



Facoltà di Scienze e Tecnologie

UNIVERSITA' DEGLI STUDI DI MILANO
MANIFESTO DEGLI STUDI A.A. 2014/15
LAUREA MAGISTRALE IN
INDUSTRIAL CHEMISTRY (Classe LM-71)
Immatricolati dall'a.a. 2014-2015

GENERALITA'

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| Classe di laurea di appartenenza: | LM-71 SCIENZE E TECNOLOGIE DELLA CHIMICA INDUSTRIALE |
| Titolo rilasciato: | Dottore Magistrale |
| Durata del corso di studi: | 2 anni |
| Crediti richiesti per l'accesso: | 180 |
| Cfu da acquisire totali: | 120 |
| Annualità attivate: | 1° |
| Modalità accesso: | Condizionato |
| Codice corso di studi: | F7Y |

RIFERIMENTI

Presidente Collegio Didattico
 Prof.ssa Rita Annunziata

Docenti tutor
 Prof.sse Elisabetta Ranucci e Sandra Rondinini

Sito web del corso di laurea
<http://www.cedchim.unimi.it>

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

Main Student Office
 Via Celoria, 22 - 20133 MILANO Monday - Wednesday - Friday from 9:00 to 12:00, Tuesday – Thursday from 13:30 to 15:30 <http://www.unimi.it/studenti/segreteria/773.htm>
<http://www.unimi.infostudente.it> (registration required)

Student Office of the Department of Chemistry

Via Golgi 19 - 20133 MILANO Tel. Tel. 02 50314419 From Monday to Friday from 10:00 to 12:00, by appointment outside of these hours available upon request
<http://users.unimi.it/chimp> Email: didattica.dipchi@unimi.it, skype: [segreteriachimica](https://www.skype.com/name/segreteriachimica)

CARATTERISTICHE DEL CORSO DI STUDI

Premessa

FOREWORD

The Master's Degree Course is newly launched. For this reason, only the first year course is active in the Academic Year 2014/15.

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.#

They will acquire good knowledge of economics and management and learn to work independently and to take responsibilities 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, favoring access of graduates in Industrial Chemistry to the world labor 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 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's Degree Course in Industrial Chemistry as a master's degree recognized by the European Universities and gives the right to access the post-graduate courses of chemistry at the European level.

Obiettivi formativi generali e specifici

GENERAL AND SPECIFIC EDUCATIONAL GOALS

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:

- skill related to self-directed and independent work, enabling to hold positions of 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 centers, 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.

Abilità e competenze acquisite

ACQUIRED SKILLS AND COMPETENCIES

Graduates in the 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.

Profilo professionale e sbocchi occupazionali

PROFESSIONAL PROFILE AND JOB OPPORTUNITIES

Graduates in the 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 the Industrial Chemistry are expected to find employment in: research and development in chemical and electrochemical industries; design and management of pilot plants, chemical plants; industries and research centers working in diversified sectors of conventional and innovative materials; design and production of generators and electrochemical sensors.

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 programme in the area of industrial chemistry.

Conoscenze per l'accesso

ADMISSION REQUIREMENTS

The curricular prerequisite to access the Master's Degree Course in Industrial Chemistry are those peculiar of the L-27 class of degree courses, 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 L27 Class Table:
- analytical and environmental chemistry CHIM/01 and CHIM/12;
- inorganic and physical chemistry CHIM/03 e CHIM/02
- industrial and technology CHIM/04, CHIM/05 and ING-IND/21-22, ING-IND/25;
- organic chemistry and biochemistry CHIM/06, BIO/10-12

The minimum entry requirement in English proficiency is level B1 ("lower intermediate") of the Common European Framework.

Struttura del corso

COURSE STRUCTURE

The master degree in Industrial Chemistry is structured in Semesters

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

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 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

THE TOTAL NUMBER OF CREDITS OF THE 1ST YEAR IS 60:

2ND YEAR NOT ACTIVE in 2014-15

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. Students must earn the English proficiency certificate and start the Thesis laboratory

2st Semester

Thesis Laboratory, preparation of the dissertation and final defense of the Thesis

THE TOTAL NUMBER OF CFU FOR THE 2ND YEAR IS 60

Biblioteche

LIBRARIES

The Chemistry Library is located on the 1st floor of the Department of Chemistry. The library offers the following services:

- Internet point
- Data retrieval
- Electronic Journals
- Book loan
- Document Delivery
- Bibliographic Information
- Photocopies

For further information on these services you may refer to the website of the facility <http://www.sba.unimi.it/Biblioteche/chimica/1873.html>

Note

For information on course schedules, course contents and all matters related to teaching please refer to the Student Office of the Department of Chemistry (main entrance, via Golgi 19 – open to the public on weekdays from 10:00 to 12.00; appointments outside of these hours are available upon request.

