UNIVERSITY OF TRIESTE
ACADEMIC AND TEACHING REGULATIONS
for students enrolled in the academic year 2025/26

Master's degree programme in
Materials and Chemical Engineering for Nano, Bio, and Sustainable Technologies
Interclass degree programme – Classes LM-22 and LM-53

Art. 1 - Objective

1. These regulations define in detail the contents of the related General Regulations (*Ordinamento Didattico*) of the Master's degree programme in Materials and Chemical Engineering for Nano, Bio, and Sustainable Technologies, under art. 12, s. 1 of the Ministerial Decree no. 270/2004 on "Amendments to the regulation containing the rules concerning the teaching autonomy of universities".
2. The General Regulations and the organisation of the Master's degree are defined in respect of freedom of teaching and the rights and duties of lecturers and students.

Art. 2 - Contents of the Academic and Teaching Regulations

1. The Academic and Teaching Regulations define the implementation of the General Regulations of the degree course and its organisational aspects.
2. In accordance with art. 4, s. 2 of the Teaching Regulations of the University of Trieste, the Academic and Teaching Regulations define:
   a) the list of modules (and their scientific sector), divided by year and their partition into submodules, and other teaching activities;
   b) the method for carrying out laboratory and practical activities, and traineeships;
   c) the expected learning outcomes (see annex F), the number of university credits (ECTS) and any prerequisites for modules and other teaching activities, all divided by year;
   d) the curricula available to students and, where necessary, how to present the individual study plan;
   e) the provisions on any compulsory attendance and/or any alternative learning plan for student workers and/or disabled people;
   f) the entry requirements, the procedures to verify them at enrolment and any provisions on preparatory and supplementary activities aimed at fulfilling a conditional advancement;
   g) the procedure for admission to the final examination and graduation;
   h) the procedure for verification of knowledge of the foreign language at the required level;
   i) the possible use of English as the teaching language for some modules.

Art. 3 - Structure and organisation of the Master's degree programme

The following documents and regulations set the organisation and management of the degree course:

- University Charter;
- Teaching Regulations of the University;

- General Regulations of the Master's degree;
- List of taught modules and other teaching activities;
- Annual Study Plan.

Art. 4 - General Regulations of the Master's degree programme

1. The General Regulations set the structure and organisation of the Master's degree programme. In particular, they contain:
   a) the name and the ministerial class to which it belongs;
   b) the expected learning outcomes of the programme in agreement with the European qualification framework;
   c) career opportunities in relation to the activities listed by ISTAT;
   d) the plan of teaching activities in agreement with the provisions of the ministerial class to which the course belongs;
   e) the number of ECTS of all teaching activities;
   f) the entry requirements and the procedure to verify them at enrolment;
   g) the method for carrying out the final examination and graduation;
2. The General Regulations can be found in the SUA (*Scheda Unica Annuale*) statement of the programme.

Art. 5 - Plan of teaching activities

1. The plan of teaching activities specifies:
   a) the list of taught modules, their scientific sectors and other teaching activities;
   b) the sub-modules into which a module may be potentially subdivided and their scientific sectors;
   c) the number of ECTS of each module or teaching activity;
   d) any progression rules between modules;
2. The plan of teaching activities can be found in the SUA statement of the programme.

Art. 6 - Annual study plan

The annual study plan is updated annually and can be found in Annex A that is reported also in the SUA statement of the programme.

Art. 7 – Admissions

In order to be enrolled students must meet specific curricular requirements and must be adequately prepared. Details can be found in Annex B.

Art. 8 – Award of the degree

1. In order to graduate a student will have to acquire 120 ECTS.
2. Given that each year conventionally corresponds to 60 ECTS, the duration of the programme is two years.

3. The degree can be awarded in less than two years should the student has acquired all 120 ECTS included in their study plan.

Art. 9 - Structure of the Master's degree programme

1. The Master's degree programme entails the following types of teaching activities:
   a) core teaching activities (teaching activity of type B - TAF B);
   b) teaching activities related to the core ones, also with reference to cross-disciplinary training (TAF C);
   c) optional teaching activities (TAF D);
   d) teaching activities related to the final examination and linguistic knowledge (TAF E);
   e) teaching activities to improve linguistic knowledge, any traineeships, computer skills, telematic and relational skills, and all skills useful for the professional career (TAF F).
2. The number of ECTS assigned to each of the listed activities is specified in Annex A.
3. One ECTS corresponds to 25 hours of overall commitment per student. Usually, 1 ECTS corresponds to 8 hours of classroom teaching.

