



UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2023/24
IN
INDUSTRIAL CHEMISTRY (Classe LM-71)
Students enrolled from the academic year 2014-2015

HEADING

Degree classification - Denomination and code:	LM-71
Degree title:	Dottore Magistrale
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Course years currently available:	1st , 2nd
Access procedures:	open, subject to entry requirements
Course code:	F7Y

PERSONS/ROLES

Head of Study Programme

Prof. Luigi Falciola

Degree Course website

<https://industrialchemistry.cdl.unimi.it/en>

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Mr- Antonino Nucera, Via Golgi 19 - 20133 MILANO From Monday to Friday from 10:00 to 12:00, by appointment outside of these hours available upon request <https://fb.me/chimicamilano> to contact: <https://informastudenti.unimi.it/saw/ess?AUTH=SAML>

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Wellcome desk

International students can contact the Welcome Desk directly by writing to international.students@unimi.it
<https://www.unimi.it/en/international/coming-abroad/international-students-office-welcome-desk>

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The Master's Degree Course in Industrial Chemistry aims at preparing chemists with a good knowledge of theory and practical aspects of the industrial production in different areas of chemistry, specifically concerning the product-process relationship, as well as of economics and management. The students could also learn to work independently and to take full responsibility of projects and structures.

The Master's Degree program in Industrial Chemistry, entirely taught in English, is designed to train high-quality human capital, capable to take on the challenges of the global economy, favouring access of graduates in Industrial Chemistry to the world labour market. The key role given to English in this learning program is justified by the fact that English has long since represented a global communication tool in economy and society, which will contribute to the achievement of the prefixed quality objectives.

The Master's Degree program in Industrial Chemistry complies with the European standards of reference for Sciences and Technologies of Industrial Chemistry and provides technical skills in the disciplines of chemistry and industrial chemistry and in their applications.

The educational program of the master's degree course is designed to provide:

- skills related to self-directed and independent work, enabling to hold positions of full responsibility in the implementation of industrial and research projects and structures;
- knowledge and understanding to undertake professional careers in the area of industrial chemistry, by independently managing diversified activities, such as the characterization of new products and materials, the experimentation of new technologies, and the activities related to the development and pilot phase in view of the industrial production;
- the ability to interact during the decision-making process with different corporate functions (engineering, marketing etc.) involved in the process of research, development and marketing of active principles, especially those characterized by high added value;
- the competencies required to work in the creative process and in the managerial and operational phases of research in chemistry and industrial chemistry either in public or private laboratories (either European or extra-European), research centres, research and development organizations; to participate in the theoretical and practical development of new chemical technologies and to meet requirements of research and development, quality control within specific legal frameworks or production processes in industries and public institutions;
- written and oral communication skills in English, to enable students to communicate independently and fluently with foreign partners.

Expected learning outcomes

Graduates in Industrial Chemistry have the skills and knowledge to undertake highly qualified professional activities in business management and in the operation of research laboratories in the field of chemistry, industrial and pharmaceutical chemistry and possess the knowledge to develop industrial chemical processes from the laboratory scale to the pilot plant.

Their competences in corporate management are characterized by high knowledge of science and technologies of chemistry and industrial chemistry. They are able to organize the research work, to define the development lines and their plans, to ensure integration of the different research sectors, to guarantee the scientific upgrade as well as to verify the results obtained and to promote their development and application and will have the ability to adapt to the continuous evolution of the chemical disciplines and to interact with professional having similar background.

Professional profile and employment opportunities

Typically, the graduates in Industrial Chemistry are characterized by the following professional profiles:

- Industrial Chemist
- Manager/Director of Research and Development laboratory
- Production Manager
- Director/Conductor of chemical plants
- Informant and scientific populariser.

Therefore, they will be able to carry out, among others, the following activities: promotion and development of the scientific and technological innovation; planning and management of industrial technologies; holding functions of high responsibility in the industrial, environmental, health care, and public service sectors.

Graduates in Industrial Chemistry are expected to find employment in: research and development in chemical industries; design and management of pilot plants, chemical plants; industries and research centres working in diversified sectors of either conventional or innovative fields.

The acquired competences allow graduates to have open access to several industrial sectors such as those of polymeric materials, food industry, agrochemicals, additives, auxiliaries, materials for electronics, ecology, intellectual property (patents) and business management.

The Master's Degree in Industrial Chemistry constitutes a preferential title to access the PhD programmes in the area of industrial chemistry*.

