



#### DIDACTIC REGULATIONS FOR THE DEGREE COURSE

#### **BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY**

## CLASS L-2

#### School: Polytechnic School and Basic Sciences

#### **Department: Chemical Sciences**

#### Regulations in force for the academic year 2023-2024

	ACRONYMS	
CCD	[Commissione di Coordinamento Didattico]	Didactic Coordination Commission
CdS	[Corso/i di Studi]	Degree Course
CPDS	[Commissione Paritetica Docenti-Studenti]	Joint Teachers-Students Committee
OFA	[Obblighi Formativi Aggiuntivi]	Additional Educational Obligations
SUA-CdS	[Scheda Unica Annuale del Corso di Studi]	Annual Single Course Schedule
RDA	[Regolamento Didattico di Ateneo]	University Didactic Regulations

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#### **Art. 1**

#### Object

1. These Regulations govern the organisational aspects of the Course of Studies in Biomolecular and Industrial Biotechnology (Biotecnologie Biomolecolari e Industriali) (class L-2). The Course of Studies in Biomolecular and Industrial Biotechnology belongs to the Department of Chemical Sciences and is held in Italian.

2. The CdS is governed by the Didactic Coordination Commission (CCD), pursuant to Art. 4 of the RDA.

3. The Rules are issued in compliance with the relevant legislation in force, the Statute of the University of Naples Federico II and the University Didactic Regulations.

#### Art. 2

#### Learning objectives

The course aims to train graduates who, in addition to an adequate basic knowledge in the different fields of biotechnology, have knowledge that allows them to operate in industrial/social contexts characterized by the production/use of many categories of products falling within the scope of industrial biotechnology.

The student will acquire the theoretical and experimental notions of the disciplines aimed at understanding and managing the molecular and industrial applications of biotechnology. The graduate will then be able to carry out the activities of the chemical technician (ISTAT code 3.1.1.2.0), biochemical laboratory technician (3.2.2.3.1) and technician of conducting and controlling chemical plants (3.1.4.1.2). The graduate will be able to work in biotechnology analysis laboratories, in particular for industrial purposes. For example, the control laboratories of the biotechnology industries.

The CdS is structured in three years, each divided into two semesters: from the first to the sixth semester the student progressively matures the fundamental knowledge for the construction of the professional profile, from the acquisition of the fundamentals of scientific subjects (mathematics, physics and chemistry), to the subjects of biology (biology, molecular biology, genetics, microbiology, biochemistry), to specific subjects (fundamentals of industrial processes, analytical chemistry, cellular biotechnology, industrial microbiology) with a structure that allows the student to mature in a first phase the various basic concepts and then acquire in a second phase the most advanced aspects. In this second phase, the student will increase the knowledge framework of other disciplines starting from the basic concepts. As an example, the path of chemistry, which develops from the first semester ("General Chemistry"), expands to the second semester ("Organic Chemistry") and finalizes to the biological field in the third semester ("Biochemistry" and "Molecular Biotechnology") and the analytical aspects in the fifth semester ("Bioanalytical Chemistry"); the biological path, which develops from the first year ("Biology", "Genetics") to expand with the "Molecular Biology" in the third semester and complete with the "Molecular Biology" and the "Applied Genetics" on the sixth; the path of industrial development, which starts from the fourth semester ("Microbial Biotechnology", "Principles of Bioprocesses Engineering") to expand to the fifth ("Introduction to Biotechnological Plants", "Industrial Enzymology"). Of relevance is the teaching of "Perception and ethics of industrial biotechnology" which addresses the social and bioethical issues related to biotechnology. Fundamental in the cultural growth of the student is the internship scheduled in the last semester. During the Internship the student has the opportunity to apply the concepts acquired during the course of studies in a research chain in groups that carry out activities in the biotechnology field at the University or in institutions or companies. The large window provided for the acquisition of ECTs at the student's own choice finally allows him to direct the preparation according to her/his cultural needs and complete her/his preparation also in function of the continuation of her/his university studies. By this way, the student will have a solid preparation for the continuation of studies in the Master Degree in Molecular and Industrial Biotechnology. The appropriate choice of courses will also allow you to acquire the skills necessary for enrolling in other Master's Degree Programmes in Biotechnology.

#### Art. 3

#### **Professional profile and work opportunities**

The Degree Course in Biomolecular and Industrial Biotechnology (L-2 degree class) is aimed at preparing the figure of the Industrial Biotechnologist. Through a concrete multidisciplinary and formative path, the technical-scientific skills for the use of biological systems, interpreted in a molecular and cellular key, are provided to design and produce new biotechnological products and to develop new eco-systems compatible. The graduate will be able to work in various biotechnological fields, such as industry, environmental, molecular and scientific communication.

Function in a work context:

Graduates will find a job as technicians with mainly executive functions in research and development laboratories in public and private bodies and in the chemical, pharmaceutical, food and biotechnology industries. In particular, they will be able to perform technical functions in the chemical industry for the production of intermediates and products for fine chemistry, in the industry for environmental rehabilitation for the management of bioremediation processes, in the fermentative industry for the production of primary and secondary metabolites. In addition, graduates will be able to work in research and service centers for the development and use of molecular diagnostic kits, for the validation and analysis of biotechnological products, for the provision of services related to the main methodologies of biotechnological analysis and process technologies, for the detection of genetically modified organisms in the agro-food supply chain and in the environment.

Skills associated with the function:

Thanks to the multidisciplinarity of the training offered by the CdS, the graduate will acquire the spectrum of theoretical and practical skills necessary to perform the technical functions mentioned above. In particular, the acquired skills in chemistry and biotechnology of fermentation, biochemistry, molecular biology and genetics, process technologies, thermodynamics and transport phenomena, Industrial enzymology and microbiology will provide the graduate with the necessary tools to perform the above-mentioned functions.

Job opportunities in the sector:

Technical operator in research and development laboratories in public and private entities, in the chemical, pharmaceutical, food, biotechnological industries and in public and private service centres for biotechnology. The following professions have been selected from the list in the database. However, this list does not cover the specific professions of the graduate of the "L-2 Biotechnology" class. Therefore, these professions must be integrated with the profiles explained above.