Art. 10 – Laboratory and practical activities, and traineeships

Such activities are promoted and coordinated by members of the Board of Studies. More details can be found in Annex C.

Art. 10bis - Foreign Languages

Verification of proficiency in spoken and written English, at least equivalent to level B2 of the Common European Framework of Reference for Language Proficiency, is part of the assessment of the applicant's personal preparation. This competence can be taken from the Curriculum studiorum or from an appropriate certificate issued by a qualified institution recognised as valid by the University. In all other cases, admission is verified by a test prepared by the University.

Art. 11 - Teaching activities preparing for the final examination

1. In agreement with its learning outcomes and assigned number of ECTS, the final examination is an extensive project or methodological work presented together with a report (Master's dissertation). The graduating student will have to prove through the dissertation that they master the topic, they can work independently and can communicate effectively. The topic needs to be pertinent to the traineeship or to issues studied throughout the programme and will be developed with the supervision of an academic staff (supervisor) and, if necessary, with the help of co-supervisors; the latter may be an academic staff of an external expert, especially if the dissertation is written during a traineeship to the premises of an external partner (either a company or an institution other than the University of Trieste).
2. The dissertation is presented and discussed during a pre-graduation examination in front of a Board nominated by the Head of Department. The Board consists of at least 3 members, one of which is the supervisor; others members can be either academic staff or external lecturers or experts. The committee assesses the content and the presentation and marks (maximum 30 marks).

3. The final mark of the Master's degree programme (a mark out of 110) is calculated through following formula:

$$L = \frac{110}{30} \frac{N_{cr} * E + n * P}{N_{cr} + n} + \Delta$$

with

$$\Delta = t + d + l + c \qquad \Delta = 0 \div 6$$

where

- N_{cr} sum of the number of ECTS of modules or teaching activities for which a mark is assigned;
- N number of ECTS of the final examination;
- E weighted average of the marks of modules or teaching activities for which a mark is assigned;
- P examination mark assigned by the Pre-graduation Board; □□

increment determined by:

- t type of dissertation, with t = 0; 1; 2
  (0: literature-review; 1: design, workshop; 2: research project);
- d duration of enrolment in the programme, with d = 0; 1
  (0: duration> 2.5 years (i.e. beyond the extraordinary session of Year 2); 1: all other cases);
- l value based on number of marks "30 *cum laude*", with l = 0; 1; 2
  (0: no. "30 cum laude" < 4; 1: 4 ≤ no. "30 cum laude" < 8; 2: no. "30 cum laude"≥ 8);
- c additional mark assigned by the Graduation Board, with c = 0; 1.

The final mark *L* is rounded off (e.g. 107.49 becomes 107 and 107.50 becomes 108).

4. The number of ECTS assigned to the final examination is specified in Annex A.

Art. 12 - Examination progression

1. In order to guarantee an appropriate teaching and learning path, the progression between examinations must be respected in accordance with the Teaching Regulations of the University.
2. The list of progression of examinations can be found in Annex D.

Art. 13 - Specific curricula

1. Within the programme, modules and teaching activities can be combined to offer specific curricula and to fulfil different cultural or professional needs.
2. Any specific curricula can be found in Annex A.

Art. 14 - Submission of an individual study plan

1. As an alternative to the regular procedure, a student can present an individual study plan for each academic year which includes from a minimum of 48 to a maximum of 84 ECTS, including those foreseen in the study plan of the student in the previous year and not yet acquired, with the constraint that the number of ECTS corresponding to modules or other teaching activities for which attendance has yet to be acquired should not exceed 60.
2. The Board of Studies may allow students to replace their modules with other modules offered from the University of Trieste or from other programmes of foreign Universities (either Bachelor's or Master's degrees) based on the coherence with the expected learning outcomes of the programme and the number of ECTS.

Art. 15 - Assessment

1. *Criteria for the arrangement of examination boards.* The examination board consists of two members: the module leader and another expert that can be either an academic staff or an expert of the subject. Non-academic staff experts are authorised by the Departmental Council. If the module is composed of two or more sub-modules with different leaders, they all must be part of the examination board.
2. *Assessment of taught modules and other teaching activities.* Assessment can take place with either ongoing tests or a final test to be held at the end of the module or activity.
3. *Recording of the mark for examination composed of multiple tests.* When an examination is composed of multiple tests, recording of the mark is performed only when the final mark is available.
4. *Rules for repeating failed examinations during the same academic year.* Students can repeat a failed examination in all the exam sessions of the academic calendar.