For the graduate of this class, enrolment in the National Federation of the Order of Chemists and Physicists is possible, after passing the State Exam.

* Euromaster®.

The Master's Degree Course in Industrial Chemistry (before academic year 2013/14: Chimica Industriale e Gestionale) of the Università degli Studi di Milano has been among the first ones in Italy to gain the EuroMaster Label. The EuroMaster Label is assigned by a special jury purposely appointed by the European Thematic Association, gathering European universities and chemical societies. The EuroMaster Label certifies the educational qualification provided by the Master Degree Course in Industrial Chemistry as a master degree recognized by the European Universities and gives the right to access the post-graduate courses of chemistry at the European level.

Pre-requisites for admission

Requirements and knowledge required for access

Requirements and knowledge required for access

The curricular prerequisites to access the Master's Degree Course in Industrial Chemistry are those peculiar of the L-27 class of degree courses (DM 270/04), and in particular:

- at least 20 credits in disciplines of mathematics, information technology and physics;
- at least 70 CFU in discipline groups belonging to the distinguishing areas included in the L-27 Class Table (Analytical and Environmental chemistry - CHIM/01 and CHIM/12; Inorganic and Physical chemistry - CHIM/03 and CHIM/02; Industrial chemistry and engineering - CHIM/04, CHIM/05, ING-IND/21-22, ING-IND/25; Organic chemistry and Biochemistry CHIM/06- BIO/10-12).

The above credits are fully recognized to graduates of the undergraduate programs of class L-27 of the Università degli Studi di Milano. All other students must demonstrate to have the curricular requirements of the graduates of the class L-27. Different curricular profiles will be evaluated by the Commission for the Access to Industrial Chemistry.

Moreover, also a minimum English language proficiency at level B1 within the Common European Framework of Reference for Languages (CEFR) is required.

The Italian and foreign students with academic qualification awarded in Italy must submit application for admission electronically from 6 March to 25 August, 2023, respecting the instructions indicated in the "student area" of the UNIMI web portal (<https://www.unimi.it/en/node/90/>).

Undergraduates who intend to graduate by December 31st, 2023 are also allowed to apply.

Methods for verifying knowledge and personal preparation

The personal skills of each candidate will be ascertained through a Chemistry test and an interview on topics related to the subjects covered in the fundamental courses of the bachelor's degree in Industrial Chemistry. The interview will be conducted by the Commission for the Access to the Master, composed by teachers appointed by the Teaching Board.

The test to verify the personal skills is selective even in the case the curricular requirements listed above are recognized.

In particular, the Personal Skills will be verified in the following ways:

- a) execution of European Chemistry Tests granted by the European Chemistry Thematic Network (<http://ectn.eu/committees/virtual-education-community/echemtest/>) for the assessment of expertise in Chemistry. The test includes questions, in English, with multiple choices, on topics of the five areas of Analytical, Industrial, Inorganic, Organic and Physical Chemistry. In order to pass the test, students must answer correctly to at least 20% of the questions in each of the five thematic areas. In case of slight insufficiencies (15-19%) the Access Commission reserves the right to summon the candidate in any case to better evaluate his/her preparation;
- b) interview with the Access Commission on topics related to fundamental aspects of core disciplines of the degree in Industrial Chemistry. The failure of the interview prevents the access to the MSc in Industrial Chemistry for the current year.

ECheMTest will take place in July and September 2023, according to a calendar that will be communicated on the website of the Degree Program (<https://industrialchemistry.cdl.unimi.it/it>). The test will be delivered remotely. A valid identification document is required to carry out the test. The interview with the Access Commission will be scheduled in the following days (possibly also remotely). A further edition of the EChemTest, for any recovery of insufficiencies will take place in December 2023, with its subsequent interview. It is possible to take only a recovery test, subsequent to the one carried out and in which the failure in one or more parts was found. The test and the interview can also be carried out before graduation, subject to the possession of the curricular requirements indicated above.

For non-EU students, who may have visa and/or residence permit problems, an EChemTest will also be scheduled in May. Furthermore, it will be possible for them to schedule the interview remotely using a videoconferencing platform.

It is recommended to all foreign students to take advantage of this early-bird test in order to avoid problems in obtaining all the documentation useful for the enrolment.

FOR A BETTER TEACHING PLANNING ALL CANDIDATES, INCLUDING THOSE EXPECTING to graduate before December 31st, 2023, ARE STRONGLY SUGGESTED TO APPLY FOR TEST and INTERVIEW in July or September.