#### Art. 4

#### Admission requirements and knowledge required for access to the Degree Course<sup>1</sup>

The general knowledge required to be admitted to the degree programme is that resulting from the achievement of an upper secondary school diploma or other qualifications obtained abroad and recognised as eligible. In particular, a student who accesses the CdS requires:

1. ability to verbally understand a written text with autonomous ability to rework and synthesis;

2. good logical and methodological skills necessary both to address the learning of the frontal lessons and practical exercises of the CdS and in personal study;

3. basic knowledge of general and inorganic chemistry, general physics, mathematics, biology with regard to the contents of the programmes in force in secondary education institutions, including elements of computer science.

In this context, the minimum knowledge for access to CdS are:

- mathematical notions: main properties of numerical sets; rational equations; Cartesian coordinate systems; decimal and natural logarithms; basic elements of analytical geometry and trigonometry;

- notions of physics: fundamentals of mechanics. Form, mass and weight; action and reaction. Elements of optics and electromagnetism;

- notions of chemistry: matter and states of aggregation, structure of the atom, classification of elements, chemical compounds, elements of organic chemistry (the main functional groups). Basic knowledge of the main molecules of biological interest (sugars, lipids, proteins, nucleic acids);

- notions of biology: fundamental properties of living organisms, prokaryotes and eukaryotes, structure of eukaryotic cells, elementary notions of metabolism and function of enzymes.

It is also believed that basic knowledge of the English language is necessary in terms of the ability to understand a written text and the knowledge of elementary notions on the use of the main widely used computer programs.

The knowledge required for access will be verified by means of assessment tests with methods that are defined in the teaching regulations of the course of study also according to the possible local programming of access. The details of the method of verification of knowledge and information about specific additional training obligations, to be met in the first year of the course in the case of non-positive verification, are reported in the teaching regulations of the course of study.

<sup>&</sup>lt;sup>1</sup> Artt. 7, 10, 11 of the University Didactic Regulations. January 2023

#### **Procedures for access to the Degree Course**

Admission to the Degree Programme is scheduled annually by the University's Organizational Structures. The maximum number of students admitted is annually decided by the Structures by May. The knowledge required for access - normally reported in the section Orientation in Input of the site of the CdS - will be verified by means of admission tests with modalities that are defined in the notice of competition published every year by July.

Detailed information on the admission test are published on the website of the University and on the website of the CdS.

In the event of negative assessment of the adequate initial preparation regarding knowledge requirements for admission to the Degree Course, the Didactic Coordination Commission assigns specific Additional Formative Obligations (OFAs), indicating the means of verification to be fulfilled within the first year of the course.

#### Art. 6

#### **Teaching activities and Credits**

Each educational activity prescribed by the degree system is measured in Credits (ECT). Each Credit corresponds to 25 hours of work<sup>2</sup> per student and includes the hours of assisted teaching and the hours reserved for personal study or other individual training activities.

For the Degree Course covered by these Regulations, the hours of assisted teaching for each ECT, established in relation to the type of training activity, are as follows <sup>3</sup>:

- Lecture: 8 hours for ECT;
- Seminar: 4 hours for ECT;
- Guided teaching exercises: 12 hours per ECT;
- Laboratory activities: 12 hours per ECT;
- Internship: 25 hours for ECT 4.

The ECT corresponding to each learning activity is acquired by the student by satisfying the assessment procedures (examination, pass mark) indicated in the Schedule relating to the course/activity attached to these Regulations.

<sup>&</sup>lt;sup>2</sup> According to Art. 5, c. 1 of Italian Ministerial Decree No 270/2004, "25 hours of total commitment per student correspond to university training credits; a ministerial decree may justifiably determine variations up or down the aforementioned hours for individual classes, within the limit of 20 per cent".

<sup>&</sup>lt;sup>3</sup> The number of hours considers the instructions in Art. 6, c. 2 of the RDA: "of the total 25 hours, for each ECT, are reserved: a) 5 to 10 hours for lectures; b) 6 to 10 hours for seminars; c) 8 to 12 hours for laboratory activities, except in the case of training activities with a high experimental or practical content, and subject to different legal provisions or different determinations by DD.MM.".

<sup>&</sup>lt;sup>4</sup> For Internship activities (Inter-ministerial Decree 142/1998), subject to further specific provisions, the number of working hours equal to 1 ECT may not be less than 25. [please indicate below in the note any different regulatory provisions, e.g., "LM-13: 1 ECT = 30 hours, Note MUR, Director Cuomo, Prot. 570/2011; LM-51, L-24: 1 CFU = 20 hours professional training activity + 5 hours of further supervised training activity, D.M. 654/2022 (Art. 2, practical-assessment Internship)"] 5 January 2023

#### Art. 7

#### **Description of teaching methods**

Teaching is carried out in a conventional way.

If necessary, the CCD decides which class may also include teaching activities offered online.

Some lectures may also take place in seminar form and/or involve classroom exercises, language and computer laboratories.

Detailed information on how each course is done can be found on the course website.

## Art. 8

# **Testing of learning activities<sup>5</sup>**

1. The Didactic Coordination Commission, within the regulatory limits laid down<sup>6</sup>, establishes the number of examinations and other means of assessment that determine the acquisition of credits. Examinations are individual and may consist of written, oral, practical, graphical tests, term papers, interviews or a combination of these modes.

2. The examination procedures published in the teaching schedules and the examination schedule will be made known to students before the start of classes on the Department's website.

3. Examinations are held subject to booking, which is made electronically. In the event that the student is unable to book an exam for reasons that the President of the Board considers justified, the student may still be admitted to the examination, following the other booked students.

4. Before the examination, the President of the Board of Examiners verifies the identity of the student, who must present a valid photo ID.

5. Examinations are marked out of 30. Examinations involving an assessment out of 30 shall be passed with a minimum mark of 18; a mark of 30 may be accompanied by honours by unanimous vote of the Board. Examinations are marked out of 30 or with a simple pass mark. Assessment following tests other than examinations are marked out with a simple pass mark.

6. Oral exams are open to the public. If written tests are scheduled, the candidate has the right to see his/her paper(s) after correction.

7. Examination Boards are governed by the University Didactic Regulations.

## Art. 9

## **Course structure and syllabus**

1. The legal duration of the Degree Course is 3 years. It is also possible to enrol on the basis of a contract in accordance with the rules laid down by the University (Art. 21 of the University Didactic Regulations).

<sup>&</sup>lt;sup>5</sup> Article 20 of the University Didactic Regulations.