Art. 16 - Mandatory attendance

Attendance is not mandatory with the exception of any mandatory activities specified for each course.

Art. 17

Abrogated.

Art. 18 - Criteria for recording ECTS for activities and skills obtained prior to the enrolment

The Board of Studies can recognise a number of ECTS for activities performed or skills obtained prior to the enrolment to the Master's degree, if such activities are deemed coherent with the teaching activities and the expected learning outcomes of the programme as well as the duration, as specified in Annex E.

Art. 19 - Minimum number of ECTS to be acquired by the student in an established lapse

Any requirements

Art. 20 - Nature of these Regulations

These Regulations are defined as Academic and Teaching Regulations under art. 12 of the Ministerial Decree no. 270/2004.

Annexes

Ann. A: Annual study plan
Ann. B: Entry requirements
Ann. C: Traineeships
Ann. D: Progression rules
Ann. E: Recognition of previously-acquired skills or qualifications
Ann. F: Learning outcomes and teaching activities: tuning matrix

UNIVERSITÀ DEGLI STUDI DI TRIESTE

Dipartimento di Ingegneria e Architettura

"CORSO DI LAUREA MAGISTRALE INTERCLASSE" – MASTER DEGREE
MATERIALS AND CHEMICAL ENGINEERING FOR NANO, BIO, AND SUSTAINABLE TECHNOLOGIES
CLASS LM-22 R (CHEMICAL ENGINEERING) AND LM-53. (MATERIALS ENGINEERING)
PLAN OF STUDY
Academic Year 2025-2026

Students have the opportunity to pursue a personalized plan of study. There are two "curricula" with a total of **four main suggested study plans ("tracks")**:

- *Curriculum "Nanotechnology and Biotechnology"*
  - Track **"Materials Engineering for Nanotechnology and Biotechnology"**
  - Track **"Chemical Engineering for Nanotechnology and Biotechnology"**
- *Curriculum "Sustainable Industrial Technology"*
  - Track **"Materials Engineering for Sustainable Industrial Technology"**
  - Track **"Chemical Engineering for Sustainable Industrial Technology"**

Curriculum "Nanotechnology and Biotechnology"
Track: "Materials Engineering for Nanotechnology and Biotechnology"

1st year - 60 credits ("CFU")

Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Molecular simulation	**9**		ING-IND/24	B	9
Soft materials and release kinetics	**9**		ING-IND/24	B	9
Polymers and composites	**9**	Polymers and polymeric materials	ING-IND/22	B	6
		Composite materials	ING-IND/22	B	3
Biomateriali e Ingegneria tissutale (Italian)	**6**		ING-IND/34	C	6
Enzyme kinetics for nano and biotechnology	**6**		ING-IND/34	C	6
Molecular biology for engineering and nano-bio laboratory	**12**	Molecular biology for engineering	ING-IND/24	B	6
		Laboratory for nano-bio materials	ING-IND/24	B	6
Elective courses (*)	**9**			D	9

2nd year - 60 credits ("CFU")

Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Metallic materials and fracture mechanics	**6**		ING-IND/22	B	6
Materials characterization and data analysis	**9**	Data Analysis	CHIM/07	B/C**	6
		Spectroscopic methods for materials characterization	ING-IND/22	B	3
Advanced materials science	**9**	Physics of materials and radiation - matter interaction	FIS/03	B/C**	6
		Physical properties of materials	ING-IND/22	B	3
Nanomaterials for nano-bio technologies	**6**		ING-IND/24	B	6
Ceramic materials and materials characterization laboratory	**9**		ING-IND/22	B	9
Elective courses (*)	**6**			D	6
One activity between the following two:	**3**				
Italian language (mandatory if the student does not have a B2 level in Italian)				F	3
OR					
Internship				F	3
Final thesis[3]	**12**			E	12