Prove di lingua / Informatica

TEST OF ADVANCED KNOWLEDGE OF LANGUAGES

Students can earn their credits of the English Proficiency certificate by presenting an internationally recognised certificate of B2 level, as defined by C.E.F. (Common European Framework) not later than 7 years before.

Obbligo di frequenza

OBLIGATION OF ATTENDANCE

It is mandatory to attend the Laboratory courses/modules. In all the other cases the attendance is strongly suggested

Modalità di valutazione del profitto

ASSESSMENT PROCEDURE OF THE LEARNING OUTCOMES

The schedule of the examination sessions for the assessment of the learning outcomes is available through the Sifaonline Service

For each course at least one 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.

TEACHING AGENDA

Lessons take place as follows:

- 1st Semester: October 1st, 2014 – January 23rd, 2015
- 2nd Semester: March 2nd, 2015 – June 12th, 2015

FIXED DATES

- Students have to choose a complete study plan, to be submitted to the Student Bureau (according to the appropriate procedures) preferably between December 2014 and March 2015

SESSIONS OF THE FINAL EXAM

- July 2015
- October 2015
- December 2015
- February-March 2016

Regole generali per iscrizione e ammissione agli appelli d'esame

EXAM ENROLMENT

To sit for an examination, the student must enroll for the relevant session, through the SIFA online services: SIFA – Servizi didattici – iscrizione agli esami (http://www.unimi.it/studenti/servizi_online.htm).

Before (or contextually with) the enrolment the student must fill the online questionnaire for the evaluation of the relevant course.

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 by selecting “Informazioni – Visualizza gli appelli a cui sei iscritto” in the left column of the SIFA page for exam enrolling

TEACHING EVALUATION

The online evaluation of a single course is mandatory and enables the enrolment for the said course. You are suggested to fill the questionnaire before the completion of the teaching activities of each course, even if you do not intend to take soon the exam. It is guaranteed that you will remain anonymous. Remember that the dead-line for enrolments is usually 5 days before the session.

EXAM RECORDING

Exams and tests are recorded electronically. Only the students correctly enrolled via the SIFA online services can be allowed to take any exam.

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 his/her university id-card. No student can be allowed to take any exam or test in the absence of his/her id-card.

Regole generali per iscrizione alle attività formative e/o laboratori**GENERAL RULES FOR THE ENROLMENT FOR EDUCATIONAL ACTIVITIES AND LABORATORIES**

Students must enrol to Laboratories via internet at the SIFA online services (http://www.unimi.it/studenti/servizi_online.htm).

Formulazione e presentazione piano di studi**CHOICE AND SUBMISSION OF THE STUDY PLAN**

To favour the planning of the educational activities, Students are asked to fill a preliminary study plan to be presented to the Ufficio Didattica del Dipartimento di Chimica before October 10th, 2014. Students will receive the necessary form at their admission interview.

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 the web address http://www.unimi.it/studenti/servizi_online.htm, within the term fixed by the Segreteria Studenti, generally between December 2014-March 2015. For special cases a printed form is available, to be requested and submitted to Segreteria Studenti, Via Celoria, 20. 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.

NOTICE: 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' 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 Ufficio Didattica del Dipartimento di Chimica.

For information about dates and procedures for submitting the official study plan, please visit the relevant section of the UNIMI website.

Caratteristiche Tirocinio**TRAINING****RULES FOR THE THESIS LABORATORY AND THE FINAL EXAM**

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 a Correlatore (Co-tutor if any). 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 Theses are:

- Internal Experimental Theses
- External Experimental Theses

The Internal Experimental Theses are carried out at the Dipartimento di Chimica dell'Università degli Studi di Milano. The External Experimental Theses are carried out at other university structures, or at other public Institutions with adequate facilities. The possibility of an external Thesis is evaluated by the Teaching Board of Dipartimento di Chimica

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 Didactic Council.

THESIS STARTING SESSIONS

The Theses can start on the first day of July, October, December and March. The applications – drafted on the specific form undersigned by the Supervisor – must be submitted at the Ufficio Didattica del Dipartimento di Chimica by the first day of the month preceding the starting month, for the necessary approval of the Didactic Council.

OFFICIAL SUPERVISORS

The Master Thesis Supervisor is responsible to the CD for the scientific research activity assigned to the student and for the correct execution.

The Professors and Researchers in chemistry, afferent to the CD or to the Dipartimento di Chimica or the Departments of the Faculty of Science and Technology, are eligible as Supervisors.

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

CO-TUTORS

In addition to all the Professors and Researchers are eligible as co-tutors of Master Theses:

- The Professors and Researchers of other Universities and Polytechnical Schools, in Italy and abroad
- Persons with the Master Degree, with a recognised activity as experts
- The employees of Università degli Studi di Milano, enrolled as non-teaching personell at D level or higher and having a recognised activity as experts
- The C.N.R Researchers working within the Dipartimento di Chimica
- The experts, with recognised activity in chemical sciences, selected by the hosting institutions as referents for External Theses.