<sup>&</sup>lt;sup>6</sup> Pursuant to the DD.MM. 16.3.2007 in each Degree Course the examinations or profit tests envisaged may not be more than 20 (bachelor's degrees; Art. 4. c. 2), 12 (master's degrees; Art. 4, c. 2), 30 (five-year single-cycle degrees) or 36 (six-year single-cycle degrees; Art. 4, c. 3).

The student must acquire 180 ECTs<sup>7</sup>, attributable to the following Types of Educational Activities (TAF):

A) basic, 63

B) characterising, 60

C) related or complementary, 18

D) at the student's choice<sup>8</sup>, 18

E) for the final exam, 11

F) further training activities, 10.

2. The degree is awarded after having acquired 180 ECTs by passing examinations, not exceeding 20, and the performance of the other educational activities.

3. Unless otherwise provided for by the legal system of university studies, examinations taken as part of basic, characterising and related or supplementary activities, as well as activities chosen autonomously by the student (TAF D, counted in the number of one<sup>9</sup>) are taken into consideration for counting purposes. Tests constituting an assessment of suitability for the activities referred to in Article 10, paragraph 5, letters c), d) and e) of Ministerial Decree 270/2004 are excluded from the count. Integrated courses comprising two or more modules are subject to a single examination.

4. In order to acquire the ECTs relating to independent choice activities, the student is free to choose from all the courses offered by the University, provided that they are consistent with the training project. This consistency is assessed by the Didactic Coordination Commission. Also for the acquisition of the ECTs relating to autonomous choice activities the "passing of the exam or other form of profit verification" is required (Art. 5, c. 4 of Ministerial Decree 270/2004<sup>10</sup>).

5. The study plan summarises the structure of the course, listing the envisaged teachings broken down by course year and, if necessary, by curriculum. At the end of the study plan table the propedeuticities envisaged by the course are listed. The plan of studies offered to students, with an indication of the scientific-disciplinary sectors and the area to which they belong, of the credits, of the type of teaching activity, is set out in Annex 1 to these Regulations.

<sup>&</sup>lt;sup>7</sup> The total number of ECTs for the acquisition of the relevant degree must be understood as follows: six-year singlecycle degree, 360 ECTs; five-year single-cycle degree, 300 ECTs; three-year degree, 180 ECTs; master's degree, 120 ECTs. <sup>8</sup> Corresponding to at least 12 ECTs for three-year degrees and at least 8 ECTs for master's degrees (Art. 4, c. 3 of Ministerial Decree 16.3.2007).

<sup>&</sup>lt;sup>9</sup> Art. 4, c. 2 of Annex 1 to Ministerial Decree 386/2007.

<sup>&</sup>lt;sup>10</sup> Art. 10, c. 5 of Ministerial Decree. 270/2004: "In addition to the qualifying educational activities, as provided for in paragraphs 1, 2 and 3, Degree Courses shall provide for: a) educational activities autonomously chosen by the student as long as they are consistent with the training project [TAF D]; b) educational activities in one or more disciplinary fields related or complementary to the basic and characterising ones, also with regard to context cultures and interdisciplinary training [TAF C]; c) educational activities related to the preparation of the final exam for the achievement of the degree and, with reference to the degree, to the verification of the knowledge of at least one foreign language in addition to Italian [TAF E]; d) training activities, not envisaged in the previous points, aimed at acquiring additional language knowledge, as well as computer and telematic skills, relational skills, or in any case useful for integration in the world of work, as well as training activities aimed at facilitating professional choices, through direct knowledge of the work sector to which the qualification may give access, including, in particular, training and guidance courses referred to in Decree no. 142 of 25 March 1998 of the Ministry of Labour [TAF F]; e) in the hypothesis referred to in Article 3, paragraph 5, training activities relating to internships and apprenticeships with companies, public administrations, public or private entities including those of the third sector, professional orders and colleges, on the basis of appropriate agreements". January 2023 7

#### Art. 10

#### Attendance requirements<sup>11</sup>

1. In general, attendance of lectures is strongly recommended but not compulsory.

In view of the type of educational organisation provided for in this Regulation, compulsory attendance at all training activities may be required. In particular, for courses that include laboratory activities, attendance at least 70% of them is a prerequisite for access to the evaluation.

For courses in which the verification of profit includes ongoing assessments, with tests to be carried out during the course, the prerequisite to access the assessment is to have carried out at least 70% of the tests.

2. If the lecturer envisages a different syllabus modulation for attending and non-attending students, this is indicated in the individual Teaching Schedule published on the course web page and on the teachersUniNA website.

3. Attendance at seminar activities that award training credits is compulsory. The relative modalities for the attribution of ECTs are the responsibility of the CCD.

#### Art. 11

#### Prerequisites and prior knowledge

1. The list of incoming prerequisites (necessary to sit a particular examination) and outgoing prerequisites can be found at the end of Annex 1 and in the Teaching Schedule (Annex 2).

2. Any prior knowledge deemed necessary is indicated in the individual Teaching Schedule published on the course webpage and on theUniNA teaching website.

#### Art. 12

#### **Course Calendar**

The course calendar is available on the Department's website and on the CdS's website prior to the beginning of classes.

#### Art. 13

#### Guidelines for the recognition of credits earned in other Courses in the same Class<sup>12</sup>

For students coming from Courses in the same Class, or simultaneously enrolled in Degree Courses of the same Class, the Didactic Coordination Commission shall ensure the recognition of the highest possible number of credits acquired by the student at the Course of origin and/or simultaneously attended, according to the criteria set out in Article 14 below. Failure to recognise credits must be adequately justified. This is without prejudice to the fact that the number of credits relating to the same scientific-disciplinary sector directly recognised to the student may not be less than 50% of those already achieved.

<sup>&</sup>lt;sup>11</sup> Art. 20, c. 8 of the University Didactic Regulations.

<sup>&</sup>lt;sup>12</sup> Art. 16 of the University Didactic Regulations.January 2023

# Article 14

Guidelines for the recognition of credits acquired in Degree Courses of different classes, in university or university-level Degree Courses, through single courses, at online Universities and in international Degree Courses<sup>13</sup>; Guidelines for the recognition of credits acquired in extra-curricular activities

1. With regard to the criteria for the recognition of ECTs acquired in Degree Courses of different Class, in university or university-level Degree Courses, through single courses, at online Universities and in International Degree Courses, the credits acquired are recognised by the competent structure on the basis of the following criteria:

• analysis of the programme carried out;

• evaluation of the congruity of the disciplinary scientific sectors and of the contents of the training activities in which the student has earned credits with the specific training objectives of the Course of Studies and of the individual training activities to be recognised.