Graduates who have successfully passed the verification tests will be able to enrol after 5 working days from the date of the verification, within the terms indicated on the website <https://www.unimi.it/en/study/bachelor-and-master-study/degree-programme-enrolment/enrolment-masters-programme>

MOREOVER, proficiency in English at a B1 level or higher, under to the Common European Framework of Reference for Languages (CEFR), is required for admission.

The B1-level requirement will be ascertained by the University Language Centre (SLAM) upon admission as follows:

- Language certificate at or above B1, obtained no more than three years earlier. For the list of language certificates recognized by the University please review: <https://www.unimi.it/en/node/39267/>). The certificate must be uploaded when submitting the online application;
- English level achieved during a University of Milan degree programme and certified by the University Language Centre (SLAM) no more than four years before the date of admission application. In this case the process is automatic, the applicant does not have to attach any certificates to the application;
- Placement test administrated by the University Language Centre (SLAM) according to the calendar published on the website: <https://www.unimi.it/en/node/39267/>

All those who fail to submit a valid certificate or do not meet the required proficiency level will be instructed during the admission procedure to take the placement test.

Applicants who do not take or pass the placement test will be required to obtain a language proficiency certificate recognized by the University (see: <https://www.unimi.it/en/node/297/>) and deliver it to the SLAM via the InformaStudenti service by the deadline fixed for the master's programme (<https://www.unimi.it/en/node/39267/>).

Applicants who do not meet the requirement by said deadline will not be admitted to the master's degree programme and may not sit any further tests.

Programme structure

Methods of teaching and its articulation

The Master's degree course in Industrial chemistry is structured over two years (duration of the CdS). The teaching is organized for each year of the course in two coordinated cycles, conventionally called semesters, with a minimum duration of 13 weeks each.

All teaching activities (lessons, exercises, laboratory activities, seminars, research activities) are computed in CFU (Crediti Formativi Unitari - Credits). To graduate, students must acquire 120 CFU.

1 CFU corresponds to 25 hours of study of the student, and precisely:

- for lessons: 1 CFU means 8 hours of teaching and 17 hours of individual study;
- for exercises and laboratory activities: 1 CFU means 16 hours of practical activities and 9 hours of individual study;
- for thesis laboratory: 1 CFU means 25 hours of lab work.

The training activities consist of teaching courses, numerical and laboratory exercises, seminars, teaching activities in small groups, free courses, participation in seminars, conferences, conventions, research activities relating to the research thesis, bibliographic research activities. The teaching courses can be organized in modules. The course includes the passing of curricular exams, according to the study plan presented by the student, for a total of 81 CFU, as well as the carrying out of a period of experimental final thesis (39 CFU) to be carried out in the research laboratories of the Chemistry Department of the Università degli Studi di Milano or at other research facilities, at the Università degli Studi di Milano or other universities, or at public research centres with adequate facilities. A university tutor, then thesis supervisor, will guarantee the quality level of the aforementioned activities. The work performed is ascertained through the preparation and discussion of the final degree thesis.

Teaching Courses articulation

The distribution of the courses into 1st- and 2nd-year semesters is the following:

1st YEAR

1st Semester

- Advanced industrial chemistry with Laboratory (9 CFU), Economics and management (6 CFU), Chemical processes and industrial plants (6 CFU), 1 course from Related and Integrative

- 2nd Semester

Students must earn 9 CFU by selecting 1 course from those included in Table 1, and 24 CFU by selecting 3 courses of 6 CFU taken from Table 2 and 1 course from Related and Integrative Courses

2ND YEAR

1st Semester

- Students must earn 18 CFU by selecting 1 course of 6 CFU from Table 2, and 2 freely selectable courses (included those held in Italian) of 6 CFU, and start the Thesis laboratory

2st Semester

- Thesis Laboratory, preparation of the dissertation and final defence of the Thesis.

Procedures for enrolment in lab activities

Students must enrol to Laboratories via internet through the UNIMIA online services:

<https://www.unimi.it/en/study/student-services/technology-and-online-services/unimia>

Registration must be completed by the deadline indicated on the website, even if the student has not yet completed the enrolment for the year.

Presentation of the study plan (methods and deadline for submission)

To favour the planning of the educational activities, students are asked to fill a preliminary study plan to be presented before the Admission interview, according to the dates that will be communicated on the CdS website.

OFFICIAL STUDY PLAN

The submission of the study plan is mandatory.

