions or companies, students must contact the Thesis and Internship Board in time to start the authorization procedure. Please review the applicable regulations, which are available on the programme website.
Students who are admitted to an Erasmus internship must apply before leaving for the host university. In this case, the CFU requirement will be waived provided that the student reaches a total of 126 CFU by taking exams abroad. Otherwise, the internship will not be valid for the purpose of obtaining the degree.
The supervisor will guarantee for the quality of the student's work before the Academic Board. All professors and research fellows who sit on the Academic Board or teach chemistry at the Department of Chemistry, or at the Departments connected to the Faculty of Science and Technology, may be supervisors. The supervisor may be assisted by a co-supervisor. The following may be co-supervisors, in addition to all faculty members included in the category of official supervisors:
- Official faculty members of other universities and polytechnics, including international ones;
- Graduates who are recognized experts in the field;
- Non-teaching staff of the University of Milan who are recognized experts in the field, provided their employment level is equal to or higher than D;
- C.N.R. researchers working within the Department of Chemistry; - experts designated by host institutions, for off-campus internships.
Special cases may be submitted to the Academic Board, provided the proposed co-supervisor is a high-level scientist. In this case, the supervisor will be required to write a short profile documenting
the co-supervisor's subject-specific skills.

For off-campus internships, in addition to the internal supervisor, there will be an external supervisor (or tutor) acting as the academic and organizational manager for the internship, who will be identified by the host institution.
Any anomalies will be reviewed by the Thesis and Internship Board, which will make its decisions and submit them to the Academic Board for approval.
All forms are available at https://scienzechimiche.cdl.unimi.it/en/study/stage-and-internship

Degree programme final exams

Upon completion of the internship, students will be required to write a short paper on their work, to be discussed before an examining board. The latter's assessment will count towards the degree mark. After the final interview, the board will deliver the end-of-internship report, countersigned by the supervisor(s), to the Didactic Office of the Department of Chemistry.
For the student to be admitted to the graduation session, they must have passed all the exams required by the study plan (including the English language proficiency test) and obtained internship approval, for a total of 177 CFU.

Notes

In order to obtain their degree, students must be proficient in English at a B1 level under the Common European Framework of Reference for Languages (CEFR). This proficiency level may be certified as follows:
- Through a language certificate, earned within three years prior to the date of submission, at a B1 level or higher. For the list of language certificates recognised by the University, please review: https://www.unimi.it/en/node/297/). The certificate must be uploaded during the enrolment procedure, or subsequently to the portal http://studente.unimi.it/uploadCertificazioniLingue;
- Through a Placement Test, which is delivered by the University Language Centre (SLAM) during year I only, from October to December. Students who fail the test will be required to take a SLAM course.
The Placement Test is mandatory for all students who do not hold a valid certificate.
Those who do not sit the Placement Test by December, or who fail to pass the end-of-course test within six attempts, must obtain a paid certificate by graduation.

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 organizations.

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

Study and internships abroad

As part of the curriculum, students can participate in Erasmus Programme projects activated for the degree course. In particular, under the Erasmus + programme, students can choose from 16 affiliated European universities. At these locations, students can obtain training credits by following the teachings and passing the related exams, or by carrying out part or all of the final internship. The acquisition of training credits is subject to the approval, by the Teaching College, of a special study plan (learning Agreement) and the passing of the exams at the Foreign Office.
Interested students are kindly requested to make an appointment with the Tutor for international mobility and Erasmus (Prof. Emma Gallo, Tel. 02503 14374; e-mail: emma.gallo@unimi.it) for the instruction of practices.
Students can also participate in the numerous seminar meetings with foreign teachers.

How to participate in Erasmus mobility programs

How to participate in Erasmus+ mobility programmes

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 organizes 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; mobility.out@unimi.it
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common

Learning activity	Ects	Sector
Analytical chemistry I with lab	12	CHIM/01
Complements of mathematics and calculus	6	MAT/09, MAT/01, MAT/02, MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08
English assessment B1 (3 ECTS)	3	ND
Fundamentals of mathematics	9	MAT/09, MAT/01, MAT/02, MAT/03, MAT/04, MAT/05, MAT/06, MAT/07, MAT/08
General and inorganic chemistry with lab	12	CHIM/03
General physics	9	FIS/08, FIS/07, FIS/06, FIS/05, FIS/04, FIS/03, FIS/02, FIS/01
Organic chemistry I	7	CHIM/06
Total compulsory credits	58	