Curriculum Nanotechnology and Biotechnology **Track: "Chemical Engineering for Nanotechnology and Biotechnology"**					
1st year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Molecular simulation	**9**		ING-IND/24	B	9
Soft materials and release kinetics	**9**		ING-IND/24	B	9
Polymers and composites	**9**	Polymers and polymeric materials	ING-IND/22	B	6
		Composite materials	ING-IND/22	B	3
Biomateriali e Ingegneria tissutale (Italian)	**6**		ING-IND/34	C	6
Enzyme kinetics for nano and biotechnology	**6**		ING-IND/34	C	6
Molecular biology for engineering and nano-bio laboratory	**12**	Molecular biology for engineering	ING-IND/24	B	6
		Laboratory for nano-bio materials	ING-IND/24	B	6
Elective courses (*)	**9**			D	9

2nd year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Metallic materials and fracture mechanics	**6**		ING-IND/22	B	6
Process design and control	**9**		ING-IND/24	B	9
Chemical and biochemical reaction engineering	**9**	Chemical Reaction Engineering	ING-IND/24	B	6
		Biochemical Reactors	CHIM/04	B/C**	3
Nanomaterials for Nano-Bio Technologies	**6**		ING-IND/24	B	6
Sustainable industrial chemistry	**9**		CHIM/04	B/C**	9
Elective courses (*)	**6**			D	6
Other activities between the following two:	**3**				
Italian language (mandatory if the student does not have a B2 level in Italian)				F	3
OR					
Internship				F	3
Final thesis[3]	**12**			E	12

Curriculum "Sustainable Industrial Technology" **Track: "Materials Engineering for Sustainable Industrial Technology"**					
1st year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Molecular simulation	**9**		ING-IND/24	B	9
Soft materials and release kinetics	**9**		ING-IND/24	B	9
Polymers and composites	**9**	Polymers and polymeric materials	ING-IND/22	B	6
		Composite materials	ING-IND/22	B	3
Materials, systems and critical raw materials for the energy transition	**12**	Materials for the energy transition	ING-IND/22	B	3
		Systems for the energy transition	ING-IND/31	C	3
		Strategic and critical raw materials	CHIM/07	B/C**	3
		Substitution of critical materials	ING-IND/22	B	3
Renewable Energy Technologies	**6**		ING-IND/09	C	6
Hydrogen and fuel cells	**6**		ING-IND/08	C	6
Elective courses (*)	**9**			D	9

2nd year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF[4]*	*Module CFU*
Metallic materials and fracture mechanics	**6**		ING-IND/22	B	6
Materials characterization and data analysis	**9**	Data Analysis	CHIM/07	B/C**	6
		Spectroscopic methods for materials characterization	ING-IND/22	B	3
Advanced materials science	**9**	Physics of materials and radiation - matter interaction	FIS/03	B/C**	6
		Physical properties of materials	ING-IND/22	B	3
Design for sustainability of products and processes	**6**	Design for sustainability of processes and LCA	ING-IND/24	B	3
		Sustainable materials: selection and design	ING-IND/22	B	3
Ceramic materials and materials characterization laboratory	**9**		ING-IND/22	B	9
Elective courses (*)	**6**			D	6
Other activities between the following two:	**3**				
Italian language (mandatory if the student does not have a B2 level in Italian)				F	3
OR					
Internship				F	3
Final thesis[3]	**12**			E	12

Curriculum "Sustainable Industrial Technology" **Track: "Chemical Engineering for Sustainable Industrial Technology"**					
1st year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF*[4]	*Module CFU*
Molecular simulation	**9**		ING-IND/24	B	9
Soft materials and release kinetics	**9**		ING-IND/24	B	9
Polymers and composites	**9**	Polymers and polymeric materials	ING-IND/22	B	6
		Composite materials	ING-IND/22	B	3
Materials, systems and critical raw materials for the energy transition	**12**	Materials for the energy transition	ING-IND/22	B	3
		Systems for the energy transition	ING-IND/31	C	3
		Strategic and critical raw materials	CHIM/07	B/C**	3
		Substitution of critical materials	ING-IND/22	B	3
Renewable Energy Technologies	**6**		ING-IND/09	C	6
Hydrogen and fuel cells	**6**		ING-IND/08	C	6
Elective courses (*)	**9**			D	9