Recognition is carried out up to the amount of credits envisaged by the didactic system of the Degree Course. Failure to recognise credits must be adequately justified.

2. The possible recognition of ECTs relating to examinations passed as single courses may take place within the limit of 36 ECTs, upon request of the interested party and following the approval of the competent teaching structures. Recognition may not contribute to the reduction of the legal duration of the Degree Course, as determined by Art. 8, c. 2 of Ministerial Decree 270/2004, except for students who enrol while already in possession of a degree of the same level<sup>14</sup>.

## Art. 15

## **Guidelines for enrolment in individual Degree Courses**

Enrolment in individual teaching courses, provided for by the University Didactic Regulations<sup>15</sup>, is governed by the "University Regulations for enrolment in individual teaching courses activated as part of the Degree Courses "<sup>16</sup>.

The Teaching Coordination Commission of the national or local programmed access course governs the admission criteria and the possible scheduling of registrations.

# Article 16

## Features and arrangements for the final examination

The final test for the Degree in Biomolecular and Industrial Biotechnology will consist in the preparation, presentation and discussion of a written thesis that focuses on a topic relevant in the field of industrial biotechnology, deepened by the student during the internship at University facilities or Institutions or Companies. The final exam is a public discussion of the thesis, which is an important demonstration of the cultural maturity achieved by the student and her/his ability to independently and critically elaborate the topic. The thesis will deal with a theme related to one of

<sup>&</sup>lt;sup>13</sup> Art. 16 of the University Didactic Regulations.

<sup>&</sup>lt;sup>14</sup> R.D. No. 3241/2019.

<sup>&</sup>lt;sup>15</sup> Art. 16, c. 6 of the University Didactic Regulations.

<sup>&</sup>lt;sup>16</sup> R.D. No. 3241/2019.

January 2023

the basic scientific-disciplinary fields, characterizing, similar or integrative, or, in any case, consistent with the educational objectives of the CdS. To access the final exam, the student must have acquired the number of credits provided by the teaching regulations, less those provided for the final exam.

The final exam is a public discussion of the paper in front of the Degree Examination Commission. The presentation is an important demonstration of the cultural maturity reached by the student and of her/his ability to independently and critically elaborate the topic. A candidate allowed to draw up a summary file, to be handed in a copy to each member of the Commission. The paper will deal with a theme related to one of the basic scientific-disciplinary fields, characterizing, similar or integrative, and, in any case, consistent with the educational objectives of the CdS. At the end of the presentation, each Member of the Commission may submit observations to the candidate on the subject of the thesis work. The assessment of the candidate is also based on the presentation of the paper and the subsequent discussion, keeping in mind communicative skills, learning skills and judgment autonomy.

# Article 17

## **Guidelines for work internships**

1. Students enrolled in the degree course may decide to carry out internships periods with organisations or companies that have an agreement with the University. Internships are compulsory, and contribute to the award of credits for the other educational activities chosen by the student and included in the study plan, as provided for by Art. 10, par. 5, letters d and e, of Ministerial Decree 270/2004<sup>17</sup>.

2. The modalities and characteristics of internships and placements are regulated by the CCD with a specific regulation.

3. The University of Naples Federico II, through the structures of the University, School, Department, ensures constant contact with the world of work, in order to offer students and graduates of the University concrete opportunities for internships and work experience and to promote their professional integration.

## Article 18

## Disqualification of student status<sup>18</sup>

A student who has not taken any examinations for eight consecutive academic years incurs forfeiture, unless his contract stipulates otherwise. In any case, forfeiture shall be notified to the student by certified e-mail or other suitable means attesting to its receipt.

# Article 19

# Teaching tasks, including supplementary teaching, guidance and tutoring activities

1. Lecturers and researchers carry out the teaching load assigned to them in accordance with the provisions of the University Teaching Regulations and the Regulations on the teaching and student service duties of professors and researchers and on the procedures for self-certification and verification of actual performance<sup>19</sup>.

<sup>&</sup>lt;sup>17</sup> Letter d traineeships can be both internal and external; letter d traineeships and placement can only be external.

<sup>&</sup>lt;sup>18</sup> Art. 21 of the University Didactic Regulations.

2. Professors and researchers must guarantee at least two hours of reception every 15 days (or by appointment in any case granted no longer than 15 days) and in any case guarantee availability by e-mail.

3. The tutoring service has the task of guiding and assisting students throughout their studies and of removing the obstacles that prevent them from adequately benefiting from attending courses, also through initiatives tailored to the needs and aptitudes of individuals.

The University ensures guidance, tutoring and assistance services and activities to welcome 4. and support students. These activities are organised by These activities are organized by the Polytechnic School and Basic Sciences in collaboration with the individual Teaching Structures, as established by the RDA in Article 8.

# Article 20

# Evaluation of the quality of the activities performed

The Didactic Coordination Commission implements all the forms of quality assessment of 1. teaching activities envisaged by the regulations in force according to the indications provided by the University Quality Presidium.

2. In order to guarantee the quality of teaching to the students and to identify the needs of the students and all stakeholders, the University of Naples Federico II uses the Quality Assurance (QA)<sup>20</sup> system, developed in accordance with the document "Self-evaluation, Evaluation and Accreditation of the Italian University System" of ANVUR, using:

surveys on the degree of integration of graduates into the world of work and on postgraduate needs.

data extracted from the administration of the questionnaire to assess student satisfaction for each course in the curriculum, with questions relating to the way the course is conducted, teaching materials, teaching aids, organisation, facilities.

The requirements deriving from the analysis of student satisfaction data, discussed and analysed by the Teaching Coordination Committee and the Joint Teachers' and Students' Committee (CPDS), are included among the input data in the service design process and/or among the quality objectives.

4. The QA organisation developed by the University implements a process of continuous improvement of the objectives and of the appropriate tools to achieve them, ensuring that planning, monitoring and self-assessment processes are activated in all the structures to allow the prompt detection of problems, their adequate investigation and the design of possible solutions.

# Article 21

# **Final Rules**

The Department Council, on the proposal of the Academic Coordination Committee, submits any proposals to amend and/or supplement these Rules for consideration by the Academic Senate.

<sup>&</sup>lt;sup>20</sup> The Quality Assurance System, based on a process approach and adequately documented, is designed in such a way as to identify the needs of the students and all stakeholders, and then translate them into requirements that the training offer must meet. January 2023

# Article 22

## **Publicity and Entry into Force**

1. These Rules and Regulations shall enter into force on the day following their publication on the University's official notice board; they shall also be published on the University website. The same forms and methods of publicity shall be used for subsequent amendments and additions.