The OFFICIAL study plans, that might be different from the preliminary ones, must nonetheless be submitted at the 1st Year, via UNIMIA services (<https://www.unimi.it/en/study/student-services/technology-and-online-services/unimia>), within the term fixed by the Segreteria Studenti and accordingly to scheduled dates. For special cases a printed form is available, to be requested and submitted to Segreteria Studenti, Via Celoria, 18. The official study plans may be modified, if needed, in the subsequent years. The modified plans have to be submitted at fixed dates ONLY, as indicated by Segreteria Studenti.

The submission/modification of study plans is NOT ALLOWED outside the fixed dates and by students not enrolled for the academic year.

For suggestions and problems with the selection of the Courses for the Study Plan, students may contact the Tutoring Commission (tutoring.chimica@unimi.it) or the Studi Plan Commission (pierluigi.mercandelli@unimi.it).

Furthermore, we highlight the activities included in the University project for the development of transversal skills: <https://www.unimi.it/it/studiare/frequentare-un-corso-di-laurea/segue-il-percorso-di-studi/competenze-e-abilita-trasversali>

These training activities are compulsory to attend, have a defined number of places and can be included in the study plan, among the "Free choice activities", only if they have been approved by the relevant CdS. Details are available on the page <https://industrialchemistry.cdl.unimi.it/en/courses>

For the admission to the final exam, the list of passed exams must correspond to the last approved official study plan. When applying for the admission to the final exam, in the case of discrepancy between the student's educational career and the relevant study plan, the student cannot be admitted to the final exam. For support and enquiries about the effective correspondence between passed exams and courses selected in the study plan students may refer to Office for Teaching, Department of Chemistry.

For information about dates and procedures for submitting the official study plan, please visit the relevant section of the UNIMI website: <https://www.unimi.it/it/node/122/>

Teaching Agenda

Lessons take place as follows:

- I semester: from 25 September 2023 to 19 January 2024
- II semester: from 26 February 2024 to 14 June 2024

Lessons timetable

The lessons' timetable can be consulted at the link <https://www.unimi.it/it/node/128/> or using the ANDROID app "lezioniunimi", available for the most popular OS for smartphones and downloadable at the link indicated above.

Exams (exam sessions and methods of profit assessing)

For each course at least one exam session is scheduled for each of the following months: February, June, July, September, and January. Extra sessions might be scheduled in November and at the end of the Easter holidays.

Exams registration

To register for an examination, the student must enrol for the relevant session, through the online services (<http://unimia.unimi.it/portal/server.pt>). The schedule of the examination sessions for the assessment of the learning outcomes is available through the online UNIMIA services or at the websites <https://www.unimi.it/en/node/130/> where also detailed information on the exam organization can be found.

Before (or contextually with) the exam enrolment the student must fill the online questionnaire for the evaluation of the relevant course. It is strongly recommended that you complete the questionnaire by the end of each course, even if you do not intend to take the exam immediately. The application guarantees anonymity.

Contextually with the exam enrolment, the student career is checked via the information system. It is strongly suggested to check the effective enrolment for the selected exam via the UNIMIA services (<https://www.unimi.it/en/study/studentservices/technology-and-online-services/unimia>). Students are reminded that enrolments, as well as cancellations, for exam sessions generally close five days before the exam date.

Exams recording

Exams and tests are recorded electronically. Only the students correctly enrolled via the UNIMIA online services are allowed to take exams.

Special instructions

- To take any exam or test, the student must have fulfilled the payment of taxes and contributions, must have passed possible propaedeutic exams, must have all the attendance certificates, where requested.
- It is forbidden to retake an already passed exam, even in the case of educational activities recorded in a previous career. The violation of the above rules implies the annulment of the exams by Rectoral act.

- All the exams must be taken in English language

It is mandatory that, before any exam or test, the board of examiners verifies the personal identity of the candidate, who must exhibit a valid identification document. No student can be allowed to take any exam or test in the absence of an identification document and the University Badge.

Tutoring

The task of advising and guiding students in their university studies is entrusted to a special tutoring commission, which can be contacted by e-mail at: tutoring.chimica@unimi.it.

Students are recommended to often visit the Degree Course website (<https://industrialchemistry.cdl.unimi.it/it>) and to regularly consult the assigned institutional e-mail address, to stay up to date on all communications and initiatives that concern them.