2nd year - 60 credits ("CFU")					
Course	*Total CFU*	*Module*	*Disciplinary area (SSD)*	*TAF*[4]	*Module CFU*
Metallic materials and fracture mechanics	**6**		ING-IND/22	B	6
Process design and control	**9**		ING-IND/24	B	9
Chemical and biochemical reaction engineering	**9**	Chemical Reaction Engineering	ING-IND/24	B	6
		Biochemical Reactors	CHIM/04	B/C**	3
Design for sustainability of products and processes	**6**	Design for sustainability of processes and LCA	ING-IND/24	B	3
		Sustainable materials: selection and design	ING-IND/22	B	3
Sustainable Industrial Chemistry	**9**		CHIM/04	B/C**	9
Elective courses (*)	**6**			D	6
Other activities between the following two:	**3**				
Italian language (mandatory if the student does not have a B2 level in Italian)				F	3
OR					
Internship				F	3
Final thesis[3]	**12**			E	12

(*) In the study plan, the student must register for elective courses (TAF D). Courses listed in any of the tracks not selected by the student, as well as the ones listed in the group "Elective Courses" below require no specific approval as elective courses, i.e. students can add them directly through the online system "esse3". The student can propose other elective courses, but they are subject to approval. The student cannot enroll in an elective course if s/he has already given the same or equivalent exam in previous courses of study.

(*) ELECTIVE COURSES (automatically approved)			
Course	*Disciplinary area (SSD)*	*TAF[4]*	*CFU*
Computational fluid dynamics and heat transfer	ING-IND/10	D	9
Elementi di termofluidodinamica per le macchine - IN ITALIAN	ING-IND/06	D	9
La sicurezza ed igiene negli ambienti di lavoro - IN ITALIAN	ING-IND/35	D	6
Tecnologia meccanica - IN ITALIAN	ING-IND/16	D	6
Impianti di abbattimento delle emissioni - IN ITALIAN	ING-IND/17	D	6
Modellazione solida - IN ITALIAN	ING-IND/15	D	3
Progettazione meccanica con materiali avanzati e additive manufacturing - IN ITALIAN	ING-IND/14	D	6
Proprietà e applicazioni dei materiali con laboratorio - IN ITALIAN	ING-IND/22	D	9
Metallurgia e corrosione con laboratorio - IN ITALIAN	ING-IND/22	D	9
Meccanica applicata alle macchine - IN ITALIAN	ING-IND/13	D	6
Termodinamica - IN ITALIAN	ING-IND/24	D	9
Ingegneria dei processi di separazione - IN ITALIAN	ING-IND/24	D	9
Fenomeni di trasporto - IN ITALIAN	ING-IND/24	D	9
Scienza delle costruzioni - IN ITALIAN	ICAR/08	D	9
Fondamenti di fisica delle superfici - IN ITALIAN	FIS/03	D	6
Energie rinnovabili – IN ITALIAN	CHIM/04	D	6

EVALUATION

The level of knowledge will be evaluated by oral and/or written exams, as detailed by each instructor in the syllabus and at the beginning of the course.

IMPORTANT NOTES FOR THE STUDENT

1. The master degree ("Laurea magistrale") in Materials and Chemical Engineering for Nano, Bio, and Sustainable Technologies is an **interclass degree** ("corso di Laurea interclasse"), i.e. it can be conferred in one of two different "degree classes" of the Italian system ("classi di laurea"): either Chemical Engineering (LM-22), or Materials Engineering (LM-53). **The student is required to choose the degree class before the beginning of the second year.**
2. Additional personalization beyond the proposed plans of study can be possible; in this case, students are required to consult with the coordinator in order to design a plan of study in line with the degree class selected and with the student's inclination.
3. The "Final Thesis" consists of an original and independent work in the field of materials engineering and/or chemical engineering. It can take the form of an extensive analysis of the scientific literature on a current relevant topic, or a design project, or a research project based on experiments, theory, or computational simulation. The work can be carried out entirely at the University of Trieste and/or in collaboration with other universities, research centers, and industries – both domestic and international.
4. Courses are classified according to the "Type of Educational Activity" ("TAF"):

   TAF B = characterizing courses
   TAF C = complementary courses
   TAF D = elective courses
   TAF E = final thesis
   TAF F = other educational activities

   (**) Courses marked as "TAF B/C" are "characterizing" for one class and "complementary" for the other.