For any other case, the Didactic Council will consider the scientific and technical activity of the proposed co-tutor, on the basis of a brief description of the specific skills and expertise provided by the Supervisor.

The relevant forms may be downloaded from the Ufficio Didattica web-site (<http://users.unimi.it/chimp>).

Criteri di ammissione alla prova finale**FINAL EXAM ADMISSION CRITERIA**

For the admission to the final exam, the student must have passed all the exams in his/her study plan.
The final Exam is an oral discussion of the Master Thesis written dissertation.

Orario lezioni

TEACHING SCHEDULE AND CALENDAR

The teaching schedule and calendar will be available on the web pages of the Master Degree programme and of the Ufficio Didattica. In addition they will be put up on the notice board in the entrance-hall of the Dipartimento di Chimica

ACCESSO AI CORSI DI LAUREA MAGISTRALI

MODALITA' DI ACCESSO: 1° ANNO CONDIZIONATO

Istruzioni operative

INFORMATION AND METHOD FOR ADMISSION TO OPEN ACCESS MASTER DEGREE IN INDUSTRIAL CHEMISTRY FOR ITALIAN AND FOREIGN STUDENTS

The Italian and foreign students with academic qualification awarded in Italy must submit applications for admission respecting the deadlines indicated in the "student area" of the Unimi web portal. Undergraduates who intend to graduate by February 28, 2015 are also allowed to apply.

The presentation of the application form is compulsory and must be submitted electronically to the following address:

http://www.unimi.it/studenti/servizi_online.htm

Admission requires possession of minimum curriculum requirements and suitable personal skills (DM 270/04)

CURRICULAR REQUIREMENTS

The earned credits will be fully recognized to graduates of the undergraduate program of class L-27 of the University of Milan

All other students must demonstrate to have the curricular requirements of the graduates of the class L-27. In particular they are required to have earned:

- At least 20 credits in mathematics and computer and physical sciences

- At least 70 credits in the core areas of the class: CHIM/01-06, CHIM/12, ING-IND/21-22, ING-IND/25 and BIO/10-12

The minimum requirement for the English language knowledge is the B1 level ("lower intermediate") of the Common European Framework.

CHECK OF PERSONAL SKILLS

The personal skills of each candidates will be ascertained through an interview on topics related to the subjects covered in the fundamental courses of the bachelor's degree in Industrial Chemistry. The interview may also be carried out before graduation (which, for the purpose of registration, has to be achieved by February 28, 2015), subject to the curricular requirements.

The interview will be conducted by the Commission for Access to the Master, composed by teachers appointed by the Didactic Council.

The failure of the interview prevent the access to the MSc in Industrial Chemistry for the current year.

The Personal Skill will be verified by the following methods :

a) the European Chemistry Tests granted by the European Chemistry Thematic Network (<http://ectn-assoc.cpe.fr/> / Echemest /) for the accrual of expertise in Chemistry. The test includes questions , in English, with multiple answers on topics of Analytical , Inorganic, Organic and Physical Chemistry .

To perform the test, the Candidate will be asked to show a valid identification document.

The participation to the test is compulsory but the outcome not preclude the admission to the Master in Industrial Chemistry.

The test is not selective and it will be used by the Access Commission for internal use only to improve teaching planning.

b) After the test, an interview with the Access Commission will take place on topics related to fundamental aspects of core disciplines of the degree in Industrial Chemistry and to ascertain the knowledge of the English language. The test to verify the personal and language skills is selective even in the case the curricular requirements listed above are met; the negative outcome prevents the access for the current year.

FOR A BETTER TEACHING PLANNING ALL CANDIDATES, INCLUDING THOSE EXPECTING to graduate before February 28, 2015, ARE STRONGLY SUGGESTED TO APPLY FOR INTERVIEW in September.

For admission in 2014-2015, the interviews to ascertain the curricular requirements and the adequacy of personal skills of candidates will take place on the following dates :

- September 25, 2014, 8:30 am at the classrooms 306-307 - 309-310 - 311, Sector Academic Via Celoria 20, Milan

- December 18, 2014, 14.30, at the classroom Bianchi, Department of Chemistry, Via Golgi, 19 - Milan

- March 3, 2015, at 14.30, at the classroom Bianchi, Department of Chemistry, Via Golgi, 19 - Milan

It is advisable to check for any possible updates about dates and times of examination the website: <http://www.ccdchim.unimi.it>

N° posti riservati a studenti extracomunitari non soggiornanti in Italia

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Note

ENROLLMENT IN INDUSTRIAL CHEMISTRY MASTER

Only graduates who have successfully passed the verification test can be enrolled in Industrial Chemistry.