2. Annex 1 (CdS structure) and Annex 2 (Teaching/Activity schedule) are an integral part of these Regulations.





#### **ANNEX 1.1**

#### **COURSE REGULATIONS**

#### DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

#### CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

#### Regulations in force for the academic year 2023-2024

STUDY PLAN A.Y. 2023-2024

Κεγ

#### Type of Educational Activity (TAF):

A = Basic

- **B** = Characterising
- **C** = Related or Supplementary
- **D** = Optional activities
- E = Final examination and language knowledge

**F** = Further training activities

Title Teaching	SSD	Module	Credits	Hours	Type Activities	Course	TAF	Disciplinary area	Mandatory/ optional
Year I									
Mathematics and Elements of Statistics	MAT/03	single	9	72	Frontal lessons	In-person	A	Mathematics, physics, informatics and statistics	Mandatory
General Chemistry	CHIM/03	single	9	76	Frontal lessons, exercises and laboratory	In-person	A	Chemical disciplines	Mandatory
Introduction to the Biotechnology and Biology	BIO/13	single	9	72	Frontal lessons	In-person	A	Biological disciplines	Mandatory
Physics and computer laboratory	FIS/01	single	9	72	Frontal lessons	In-person	A	Mathematics, physics, informatics and statistics	Mandatory
Organic Chemistry	CHIM/06	single	9	76	Frontal lessons and laboratory	In-person	А	Chemical disciplines	Mandatory
Genetics	BIO/18	single	6	48	Frontal lessons	In-person	A	Biological disciplines	Mandatory
English		single		48			E		
Year II									
Biochemistry	BIO/10	Biochemistry of macromolecules and cellular metabolism	6	48	Frontal lessons	In-person	A	Biological disciplines	Mandatory
	BIO/10	Applied Biochemistry	6	52	Frontal lessons, exercises and laboratory	In-person	A	Biological disciplines	Mandatory

Title Teaching	SSD	Module	Credits	Hours	Type Activities	Course	TAF	Disciplinary area	Mandatory/ optional
General and applied microbiology	BIO/19	single	9	72	Frontal lessons	In-person	В	Biotechnologica I disciplines with specific purposes: biological and industrial	Mandatory
Molecular Biology	BIO/11	single	6	52	Frontal lessons, exercises and laboratory	In-person	С		Mandatory
Molecular	BIO/10	Advanced biochemistry	6	52	Frontal lessons, exercises and laboratory	In-person	В	Common biotechnologica I disciplines	Mandatory
Biotechnology	BIO/18	Molecular Genetics	6	48	Frontal lessons	In-person	С		Mandatory
Microbial biotechnology Biotechnology of	CHIM/11	Principles of chemistry of fermentation	6	52	Frontal lessons, exercises and laboratory	In-person	В	Common biotechnologica I disciplines	Mandatory
fermentation processes	CHIM/11	Biotechnology of fermentation processes	6	52	Frontal lessons, exercises and laboratory	In-person	В	Common biotechnologica l disciplines	Mandatory
Principles of bioprocess engineering	ING- IND/24	single	6	48	Frontal lessons	In-person	С		Mandatory
				Year II	I				
Bioanalytical chemistry	CHIM/01	single	6	48	Frontal lessons	In-person	В	Biotechnologica I disciplines with specific objectives: chemical and pharmaceutical	Mandatory
Industrial enzymology	BIO/10	single	6	48	Frontal lessons	In-person	В	Common biotechnologica l disciplines	Mandatory
Perception and ethics of industrial biotechnology	M-FIL/03	single	6	48	Frontal lessons	In-person	В	Disciplines for regulation, economics and bioethics	Mandatory
Introduction to biotechnological installations	ING- IND/25	single	6	48	Frontal lessons	In-person	В	Biotechnologica I disciplines with specific objectives: chemical and pharmaceutical	Mandatory
Advanced molecular biology	BIO/11	single	9	72	Frontal lessons, exercises and laboratory	In-person	В	Common biotechnologica I disciplines	Mandatory
Training activities of the student's own choice			18 (+)			In-person	D		Mandatory
Internship			9			In-person	F		
Orientation towards the world of work			1	8		In-person	F		
Final test			5			In-person	E		

# (+) Every year the CCD offers courses available for independent student choice





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:		
Mathematics and Elements of Statistic	S	Italian		
SSD (Subject Areas):			CREDITS:	
MAT/03			9	
Course year: I	Type of Educ	ational Activit	t <b>y:</b> A	
Contents extracted from the SSD of	declaratory lis	st consistent v	vith the learning objectives of the	
course:				
Elements of set theory. Real numb	ers: The axion	n system of re	al numbers, first properties of real	
numbers, real functions of real varia	ables. Elemen	tary functions.	. Limits and Continuity. Elements of	
Integral Calculus. Outline of Prot	bability Theor	y Elements. I	Elements of descriptive statistics.	
Collection and organization of dat	a (descriptive	statistics). Ele	ements of Computer Science: The	
concept of Algorithms, introduct	tion to prog	ramming, ele	ments of data analysis through	
spreadsheets.				
Learning objectives:				
The main target of the course is to	b lead the stu	dent to know	and understand the language and	
basic concepts of mathematics with	n particular ret	ference to the	differential and integral calculus of	
functions of one variable. To learn	how to identi	fy the most ap	ppropriate methods to analyse and	
solve a problem related to the co	ourse topics a	nd correctly i	nterpret the results; to know and	
understand elements of probability	calculation, o	descriptive and	inferential statistic topics.	
Pre-requisites:		-	· · · ·	
None				
Is a pre-requisite for:				
None				
Types of examinations and other t	ests:			
Written and oral				





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:		
General Chemistry		Italian		
SSD (Subject Areas):			CREDITS:	
CHIM/03			9	
Course year: I	Type of Educ	ational Activit	t <b>y:</b> A	
Contents extracted from the SSD of	declaratory lis	st consistent v	vith the learning objectives of the	
course:				
Basic principles of chemical sciences v compounds.	Basic principles of chemical sciences with special focus on the chemical properties of elements and their compounds.			
Learning objectives:				
The course provides the basic know	ledge for unde	erstanding the	principles of chemistry and chemical	
phenomena, with special focus on: a	tomic model; l	bonding and in	teractions; states of matter; kinetics,	
electrochemistry and fundamentals of	thermodynam	ics.		
Pre-requisites:				
none				
Is a pre-requisite for:				
none				
Types of examinations and other tests:				
Written and oral				