Language test / computer literacy test

In order to obtain their degree, students must be proficient in English at a B2 level, certified as follows:

- via a B2 or higher level language certificate issued no more than three years prior to the date of application. You will find the list of language certificates recognized by the University at: <https://www.unimi.it/en/node/39267/>). If not submitted during the application process, the certificate must be uploaded when enrolling, or subsequently at: <http://studente.unimi.it/uploadCertificazioniLingue>;
 - B2 or higher level achieved earlier and validated during the application process;
 - B2 or higher level achieved during the admission test;
 - via the placement test administered by the University Language Centre (SLAM) between October and January of year 1.
- All those who do not achieve B2 or higher level will be required to attend a B2-level English course administered by the University Language Centre (SLAM) during the second semester of year 1.

Those who do not attend the course or do not pass the end-of-course exam after six attempts must obtain the necessary certification privately before graduating.

Compulsory attendance

It is mandatory to attend the Laboratory activities. In all the other cases the attendance is strongly suggested.

Internship criteria

The Master Thesis is a written dissertation on original research activities, performed by the student during the 2nd year, under the guidance of a Relatore (Supervisor) and possibly a Correlatore (Co-tutor). These activities are carried out in the laboratory indicated in the admission application. The Thesis Laboratory lasts at least one solar year, and includes the attendance at the courses scheduled in that year.

The Master Thesis could be:

- Internal Experimental Thesis
- External Experimental Thesis

The Internal Experimental Thesis are carried out at the Department of Chemistry of University of Milano or in other Departments belonging to the Faculty of Sciences and Technology. As part of these internal theses, in agreement with the thesis supervisor, it will be possible to carry out internships at public or private entities or companies, under the guidance of an external supervisor. The duration of the internship may correspond to a maximum of 20 CFU, even in non-continuous periods. These internship periods must in any case be approved by the Teaching Council of the Chemistry Department.

The External Experimental Thesis are carried out at other university structures, at other public Institutions or at highly qualified public and private (non-profit) research centres, with adequate facilities and personnel capable of adequately supporting the research. The possibility of an external Thesis is evaluated, case by case, by the Teaching Board of the Department of Chemistry.

To apply for an External Thesis the following documents must be provided:

- justification of the application to an external experimental thesis (one printed page) signed by the student and undersigned by the Supervisor (an Official Supervisor, according to the rules further below);
- detailed research plan (one printed page);
- a declaration of the referent person of the hosting structure about the availability to host at no-cost the student and to guarantee the use, free-of-charge, of any facility and instrumentation.

The applications must be submitted well in advance, to obtain the approval of the Teaching Board. Please consult in advance the Thesis Commission and the Rules you can find on the Course website.

Students on internships at external organizations or companies and students in external experimental thesis are required to report, on a fortnightly basis, to the supervisor and to another competent teacher, appointed by the Thesis and Internship Commission after consulting the supervisor, on the experience and activities conducted outside the Department.

It is possible to apply for admission to the thesis internship starting from the end of the second semester of the first year of the course. To enter the thesis internship, it is necessary to have already obtained the recognition of knowledge of the English language at level B2.

The Thesis can start on the first day of July, October, December and March. The application – drafted on the specific form – must be e-mailed to the Student Office of the Department of Chemistry and, for acceptance and knowledge, to the Supervisor, by the first day of the month preceding the starting month, for the necessary approval of the Teaching Board.

The Master Thesis Supervisor (Relatore) is responsible to the Teaching Board for the scientific research activity assigned to the student and for its correct execution.

The Professors and Researchers in chemistry, afferent to the Teaching Board or to the Department of Chemistry or other Departments of the Faculty of Science and Technology, are eligible as Supervisors.

The Supervisor can be assisted by a maximum of two co-tutors.

Detailed information can be found in the Thesis Regulations downloadable from the page "Stage and Internships" of the Master's Degree Course: <https://industrialchemistry.cdl.unimi.it/en/study/stage-and-internship>

Degree programme final exam

To be admitted to the final exam, the student must have passed all the exams required by the study plan.

The final exam consists in the discussion of the degree thesis in front of a specific Commission of the Teaching Board.

The Degree Thesis has to be written in English. The preparation of a summary in English (maximum 5 typed pages) is also required, to be delivered according to the timing indicated on the website

<https://industrialchemistry.cdl.unimi.it/en/study/graduating>

SESSIONS FOR FINAL DEGREE EXAMS

- July 2024
- October 2024
- December 2024
- February 2025
- April 2025

EXPERIENCE OF STUDY ABROAD AS PART OF THE DEGREE 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

Students enrolled in the Industrial Chemistry course are encouraged to apply to the Erasmus + actions, where various positions are available in 20 European universities. They can earn their credits by following courses and/or by performing part of their experimental thesis abroad. Before leaving, students must submit a Learning Agreement to be approved by the Teaching Board: this approval is mandatory for the acquisitions of the credits.