2nd COURSE YEAR (available as of academic year 2023/24) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Analytical chemistry II with lab	12	CHIM/01
Biological chemistry	6	BIO/10
Inorganic Chemistry	8	CHIM/03
Organic chemistry II	7	CHIM/06
Organic chemistry lab	10	CHIM/06
Physical Chemistry I with Lab	12	CHIM/02
Physical chemistry of matter and fundamentals of spectroscopy	6	CHIM/02
Total compulsory credits	61	

Elective courses

In the second year of the course the student must acquire 6 CFU by freely choosing among all the courses activated by the University that are functional to the training course of the LT in Chemistry.
Students are advised to choose from the list of 6 CFU teachings of the LM in Chemical Science and Industrial Chemistry.

3rd COURSE YEAR (available as of academic year 2024/25) Core/compulsory courses/activities common

Learning activity	Ects	Sector
Chemistry of coordination compounds with laboratory	10	CHIM/03
Instrumental analytical chemistry applications	6	CHIM/01
Organic chemistry advanced	6	CHIM/06
Physical chemistry II with Lab	6	CHIM/02
Physical chemistry III	6	CHIM/02
Training	12	NA
Total compulsory credits	46	

Elective courses

In the third year of the course the student must acquire 6 CFU by freely choosing among all the courses activated by the University that are functional to the training course of the LT in Chemistry.
Students are advised to choose from the 6 CFU teachings of the LM in Chemical Science and Industrial Chemistry.

End of course requirements			
Final exam		3	NA
	Total compulsory credits	3	

COURSE PROGRESSION REQUIREMENTS

- The exams of Mathematical Institutions and "General and Inorganic Chemistry/Laboratory of General and Inorganic Chemistry". must be taken before the 2nd and 3rd year exams.
- The "General Physics" exams and "Complements to Mathematics and Numerical Calculus"... must be taken before the 3rd year exams.
- The exams of "Organic Chemistry I" must be supported before those of "Organic Chemistry Laboratory", of "Biological Chemistry". and "Insights in Organic Chemistry."
- The exams of "Organic Chemistry II" must be supported before the one in "Deepening Organic Chemistry".
- The exams indicated as Course I must be taken before the corresponding exams indicated as Course II, which in turn must be taken before the corresponding exams indicated as Course III.

It is advisable, however, to take the exams of each semester before taking those of the following semesters.

Learning activity	**Prescribed foundation courses**	**O/S**
Chemistry of coordination compounds with laboratory	General physics	Core/compulsory
	General and inorganic chemistry with lab	Core/compulsory
	Complements of mathematics and calculus	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Organic chemistry II	General and inorganic chemistry with lab	Core/compulsory
	Organic chemistry I	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Organic chemistry lab	General and inorganic chemistry with lab	Core/compulsory
	Organic chemistry I	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Organic chemistry advanced	Organic chemistry II	Core/compulsory
	General physics	Core/compulsory
	General and inorganic chemistry with lab	Core/compulsory
	Organic chemistry I	Core/compulsory
	Complements of mathematics and calculus	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Physical chemistry II with Lab	General physics	Core/compulsory
	Physical Chemistry I with Lab	Core/compulsory
	General and inorganic chemistry with lab	Core/compulsory
	Complements of mathematics and calculus	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Physical chemistry of matter and fundamentals of spectroscopy	General and inorganic chemistry with lab	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Physical Chemistry I with Lab	General and inorganic chemistry with lab	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Biological chemistry	General and inorganic chemistry with lab	Core/compulsory
	Organic chemistry I	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Analytical chemistry II with lab	General and inorganic chemistry with lab	Core/compulsory
	Analytical chemistry I with lab	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Instrumental analytical chemistry applications	General physics	Core/compulsory
	General and inorganic chemistry with lab	Core/compulsory
	Complements of mathematics and calculus	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Physical chemistry III	General physics	Core/compulsory
	Physical chemistry II with Lab	Core/compulsory
	Physical Chemistry I with Lab	Core/compulsory
	General and inorganic chemistry with lab	Core/compulsory
	Complements of mathematics and calculus	Core/compulsory
	Fundamentals of mathematics	Core/compulsory
Inorganic Chemistry	General and inorganic chemistry with lab	Core/compulsory
	Fundamentals of mathematics	Core/compulsory