The registration will take place after 5 working days and under the terms and conditions indicated in the "students" section of the Unimi web site

The students of the Università degli Studi di Milano who have applied for admission expected to graduate between October 2014 and February 2015 will be allowed to follow the lessons and laboratories of the Master courses and take the exams acquiring credits in excess of the 180 required for the bachelor's degree.

These credits, provided that are accrued before 31 January 2015 will be validated for the achievement of 120 credits required for the LM.

| 1° ANNO DI CORSO Attività formative obbligatorie | | | | | |
|---|---|------------------------|-----|-----------|--------------------------------------|
| Erogazione | Attività formativa | Modulo/Unità didattica | Cfu | Settore | Form.Didatt. |
| 1 semestre | Advanced industrial chemistry with lab | | 9 | CHIM/04 | 48 ore Lezioni, 48 ore Laboratori |
| 1 semestre | Chemical processes and industrial plants | | 6 | CHIM/04 | 48 ore Lezioni |
| 1 semestre | Economics and management | | 6 | SECS-P/08 | 48 ore Lezioni |
| Totale CFU obbligatori | | | 21 | | |
| Attività a scelta | | | | | |
| TABLE 1 - DISTINCTIVE COURSES FROM 9 CFU | | | | | |
| Student must earn 9 CFU by selecting one of the following items | | | | | |
| 2 semestre | Applied organic chemistry with lab | | 9 | CHIM/06 | 48 ore Lezioni, 48 ore Laboratori |
| 2 semestre | Chemistry of inorganic materials with lab | | 9 | CHIM/03 | 56 ore Lezioni, 32 ore Laboratori |
| 2 semestre | Energy: source, conversion and storage with lab | | 9 | CHIM/02 | 48 ore Lezioni, 48 ore Laboratori |
| 2 semestre | Heterogeneous catalysis with lab | | 9 | CHIM/02 | 48 ore Lezioni, 48 ore Laboratori |
| 2° ANNO DI CORSO (da attivare a partire dall'a.a. 2015/16) Attività a scelta | | | | | |

FREE CHOICE COURSES

The student must earn 12 credits by choosing freely between all the teachings activated, offered by the University, provided they coherent with the educational project.

However, it is strongly recommended to use the teachings distinguishing or, as appropriate, of the Related and Integrative courses of Science Chemical unused in their class and consistent with the educational project.

ANNO DI CORSO NON DEFINITO Attività formative obbligatorie

| Erogazione | Attività formativa | Modulo/Unità didattica | Cfu | Settore | Form.Didatt. |
|------------------------|---------------------|------------------------|-----|----------|----------------|
| 2 semestre | English proficiency | | 3 | L-LIN/12 | 24 ore Lezioni |
| Totale CFU obbligatori | | | 3 | | |

Altre attività a scelta**TABLE 2 DISTINCTIVE COURSES**

Student must earn 24 CFU by selecting 4 of the following items

| | | | | | |
|------------|--|--|---|------------|----------------|
| 1 semestre | Concepts and methods in organic synthesis | | 6 | CHIM/06 | 48 ore Lezioni |
| 1 semestre | Industrial processes and scale-up | | 6 | CHIM/04 | 48 ore Lezioni |
| 2 semestre | Environmental control and sustainability management | | 6 | CHIM/12 | 48 ore Lezioni |
| 2 semestre | Metal corrosion and protection | | 6 | ING-IND/23 | 48 ore Lezioni |
| 2 semestre | Polymer chemistry | | 6 | CHIM/04 | 48 ore Lezioni |
| 2 semestre | Principles and applications of metallorganic chemistry | | 6 | CHIM/03 | 48 ore Lezioni |
| 2 semestre | Process development | | 6 | CHIM/04 | 48 ore Lezioni |
| 2 semestre | Recycle and life cycle assessment (LCA) of polymeric materials | | 6 | CHIM/04 | 48 ore Lezioni |
| 2 semestre | Synthetic methods in biotechnology <i>not enabled for the current academic year</i> | | 6 | CHIM/06 | 48 ore Lezioni |

INTEGRATIVE AND RELATED COURSES

Student must earn 12 CFU by selecting 2 of the following items following teachings related and integrative.

| | | | | | |
|------------|---------------------|--|---|---------|----------------|
| 2 semestre | Chemical safety | | 6 | IUS/07 | 48 ore Lezioni |
| 2 semestre | Medicinal chemistry | | 6 | CHIM/08 | 48 ore Lezioni |
| 2 semestre | Programming C | | 6 | INF/01 | 48 ore Lezioni |

Attività conclusive

| | | | | | |
|------------------------|------------------------------------|--|----|--|--|
| | Thesis work and Final dissertation | | 39 | | |
| Totale CFU obbligatori | | | 39 | | |