



**UNIVERSITA' DEGLI STUDI DI MILANO**  
**PROGRAMME DESCRIPTION - ACADEMIC YEAR 2021/22**  
**IN**  
**INDUSTRIAL CHEMISTRY (Classe LM-71)**  
**Students enrolled from the academic year 2014-2015**

### HEADING

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

### PERSONS/ROLES

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**Degree Course website**

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

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**Wellcome desk**

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

## CHARACTERISTICS OF DEGREE PROGRAMME

### Introduction

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.

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.

### General and specific learning 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 plant pilot.

Their competences in corporate management are characterized by high knowledge of science and technologies of chemistry and industrial chemistry. They are capable 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 and disciplines and to interact with professional having similar background.

### Professional profile and employment opportunities

Graduates in Industrial Chemistry 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.

## Pre-requisites for admission

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 01/03/2021 to 27/08/2021, respecting the modalities indicated in the "student area" of the UNIMI web portal (<https://www.unimi.it/en/study/bachelor-and-master-study/degree-programme-enrolment/enrolment-masters-programme>).

Undergraduates who intend to graduate by December 31st, 2021 are also allowed to apply.

Methods for verifying knowledge and personal preparation

Admission requires possession of the above curricular requirements (assessed after the admission application).

Moreover, 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 2021, according to the calendar at the following link:

[https://industrialchemistry.cdl.unimi.it/sites/lf7y/files/2021-04/AMMISSIONI%20LM54\\_0.pdf](https://industrialchemistry.cdl.unimi.it/sites/lf7y/files/2021-04/AMMISSIONI%20LM54_0.pdf)

The test will be delivered remotely. A valid identification document is required to carry out the test.

It is not necessary to register for the test, the application for admission involves automatic registration for the test. In particular, a few days before the test, students who have applied for admission will receive instructions by e-mail to access it on the indicated day. The instructions will also indicate how to carry out a proof test (N.B. no other proof tests will be provided).

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 2021, 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.

FOR A BETTER TEACHING PLANNING ALL CANDIDATES, INCLUDING THOSE EXPECTING to graduate before December 31st, 2021, 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>

English level evaluation

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) during admission as follows:

- By a language certification at or above B1, obtained no more than 3 years earlier. For the list of language certifications recognized by the University please review: <https://www.unimi.it/en/study/language-proficiency/placement-tests-and-english-courses/english-entry-tests> - The certification must be uploaded when submitting the online application;
- By the English level achieved during a Bachelor's degree programme through SLAM courses and tests. The certificates must be less than four years old, and will be assessed administratively, without the applicant having to attach any certificates;
- By the entrance test, which will be delivered by the SLAM on July 2nd 2021 at 9.30, on September 17th 2021 at 9.30 and on December 10th 2021 at 9.30, only for students who have applied for admission at a later date.

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

Candidates who do not sit or pass the entrance test will have until 31 December 2021 to obtain and submit one of the recognized certifications to the SLAM.

Students who do not meet the requirement by 31 December will not be admitted to the Master's degree programme and cannot sit further tests.

For further information, please visit the SLAM website: <https://www.unimi.it/en/study/language-proficiency/placement-tests-entry-tests-and-english-courses>

## **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 8 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 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:

- 1st Semester: October 4th, 2021 – January 21st 2022
- 2nd Semester: March 1st, 2022 – June 17th 2022

#### 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/student-services/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.

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](mailto: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. This proficiency level may be certified as follows:

- By a language certification, earned within three years prior to the date of submission, at a B2 level or higher. For the list of language certifications recognised by the University, please review: <https://www.unimi.it/en/study/language-proficiency/placement-tests-entry-tests-and-english-courses> - The certification must be uploaded during the enrolment procedure, or subsequently to the portal <http://studente.unimi.it/uploadCertificazioniLingue>
- By a Placement Test, which is delivered by the SLAM during year I only, from October to January. 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 certification.

Those who do not sit the Placement Test by January, or who fail to pass the end-of-course test within six attempts, must obtain an outside paid certification by graduation.

### **Compulsory attendance**

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

### **Internship criteria**

The Mater Thesis consists of a written dissertation on original chemical research carried out by the student, usually in the second year, under the guidance of a supervisor and, possibly, of a co-adviser and carried out in the laboratory specified in the application form.

Its duration is at least one calendar year, including attendance at courses scheduled in the same year.

