DIDACTIC REGULATIONS OF THE DEGREE PROGRAM

BIOLOGY OF EXTREME ENVIRONMENTS

LM-6

School: Polytechnic and Basic Science

Department: Biology

Regulations in force since the academic year 2025/26

ACRONYMS

CCD	[Commissione di Coordinamento Didattico]	Didactic Coordination Commission
CdS	[Corso/i di Studio]	Degree Program
CFU	[Crediti Formativi Universitari = 1 ECTS]	University training credits
CPDS	[Commissione Paritetica Docenti-Studenti]	Joint Teachers-Students Committee
OFA	[Obblighi Formativi Aggiuntivi]	Additional Training Obligations
SUA-CdS	[Scheda Unica Annuale del Corso di Studio]	Annual single form of the Degree Program
RDA	[Regolamento Didattico di Ateneo]	University Didactic Regulations

INDEX

Art. 1
Object

1. This Regulation regulates the organizational aspects of the Master's Degree Program in "Biology of Extreme Environments" (class LM-6 - Biology). The Master's Degree Program in Biology of Extreme Environments is hinged to the Department of Biology.
   General Information
   Master's Degree Program name in Italian: Biologia degli Ambienti Estremi
   Master's Degree Program name in English: Biology of Extreme Environments
   Class: LM-6 - Biology
   Teaching language: English
   Course delivery methods: conventional
2. The Master's Degree Program is governed by the Teaching Coordination Commission (CCD), pursuant to Art. 4 of the RDA.
3. The Regulation is issued in compliance with current legislation on the subject, the Statute of the University of Naples Federico II and the University Teaching Regulations.

Art. 2
Training objectives

The Master's Degree Program in in 'Biology of Extreme Environments' has as its qualifying training objective the preparation of graduates who will have:
- a high level of scientific and operational preparation in the disciplines that characterize the class;
- an in-depth knowledge of the biology and ecology of extreme environments, from a morphofunctional, evolutionary, ecological and biotechnological point of view and of the management strategies, sustainable exploitation and conservation of its resources, also with a view to space and astrobiological exploration;
- a solid cultural preparation in the systemic analysis of extreme environments, in all its biotic and abiotic components and in their interactions, also considered in their historical-evolutionary dimension of exploration and exploitation;
- an adequate knowledge of the physico-chemical and geological foundations of the dynamics of extreme environments, including space, in particular in terms of their interactions with the biotic component and with man;
- a high mastery of the scientific method of investigation and the knowledge necessary for starting scientific research in the biological, biotechnological and astrobiological fields of extreme environments;
- an adequate knowledge of the mechanisms of interaction between extreme environments with the surrounding ones and the human population, including the basis of environmental and toxicological risk deriving from proximity to these environments, the problems deriving from their exploitation and colonisation, with particular regard to the management and exploitation of extreme environmental resources;
- an in-depth knowledge of modern survey and sampling instruments in extreme and inhospitable environments, including spatial ones, and of the application of statistical, IT and geoinformatics techniques for data analysis and archiving;
- the ability to address problems and plan exploration, management and sustainable exploitation activities of environmental resources in extreme conditions;
- high skills and tools for the communication and management of biological, biotechnological and environmental information;

- a clear picture of the legal and ethical implications relating to the exploitation of biological and genetic resources of extreme environments, of the exploration and exploitation implications of extreme environments, including space ones and of planetary protection issues.

Graduates will also have to:
- be able to use fluently, in written and oral form, at least one European Union language other than Italian, also with reference to disciplinary lexicons.
- be able to work with great autonomy, also taking on responsibilities for projects, research structures, including the organization of sampling activities from extreme environments, including space ones

The training course is characterized by an interdisciplinary study approach on topics that concern biotic and abiotic components and their interactions in specific extreme environments. To this end, the course is structured in such a way as to develop the basic concepts in the first year and the acquisition of specific knowledge in the second year, taking great consideration of the practical/laboratory activities. To achieve these objectives, the training course includes 2 curricula focused respectively on 4 learning areas:
1) Microbiology, Ecology, Botany and Hygiene;
2) Geology, Organic Chemistry, Microbiology and Genetics;
3) Physiology, Biochemistry, Genetics;
4) Organizational skills.
The skills are achieved through participation in lectures, exercises and laboratories included in the training offer, as well as through individual study. The achievement of the learning outcomes is verified through individual exams with a final written or oral test, and/or with the preparation and discussion of reports.
The courses will be held in English.

Art. 3
Professional profile and work opportunities

The Master's Degree Program in aims to train the professional figure of the Biologist, figures of high cultural and professional depth, whose activity can range from basic research, aimed at a greater understanding of biological phenomena in extreme and extraterrestrial environments, to the development of scientific and technological innovation, and the exploitation sustainability of the resources present in these. Graduates of the class will have specific training that will enable them to carry out professional and managerial activities within public and private research centers, national and international space agencies, and companies specialized in the field of genetic, biochemical, biological, and technological exploration. of extreme environments, such as polar, geothermal, and extraterrestrial ones, with a view to exploration, exploitation, and colonization of the environments. Currently, professional figures with this preparation are required both by national and international research centers, by space agencies and by biotechnological and biomedical industries, with an increase in demand expected in the next decade.