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:			
Introduction to the Biotechnology and Biology		Italian			
SSD (Subject Areas):			CREDITS:		
BIO/13			9		
Course year: I	Type of Educ	ational Activit	t <b>y:</b> A		
Contents extracted from the SSD of	declaratory li	st consistent v	with the learning objectives of the		
course:					
Structural and functional organization	of the cell, intr	acellular compa	rtments, function of biomolecules, cell		
cycle and division, cell development a	nd communica	tion.			
Learning objectives:					
Overall knowledge of biology and biol	ogical phenom	ena. Informatio	n on the main fields of Biotechnology		
applications.					
Pre-requisites:					
none					
Is a pre-requisite for:					
none					
Types of examinations and other tests:					
Written and oral examination					





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:		
PHYSICS AND COMPUTER LABORATOR	RΥ	Italian		
SSD (Subject Areas):			CREDITS:	
FIS/01			9	
Course year: I	Type of Educ	ational Activit	ty: A	
Contents extracted from the SSD	declaratory lis	st consistent v	with the learning objectives of the	
course:				
It includes the expertise to carry out e at investigating the principles of phy innovation is part of this scientific area	xperimental re vsics and how a.	search – with p devices work.	articular reference to activities aiming Knowledge transfer for technological	
Learning objectives:				
The course aims at providing the st PC tools and utilities. Special emphasis	tudent with th s will be given t	e basic knowled by the topics of it is the top	edge of the physics laws also using interest in life sciences.	
Pre-requisites:				
none				
Is a pre-requisite for:				
none				
Types of examinations and other tests:				
written and oral.				





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:				
Organic chemistry		Italian				
SSD (Subject Areas):			CREDITS:			
CHIM/06			9			
Course year:	Type of Educ	ational Activit	t <b>y:</b> A			
Contents extracted from the SSD	declaratory lis	st consistent v	with the learning objectives of the			
course:						
The course aims to provide adequate	knowledge in	the field of the	study of carbon compounds, both of			
natural and synthetic origin, including	g amino acids a	nd their polym	ers, lipids and sugars. Object of study			
are the elucidation of the mechanism	ns through whi	ch organic com	pounds are formed and transformed			
both in the laboratory and in natural	and environme	ental systems, t	their supramolecular interactions, the			
structural characterization and the str	ucture-reactivit	ty relationships.				
Learning objectives:						
The student should demonstrate kno	wledge of the	main classes of	organic compounds, highlighting the			
relationships between structure, phys	ical properties	and chemical b	ehavior, with particular focus on their			
reactivity. The training course - aimed	at understand	ing the molecul	lar basis of processes and interactions			
between biomolecules, and between	biomolecules a	nd the environr	nent - is complemented by laboratory			
compounds.	arity with the	manipulation,	analysis and purification of organic			
The student should demonstrate know	owledge of the	e structural cha	aracteristics of the functional groups			
present in organic compounds and the	eir reactivity, de	scribing the ma	in reaction mechanisms. He should be			
able to recognize the effects that mo	dulate the cher	mical properties	s of organic compounds, predict their			
behavior in certain environmental co	onditions and c	lescribe the ma	ain conversions of functional groups,			
rationalizing possible synthesis strateg	gies of more con	mplex substrate	es starting from simple molecules.			
Pre-requisites:						
none	none					
Is a pre-requisite for:						
none						
Types of examinations and other t	ests:					
The exam is divided into written and c	oral tests.					





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:			
GENETICS		Italian			
SSD (Subject Areas):			CREDITS:		
BIO18			6		
Course year: I	Type of Educ	ational Activit	t <b>y:</b> A		
Contents extracted from the SSD of	declaratory lis	t consistent v	vith the learning objectives of the		
course:					
Understanding, knowledge and acquisi	tion of method carvotes and e	ological tools re ukarvotes cells.	elated to the mechanisms that regulate individuals and populations. Structure		
of the genetic material; regulation of g	ene expression	i; mechanisms o	of mutations and evolution.		
Learning objectives:	•				
Knowledge and basic methodological tools necessary to analyse the transmission of genetic traits. The methodological tools will be acquired through the description and analysis of genetic experiments and the knowledge will be acquired through the interpretation of the experimental results. These tools will allow students, through the application of logical-deductive principles, to understand the causes of the main problems of formal and molecular genetics and to understand their evolutionary implications.					
Pre-requisites:					
none					
Is a pre-requisite for:	Is a pre-requisite for:				
none					
Types of examinations and other t	ests:				
Oral examination					





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:			
Biochemistry		Italian			
SSD (Subject Areas):			CREDITS:		
BIO10			6		
BIO10			6		
Course year: II	Type of Educ	ational Activit	ty: A		
Contents extracted from the SSD	declaratory lis	st consistent v	with the learning objectives of the		
course:					
Properties of the chemical constituen	ts of living mat	ter. Structure a	and properties of simple (amino acids)		
and complex (protein macromolecules	) molecules. Fu	nctions and tran	nsformations of chemical constituents,		
energy exchanges associated with	their transforn	nations and th	ne mechanisms of coordination and		
regulation of metabolic functions. M	etabolism in it	s anabolic and	catabolic phases in which enzymatic		
catalysis plays a primary function. Stu	udy of laborato	ory methodolog	ies for the analysis of cellular protein		
components.					
Learning objectives:					
The student will acquire knowledge	on the concep	ot of structure-	function relationship associated with		
proteins. An integral part of the cours	e is the descrip	otion of enzyme	es, the meaning of enzymatic catalysis		
and inhibition as well as the study	of the main i	metabolic path	ways, their interconnection and the		
mechanisms that regulate their ac	tivation and	inhibition in r	esponse to specific cellular needs.		
Furthermore, the student will acquire	the basic know	ledge on protei	n purification both at a theoretical and		
practical level.					
Pre-requisites:					
none					
Is a pre-requisite for:					
none					
Types of examinations and other t	Types of examinations and other tests:				
Oral					