Dissertations are distinguished into:

- Internal Experimental Thesis
- External Experimental Thesis

Internal Experimental Thesis are those carried out at the Department of Chemistry or the Departments linked to the Faculty of Science and Technology of the University of Milan. Within the framework of internal theses, in agreement with the Thesis Supervisor and with the approval of the Teaching Board of Chemistry, it will be possible to carry out internships at public or private bodies 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.

External Experimental Thesis are considered to be those carried out at other university facilities, at the University of Milan or at other universities, at public bodies or at highly qualified public and private (non-profit) research centres with adequate facilities. The admissibility of these theses is the responsibility of the Academic Board.

The application for admission to the external thesis - to be submitted well in advance in order to allow for approval by the TB the month prior to admission to the thesis - must be attached:

- justification for the external experimental thesis request (one folder) signed by the student and countersigned by the Official Advisor;
- detailed research programme (one folder);
- a declaration from the person in charge of the host structure attesting to its willingness to host the student free of charge and to grant him/her free use of the scientific equipment.

Students in internships with external organizations or companies and students in external experimental theses are required to report fortnightly to the supervisor and to another competent teacher, appointed by the Thesis and Internship Commission, on the experience carried out outside the Department and on the activities carried out there.

### **ADDITIONAL SESSIONS FOR MAJOR DEGREE THESES**

It is possible to start the Master Thesis internship from the end of the second semester of the first year of the course.

In order to enter the Master Thesis internship, it is necessary to have already obtained the recognition of knowledge of English language level B2.

Theses entries occur on the first day of July, October, December and March. Applications for admission must be sent to the Didactic Office and, for information and endorsement, to the supervisor, by the first day of the month preceding the month of admission, for approval by the Teaching Board.

lecturers and thesis advisors

The Thesis Advisor is the scientific guarantor to the TB of the research assigned to the undergraduate student and its proper conduct. The Rapporteur is unique. All Professors and Researchers who carry out teaching activities in chemistry and who belong to the Teaching Board or to the Department of Chemistry or to the Departments linked to the Faculty of Science and Technology can be speakers. The Rapporteur may be assisted by no more than 2 Co-rapporteurs.

Thesis may be co-rapporteurs, in addition to all the teachers included among the Official Speakers:

- Official Lecturers from other Universities and Polytechnics, including foreign ones;
- graduate students with knowledge of the subject;
- UniMi employees with a qualification not lower than D who are experts in the subject;
- C.N.R. researchers working in the Chemistry Department;
- the experts designated by the external thesis host structures.

Special cases may be considered by the CD if persons of particular scientific and technical importance are involved.

### **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 2022

October 2022

December 2022

February 2023

April 2023

## ***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 and other Extra-EU countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organizations.

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

### **Study and internships abroad**

Students enrolled in the Industrial Chemistry course are encouraged to apply to the Erasmus Plus 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**

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

Every year, before the deadline for the call, the University organizes informative meetings to illustrate opportunities and rules for participation to students.

Erasmus+ scholarship

The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which is supplemented by the University funding for disadvantaged students.

Language courses

Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University.

Learn more at <https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus>

For assistance, please contact:  
International Mobility Office  
Via Santa Sofia 9 (second floor)  
Tel. 02 503 13501-12589-13495-13502  
Contacts: InformaStudenti [mobility.out@unimi.it](mailto:mobility.out@unimi.it)  
Student Desk booking through InformaStudenti

## 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 on the University website at the page <https://www.unimi.it/en/study/enrolment>

### 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

25

### Application deadline

27-08-2021

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	ND
		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 Scienze Chimiche		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		6	CHIM/02



	Course activated every other year: not active in 2021-2022, active in 2022-2023.			
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 every other year: active in 2021-2022, not active in 2022-2023.		6	CHIM/02
1 semester	Nanotechnology for inorganic materials		6	CHIM/03
1 semester	Photochemical Processes and Photocatalysis Course mutuanted by Master in Scienze Chimiche		6	CHIM/02
1 semester	Physical Chemistry of Formulations		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	Environmental control and sustainability management		6	CHIM/12
2 semester	Heterogeneous catalysis Course activated every other year: not active in 2021-2022, active in 2022-2023.		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 Course subscribed by Master in Scienze Chimiche		6	SECS-P/07
2 semester	Chemical Safety		6	IUS/07
2 semester	Medicinal chemistry Course subscribed by Master in Scienze Chimiche		6	CHIM/08

## End of course requirements

	Thesis work and Final dissertation		39	NA
		Total number of compulsory credits/ects	39	