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"CORSO DI LAUREA MAGISTRALE INTERCLASSE" – MASTER DEGREE

MATERIALS AND CHEMICAL ENGINEERING FOR NANO, BIO, AND SUSTAINABLE TECHNOLOGIES

CLASS LM-22 (CHEMICAL ENGINEERING) AND LM-53 (MATERIALS ENGINEERING)

ATTACHMENT B

CURRICULAR REQUIREMENTS

for students enrolling in the first year of the degree program in 2025/26

Curricular requirements

In order to be admitted to the Master's Degree program, candidates must hold a three-year bachelor's degree (e.g. "laurea") or a master's degree (e.g. "laurea specialistica" or "laurea magistrale"), a five-year degree (e.g. "laurea a ciclo unico"), or another qualification obtained abroad that is recognized as equivalent and suitable, which ensures that the student has adequate preparation to undertake the degree program. Knowledge equivalent to that expected from the general educational objectives of the Industrial Engineering Degrees (e.g., for applicants with an Italian degree: Class 10 of DM509/1999 and Class L-9 of DM270/2004) is considered sufficient.

In general, to be considered sufficient as an admission requirement for the program, the student's previous studies must have provided:

- A solid foundation in mathematics, physics, and chemistry. Specifically, for degrees or diplomas obtained in Italy, the student must have acquired a minimum of 30 ECTS (European Credit Transfer and Accumulation System) in the scientific-disciplinary sectors (SSD) of the basic subjects MAT/03, MAT/05, MAT/06, MAT/07, MAT/08, FIS/01, FIS/02, FIS/03, CHIM/03, CHIM/07. For qualifications obtained abroad, the Course Council will evaluate the equivalence of the student's preparation in mathematics, physics, and chemistry based on the study curriculum.

- A basic preparation in the fundamental areas of materials science and technology, and of chemical engineering. Specifically, for degrees or diplomas obtained in Italy, the student must have acquired at least 24 ECTS in the scientific-disciplinary sectors (SSD) ING-IND/16, ING-IND/21, ING-IND/22, ING-IND/23, ING-IND/24, ING-IND/25, ING-IND/26, ING-IND/27, ICAR/08. For qualifications obtained abroad, the Course Council will evaluate the

equivalence of the student's preparation in materials science and technology and chemical engineering based on the study curriculum.

In particular cases, the Course Council will assess the equivalence, with respect to the minimum requirements, of the knowledge acquired by the candidate even if they do not belong to the indicated scientific-disciplinary sectors.

Adequacy of previous knowledge

The Course Council verifies the adequacy of the personal preparation of students who have applied for admission to the program and meet the aforementioned curricular requirements. This verification is conducted, in accordance with the academic regulations, based on the applicant's curriculum vitae and, if necessary, through an oral examination, which consists of an interview with a Committee appointed by the Course Council and composed of faculty members affiliated with the program.

For admission to the program, a level of English proficiency of at least B2 according to the Common European Framework of Reference for Languages, or an equivalent level, is required. The adequacy of the linguistic preparation can be verified through the presence of any certifications or through an oral interview.

The verification can result in one of the following outcomes:

- Unconditional admission;
- Conditional admission subject to the acceptance of specific requirements;
- Rejection of the admission application with a justification and recommendations on how to acquire the missing requirements.

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CLASS LM-22 (CHEMICAL ENGINEERING) AND LM-53 (MATERIALS ENGINEERING)

ATTACHMENT C

LABORATORY ACTIVITIES AND INTERNSHIPS

for students enrolling in the first year of the degree program in 2025/26

Laboratory, practical activities, and internships are promoted and coordinated by the instructor responsible for the related educational activity.

In particular, the internship activity (area F) — which is supervised by a tutor and appropriately documented — is subject to the evaluation of a dedicated committee composed of the tutor and another faculty member. The activity is awarded 3 ECTS if it corresponds to a minimum of 75 hours, 6 ECTS if it corresponds to a minimum of 150 hours, or 9 ECTS if it corresponds to a minimum of 225 hours. Before starting an internship, the student must contact the Department of Engineering and Architecture's Academic Office, which will issue insurance coverage and arrange for the signing of an appropriate agreement.

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CLASS LM-22 (CHEMICAL ENGINEERING) AND LM-53 (MATERIALS ENGINEERING)

ATTACHMENT D

PREREQUISITES

for students enrolling in the first year of the degree program in 2025/26

No prerequisites are required.

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CLASS LM-22 (CHEMICAL ENGINEERING) AND LM-53 (MATERIALS ENGINEERING)

ATTACHMENT E

GENERAL CRITERIA FOR THE RECOGNITION OF CREDITS FOR ACTIVITIES COMPLETED OR COMPETENCIES ACQUIRED PRIOR TO ENROLLMENT IN THE STUDY PROGRAM

for students enrolling in the first year of the degree program in 2025/26

The Course Council decides on the recognition of credits acquired prior to enrollment in the study program based on the alignment of the educational and/or training activities with the educational objectives of the program and the correspondence of the respective academic workloads.