# **COURSE REGULATIONS**

# **BIOMOLECULAR AND INDUSTRIAL BIOTECNOLOGY**

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:			
Molecular Biology		Italian			
SSD (Subject Areas):			CREDITS:		
BIO/11			6		
Course year: II	Type of Educ	ational Activit	t <b>y:</b> C		
Contents extracted from the SSD	declaratory lis	st consistent v	with the learning objectives of the		
course:					
Biochemical characteristics of nucleic a	acids. Analysis c	of macromolecu	les involved in DNA replication, repair,		
transcription and translation.					
Learning objectives:					
The purpose of this course is to give t	the bases to co	rrectly underst	and the structural organization of the		
gene and the molecular mechanisms v	which rule its fu	inction.			
Pre-requisites:					
None					
Is a pre-requisite for:	Is a pre-requisite for:				
None					
Types of examinations and other tests:					
Oral exam					





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:			
GENERAL AND APPLIED MICROBIOLOGY		Italian			
SSD (Subject Areas):			CREDITS:		
BIO/19			9		
Course year: II	Type of Educ	ational Activit	<b>:у:</b> В		
Contents extracted from the SSD of	declaratory lis	st consistent v	vith the learning objectives of the		
course:					
The knowledge of the taxonomy, phy	siology, geneti	cs, and metabo	lism of the main microbial groups of		
biotechnological interest, microbial bio	odiversity and i	ts application ir	the biotechnology field.		
Learning objectives:					
The training objective of the cours	e is to provi	de basic know	ledge of microorganisms and their		
biotechnological applications.					
Pre-requisites:					
NONE					
Is a pre-requisite for:	Is a pre-requisite for:				
NONE					
Types of examinations and other tests:					
Written and oral test					





#### **COURSE REGULATIONS**

## DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

#### CLASS L-2

#### School: Polytechnic School and Basic Sciences

#### **Department: Chemical Sciences**

#### Regulations in force for the academic year 2023-2024

Course:	Teaching Language:		
Molecular Biotechnology	Italian		
SSD (Subject Areas):			CREDITS:
BIO10			6
BIO18			6
Course year: II	Type of Educational Activity: B		
	C		C

# Contents extracted from the SSD declaratory list consistent with the learning objectives of the course.

Study of the properties of chemical constituents of living matter, structure and properties of simple and complex molecules of glucidic and lipidic nature, protein macromolecules and supramolecular complexes. Study of the functions and transformations of chemical constituents, energy exchanges associated with their transformations, and the molecular mechanisms of regulation. Study of laboratory and bioinformatic methodologies for the qualitative and quantitative analysis and characterisation of structural components, for the observation of their modifications, and for the validation of experimental results.

Classical and molecular methodologies of genetics and use of bioinformatics tools. From gene to the genome, gene expression, mutation mechanisms and DNA repair. Epigenetic regulation. Functional genomics for studying complex biological phenomena and mechanisms for their understanding and manipulation for application purposes. Genetic basis of the immune response and carcinogenesis. Applications at the biotechnological and environmental level of Genetics.

#### Learning objectives:

Acquisition by the student of basic knowledge of the main molecular mechanisms responsible for the regulation of cell proliferation and cell-to-cell communication mediated by extracellular signals.

The objective of the course is to provide students with the basic knowledge and methodological tools necessary to analyze complex biological phenomena through molecular genetics tools. Reverse genetics, the student will be able to understand and describe the functioning of a cell and an experimental model system while learning and using the main techniques of Molecular Biotechnology.

#### **Pre-requisites:**

None

#### Is a pre-requisite for:

None

**Types of examinations and other tests:** Oral examination





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:	urse: Teaching La			
Microbial biotechnology Italian				
SSD (Subject Areas):		CREDITS:		
CHIM11		6		
CHIM11		6		
Course year: II	Type of Educational Ac	tivity: B		
		В		
Contents extracted from the SSD	declaratory list consiste	nt with the learning objectives of the		
course:				
The disciplinary scientific sector collec	ts the research topics that	deepen the basic knowledge necessary for		
the design of industrial processes that	use microorganisms, cell	cultures, immobilized enzymes. It includes		
the genetic improvement of microbia	al strains of industrial inte	erest, metabolic engineering, control and		
validation of fermentation processes	and the products obtaine	d, with reference to the biotechnological		
processes used in the pharmaceutical,	chemical, food and enviro	onmental remediation industries.		
Learning objectives:				
The course aims to describe the main aspects of setting up biotechnological processes. Different				
fermentation processes for the indust	rial production of products	s of commercial interest are explored.		
Pre-requisites:				
none				
Is a pre-requisite for:				
none				
Types of examinations and other tests:				
Written and oral				





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Lan	guage:
Principles of Bioprocess Engineering		Italian	
SSD (Subject Areas):			CREDITS:
ING-IND 24			6
Course year: II	Type of Educ	ational Activit	<b>ty:</b> C
Contents extracted from the SSD of	declaratory lis	st consistent v	with the learning objectives of the
course:			
Analysis of the technologies of the bio	technological i	ndustry with sp	ecific attention to the physical,
chemical and biological phenomena th	at characterize	e the specific tra	ansformations. Analysis of individual
stages of biotechnological processes a	nd equipment	from a system p	perspective, using the tools of
thermodynamics and chemical kinetics	s, verifying thei	ir compatibility	with energy and environmental
requirements. Elements of chemical and	nd biochemical	l kinetics and re	actors. Chemical and process
thermodynamics: energetic analysis of	f processes, mu	ulti-component	systems, chemical equilibria between
phases and related applications.			
Learning objectives:			
The course is aimed at enabling the student to analyse transformations of biotechnological interest,			
developing its ability to interact wi	ith other prof	essionals invol	ved in the industrial application of
bioprocesses.			
Pre-requisites:			
none			
Is a pre-requisite for:			
none			
Types of examinations and other tests:			
The exam consists of two written tests during the course, and a final oral test.			