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 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

ADMISSION CRITERIA: 1ST YEAR OPEN, SUBJECT TO ENTRY REQUIREMENTS

Application and enrolment information and procedures

For information, methods and access requirements, see the "Pre-requisite for admission " paragraph at the beginning of the document.

The procedures and deadlines for registration will be indicated in the competition notice published on the University website at the page <https://www.unimi.it/it/studiare/immatricolarsi-e-iscriversi>.

Links to enrolment information and procedures

<https://www.unimi.it/en/study/bachelor-and-master-study/degree-programme-enrolment/enrolment-masters-programme>

N° of places reserved to non-EU students resident abroad

30

Application deadline

25-08-2023

1st COURSE YEAR Core/compulsory courses/activities				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
1 semester	Advanced industrial chemistry with lab		9	CHIM/04
1 semester	Chemical processes and industrial plants		6	CHIM/04
1 semester	Economics and management		6	SECS-P/08
Total number of compulsory credits/ects			21	
Elective courses				
TABLE 1 - DISTINCTIVE COURSES FROM 9 CFU				
Student must earn 9 CFU by selecting one of the following items				
2 semester	Applied organic chemistry with lab		9	CHIM/06
2 semester	Energy: sources, conversion and storage with lab		9	CHIM/02
2 semester	Inorganic materials with lab		9	CHIM/03
2nd COURSE YEAR Elective courses				
FREE CHOICE COURSES				
The student must earn 12 credits by choosing freely between all the teachings activated, offered by the University, provided they consistency with the educational project, even if they are held in Italian.				
However, it is strongly recommended to use distinctive or, as appropriate, elective or integrative courses of the Related and Integrative courses of Master Degrees in Industrial Chemistry or in Scienze Chimiche consistent with the educational project				
UNDEFINED COURSE YEAR - COMPULSORY COURSES/ACTIVITIES				
Scheduling	Learning activity	Module/teaching unit	Ects	Sector
	English proficiency B2 (3 ECTS)		3	NN
Total number of compulsory credits/ects			3	
Further elective courses				
TABLE 2 DISTINCTIVE COURSES				
Students must earn 24 CFU by selecting 4 of the following items; at least 1 of them (6 CFU) must belong to CHIM/02, CHIM/03 or CHIM/06 class.				
1 semester	Catalytic Methodologies in organic synthesis Course subscribed by Master in Chemical Sciences		6	CHIM/06
1 semester	Concepts and methods in organic synthesis		6	CHIM/06
1 semester	Design and optimisation of chemical plants		6	ING-IND/25
1 semester	Environmental electrochemistry Course activated to alternate year: not active in 2023-2024, active in 2024-2025.		6	CHIM/02
1 semester	Fundamentals of Instrumentation for Chemical Industry		6	CHIM/04
1 semester	Industrial processes and scale-up		6	CHIM/04
1 semester	Metal Science and Corrosion Course activated to alternate year: active in 2023-2024, not active in 2024-2025.		6	CHIM/02
1 semester	Nanotechnology for inorganic materials		6	CHIM/03
1 semester	Photochemical Processes and Photocatalysis Course mutuuted by Master in Scienze Chimiche, not active in 2023/2024.		6	CHIM/02
1 semester	Recycle and Life Cycle Assessment (LCA) of products and processes		6	CHIM/04
2 semester	Advanced Chemistry and Physics of Polymers		6	CHIM/04

2 semester	Analytics for chemical Industry		6	CHIM/01
2 semester	Environmental control and sustainability management		6	CHIM/12
2 semester	Heterogeneous catalysis		6	CHIM/02
2 semester	Physical Chemistry of Formulations		6	CHIM/02
2 semester	Polymer degradation and stability		6	CHIM/04
2 semester	Process development		6	CHIM/04
2 semester	Synthetic methods in biotechnology		6	CHIM/06
INTEGRATIVE AND RELATED COURSES				
Student must earn 12 CFU by selecting 2 of the following items following teachings related and integrative.				
1 semester	Patents and Management of Innovation <i>Course subscribed by Master in Scienze Chimiche</i>		6	SECS-P/07
2 semester	Chemical Safety		6	IUS/07
2 semester	Medicinal chemistry <i>Course subscribed by Master in Chemical Sciences</i>		6	CHIM/08
End of course requirements				
	Thesis work and Final dissertation		39	NN
Total number of compulsory credits/ects			39	