EXPECTED LEARNING RESULTS																								
Learning Areas	Dublin Descriptors	Details of descriptors	Molecular Simulation	Advanced Materials Science	Chemcial and Biochemical Reaction Engineering	Soft Materials and Release Kinetics	Ceramic Materials and materials characterization laboratory	Molecular Biology for Engineering and Nano-Bio Laboratory	Materials, systems and critical raw materials for the energy transition	Biomateriali e Ingegneria Tissutale	Hydrogen and Fuel Cells	Polymeric and Composite Materials	Sustainable Industrial Chemistry	Metallic Materials and Fracture Mechanics	Materials Characterization and Data Analysis	Process Dynamics and Control	Nanomaterials for Nano&Biotechnologies	Tecnologia delle energie rinnovabili	Enzyme Kinetics for Nano and Biotechnology	Design for Sustainability of Products and Processes	Altre attività	conoscenza lingua straniera	prova finale
Fundamentals	Knowledge and understanding	fundamental atomic and molecular characteristics and process- structure-properties relationships	x	x	x	x	x	x				x	x	x	x		x		x				
		theories of the main physical and chemical phenomena in the area of materials and processes	x	x	x	x	x	x	x			x	x	x	x	x	x		x				
		modeling of phenomena and structures	x	x	x	x	x		x			x	x	x		x	x		x				
	Applying knowledge and understanding	analysis of complex processes			x	x		x			x		x			x			x				x
		analyis of the materials behavior	x	x		x	x	x	x	x		x		x	x		x						x
		design of experimental campaigns, data analysis, data interpretation					x	x	x						x								x
		failure analysis					x					x		x									
Industrial Technology	Kknowledge and understanding	selection and design of materials	x				x		x	x		x		x			x			x			
		production and properties of materials					x		x	x		x	x	x			x	x		x			
		process design and control			x								x			x							
		process design and optimization			x								x			x							
	Applying knowledge and understanding	selecting materials for specific applications					x		x	x		x		x						x			x
		devising and designing materials for specific applications	x				x		x	x		x		x			x	x		x			x
		characterizing materials		x			x	x	x			x			x		x						x
		devising and designing processes for specific applications			x								x			x							x
		optimizing and controlling processes			x								x			x							x
Nanotechnology and Biotechnology	Knowledge and understanding	modeling, simulation, design of nano- and biosystems	x		x												x						
		characterization techniques and analysis of nano- and biosystems	x				x		x						x		x						
		applications of nano- and biomaterials	x			x		x		x							x		x				
	Applying knowledge and understanding	designing nanosystems and biosystems	x														x						x
		simulating and understanding nanosystems and biosystems	x			x	x	x	x	x					x		x		x				x
Technology for Sustainability	Knowledge and understanding	sustainability criteria and indicators							x		x		x			x		x		x			
		selection and design of materials with sustainability criteria							x			x								x			
		analysis and design of processes with sustainability criteria			x						x		x			x				x			
		life cycle assessment																		x			
	Applying knowledge and understanding	analyzing the life cycle of materials, processes, products											x							x			x
		selecting, devising, designing materials and processes with sustainability criteria			x				x			x	x			x		x		x			x
Transversal competence *(section A4.c SUA-CdS)*	Making judgements	evaluation of the appropriateness of solutions for materials and processes in specific industrial environments	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x		x			x
		devising innovative materials, processes and approaches	x	x	x	x	x	x	x			x	x	x	x	x	x			x			
	Communication skills	communicating the assumptions and context of specific analyses, experimentations, simulations in a precise, rigorous, clear way	x	x	x	x	x	x	x			x	x		x	x	x		x	x		x	
		communicating the results of specific analyses, experimentations, simulations in a precise, rigorous, clear way	x				x	x	x						x		x			x			x
		communicating the conclusions of specific analyses, experimentations, simulations in a precise, rigorous, clear way	x				x	x	x						x		x			x			x
		communicating in English in a precise, rigorous, clear way	x	x	x	x	x		x	x		x	x	x	x	x	x			x		x	x
	Llearning skills	analytic learning	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
		learning through problem solving	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x
		flexible and adaptable learning	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x