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:		
Bioanalytical Chemistry Italian		Italian		
SSD:			CREDITS:	
CHIM01			6	
Course year: III	Type of Educ	ational Activit	<b>:у:</b> В	
Contents extracted from the SSD of	declaratory lis	st consistent v	vith the learning objectives of the	
course:				
The course describes the main instrumental analytical methodologies for the development and application of instrumental techniques and methods for the compositional determination - qualitative and quantitative - of chemical systems and products of biotechnological interest. Furthermore, the course foresees the optimization of methods and for the treatment of data useful for the interpretation of the results.				
<b>Learning objectives:</b> The student must demonstrate to know and be able to understand the problems related to the analysi techniques applied to chemical processes in the environmental, health, agri-food fields. The training cours of the course aims to provide students with the knowledge and the basic methodological tools necessar for qualitative and quantitative evaluation of products of biotechnological interest			I the problems related to the analysis th, agri-food fields. The training course basic methodological tools necessary ogical interest	
Pre-requisites:				
none				
Is a pre-requisite for:				
none				
Types of examinations and other tests:				
Oral examination				





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

## CLASS L-2

#### School: Polytechnic School and Basic Sciences

#### **Department: Chemical Sciences**

#### Regulations in force for the academic year 2023-2024

Course:	Teaching Language:		
Design of conversion processes	English		
SSD (Subject Areas):			CREDITS:
ING-IND/26			6
ING-IND/25			6
Course year: II	Type of Educational Activity: B		<b>ty:</b> В
	В		

# Contents extracted from the SSD declaratory list consistent with the learning objectives of the course:

The areas involved in teaching include:

• the study of the methodologies for the construction of industrial plants based on chemical-physical and biological transformations of matter aimed at the production of goods, the provision of services and the prevention or mitigation of habitat modifications induced by anthropic activities or settlements. The specific reference is to the functional design and choice of bioreactors and ancillary equipment.

• The development of a system approach to the study of processes and chemical-physical phenomena involved, aimed at optimizing, controlling and conducting equipment and industrial processes. The specific reference is to the development and application of mathematical methods for the analysis, modeling, identification and simulation of systems in the field of industrial bioprocesses.

#### Learning objectives:

The student must demonstrate:

• to know and understand the selection and design of bioreactors and the evaluation of their performance in relation to the optimal conversion of raw materials taking into account the characteristics of the proposed reactive biosystem (enzymes and/or micro-organisms), the feed and the bioreactor.

• to know and understand the problems related to the formulation and numerical solution of mathematical models of interest in industrial biotechnologies and to the analysis of experimental data using statistical techniques, also through the use of software in numerical simulation environments.

• to be able to generate written reports on the topics of the course and to expand his knowledge through research and access to documents relevant to the topics of the course.

Pre-requisites:	
none	
Is a pre-requisite for:	
None	
Types of examinations and other tests:	
Written	





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:	
Industrial Enzymology		Italian	
SSD (Subject Areas):			CREDITS:
BIO/10			6
Course year: III	Type of Educ	ational Activit	: <b>у:</b> В
Contents extracted from the SSD	declaratory lis	st consistent v	vith the learning objectives of the
course:			
Enzymology belongs to dynamic bioch	emistry that st	udies : i) functio	ons and transformations of chemical
components; ii) energetic changes related to biochemical transformations; iii) molecular mechanisms		ations; iii) molecular mechanisms of	
the enzyme-based regulation.			
Learning objectives:			
Molecular, kinetic, and regulatory asp	ects of enzyma	tic catalysis for	biotechnological applications.
Pre-requisites:			
None			
Is a pre-requisite for:			
None			
Types of examinations and other tests:			
Oral Test			





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

# School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:	
Ethical Perception of Industrial Biotechnologies		Italian	
SSD (Subject Areas):			CREDITS:
M-FIL/03			6
Course year: III	Type of Educ	ational Activit	<b>:у:</b> В
Contents extracted from the SSD of	declaratory li	st consistent v	vith the learning objectives of the
course:			
The field includes competences related	d to the study c	of human action	in its moral, ethical-social and political
dimensions. It includes elaborations on the human-environn		environment re	elationship and reflects on the ethical
consequences arising from the development of the sciences			
Learning objectives:			
The course is intended to bring to the	students' atte	ntion the main	issues related perception in the world
of industrial biotechnology. Bioethical	aspects of biot	technology	
Pre-requisites:			
None			
Is a pre-requisite for:			
None			
Types of examinations and other tests:			
Oral test			





## **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

#### School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:	
Advanced Molecular Biology Ital		Italian	
SSD (Subject Areas):			CREDITS:
BIO/11			9
Course year: III	Type of Educ	ational Activit	<b>:у:</b> В
Contents extracted from the SSD	declaratory lis	st consistent v	vith the learning objectives of the
course:			
DNA-protein interaction, protein-prot	ein interaction,	control of gene	e expression, methods for nucleic acid
characterization.			
Learning objectives:			
The course of Advanced Molecular Biology aims at providing a deep overview of the mechanisms th			ep overview of the mechanisms that
regulate the gene expression from transcription to the RNA- mediated control of translation. Students w			ed control of translation. Students will
also become familiar with advanced ap	oproaches in mo	olecular biology	methodologies to obtain quantitative
data on nucleic acid processing.			
Pre-requisites:			
None			
Is a pre-requisite for:			
None			
Types of examinations and other tests:			
Oral exam			





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

## School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course:		Teaching Language:	
Guidance to the World of Work		Italian	
SSD (Subject Areas):			CREDITS:
internship			1
Course year: III	Type of Educ	ational Activit	t <b>y:</b> F
Contents extracted from the SSD	declaratory lis	st consistent v	with the learning objectives of the
course:			
Through meetings with representative	es of companies	s in the sector,	it is intended to bring students closer
to the world of work, to illustrate the prospects for a graduate. If they continue their studies, they w		ey continue their studies, they will be	
provided with useful information for choosing the Degree Programme for Master's Degree.		ne for Master's Degree.	
Learning objectives:			
To provide students with a clear vision	of future prosp	ects, both in th	e field of work and in the continuation
of their studies. General safety aspect	s in a laborator	у.	
Pre-requisites:			
none			
Is a pre-requisite for:			
none			
Types of examinations and other tests:			
Frequency			





# **COURSE REGULATIONS**

# DEGREE IN BIOMOLECULAR AND INDUSTRIAL BIOTECHNOLOGY

# CLASS L-2

School: Polytechnic School and Basic Sciences

**Department: Chemical Sciences** 

Course: Te		Teaching Lan	Teaching Language:	
Internship	Internship Italian			
SSD (Subject Areas):			CREDITS:	
internship			9	
Course year: III	Type of Educ	cational Activit	ty: F	
Contents extracted from the SSD	declaratory li	st consistent v	with the learning objectives of the	
course:				
Internship at the laboratories of resea	rch groups on s	specific training	projects.	
Learning objectives:	arning objectives:			
Learning of analytical methodologies and instrumental techniques v		s with attention to specific research		
projects.				
Pre-requisites:				
none				
Is a pre-requisite for:				
none				
Types of examinations and other tests:				
Frequency				