The graduate will be able to perform the following functions in a work context:
- activities for the promotion and development of scientific and technological innovation, as well as the design and management of technologies;
- scientific research activities in an appropriate conceptual context and also considering natural and technical limitations;

• professional and project activities in fields related to biological disciplines, in public and private research institutes, in national and international space agencies, in the sectors of industry, healthcare and public administration, with particular regard to integrated knowledge and protection of animal and plant organisms, microorganisms and biodiversity of extreme environments, also in relation to the risk linked to the sustainable exploitation of resources, exploration and human interaction with extreme environments, including the extraterrestrial one; professional and project activities with particular regard to: the analysis, management and protection of environmental biodiversity; to the dissemination and scientific dissemination of the relevant knowledge; the monitoring of extreme environments in relation to the surrounding ones, with particular attention to possible natural risks and public health; to the sustainable exploitation of biological and genetic resources of extreme environments; to the biological, biochemical, biomolecular and biotechnological applications of extremophilic organisms, in particular aimed at industrial biotechnology, pharmacology and biomedicine

Skills associated with the function:
To carry out the functions described above, graduates will acquire the following skills and abilities during study which will be practiced on the job:
Graduates in the master's degree courses of the class will possess an in-depth knowledge of the biology and ecology of extreme environments, from the point of view of morphofunctional, evolutionary and biotechnological aspects, as well as management skills for the purposes of sustainable exploitation of resources and their conservation, also with a view to space and astrobiological exploration; a solid cultural preparation in the systemic analysis of extreme environments, considering the biotic and abiotic components and their interactions, without neglecting the historical-evolutionary, exploration and exploitation dimension; an adequate knowledge of the physico-chemical and geological foundations of the dynamics of extreme environments, including space, in particular in terms of their interactions with the biotic component and with man; a high mastery of the scientific method and the knowledge necessary for starting scientific research in the biological, biotechnological and astrobiological fields of extreme environments; adequate knowledge of the mechanisms of interaction between extreme and surrounding environments and the human population, including the basic concepts of environmental and public health risk present in these environments, and the risks deriving from both the exploitation of resources and possible colonization ; an in-depth knowledge of modern investigation and sampling instruments used in extreme and inhospitable environments including space ones; application of statistical, IT and geoinformatics techniques for data analysis and storage; skills to address problems and plan exploration, management and sustainable exploitation of environmental resources in extreme conditions; high theoretical and application skills for the communication of biological, biotechnological and environmental information; a comprehensive overview of the legal and ethical implications relating to the exploitation of biological and genetic resources of extreme environments, as well as the exploration and exploitation implications, and the issues of planetary protection; acquisition of autonomy in research and work, including in roles of responsibility for projects, research structures, including the organization of sampling activities in extreme environments, including space ones.

Employment opportunities:
● based on Presidential Decree 328/01, graduates can take the state exam to qualify to practice the profession of Biologist and consequently obtain registration in the National Order of Biologists (section A).
● Employment in public administration;

● Scientific research in universities, CNR, INGV, ENEA, Zoological Station, and other public bodies, Polar Research Institutes, Marine Biology Stations, Space Agency research centers;
● Management and management of biotechnological and biological research laboratories;
● Professional and project activities in fields related to biological disciplines;
● Professional activities, with particular attention to the biodiversity of extreme environments; to the dissemination and scientific dissemination of the relevant knowledge; to the monitoring of extreme environments and their sustainable exploitation;
● Professional and project activities in the field of biomolecular applications related to extremophilic organisms, in the areas of industrial biotechnology, pharmacology and biomedicine
● Consultancy activities in the management of extreme environments and its resources.

Art. 4

Admission requirements and knowledge required for access to the Degree Program[1]

To access the Master's Degree Program in Biology of Extreme Environments, possession of a three-year university degree or diploma is required, or another qualification obtained abroad, deemed suitable in the opinion of the Course Council, or the possession of three-year degrees in the class L-13 (Biological Sciences), L-32 (Sciences and Technologies for the Environment and Nature), L-2 (Biotechnologies) or corresponding in the former Ministerial Decree 509/99. Alternatively, for graduates in other classes, the requirements consist of possessing an adequate number of CFU for SSD, of which at least 30 CFU BIO/*, MED/04, MED/42, 6 CFU between MAT/01-MAT/09 , ING-INF/05, INF/01, 6 CFU between FIS/01-FIS/08, 6 CFU between CHIM/01-CHIM/04, CHIM/06, CHIM/12.
For graduates from foreign universities, the adequacy of the curricular requirements is assessed case by case on the basis of the coherence between the programs carried out in the different disciplinary areas, the training bases deemed necessary for the advanced training offered by the course of study, as well as the knowledge linguistics.
The methods for verifying preparation will be defined in the teaching regulations of the study course and in any case verified only after verification of possession of the curricular requirements. In any case, the required skills must be possessed before registration.
The course is taught in English, so the student must have adequate knowledge of it (minimum level B2 required). The verification of knowledge of the English language consists in the presentation by the student of an internationally recognized B2 level certificate or through an interview, the methods of which will be indicated from time to time by the CCD.

Art. 5

Procedures for access to the Degree Program

The CCD of the Master's Degree Program normally regulates the admission criteria and the possible planning of enrolments except in the case subject to different provisions of law[2].
Verification of personal preparation is mandatory in any case, and only students in possession of the curricular requirements can access it.
The verification methods will be redefined annually by the CCD and published on the WEB site of the Department of Biology.

[1] Artt. 7, 13, 14 of the University Didactic Regulations.
[2] National programmed access is regulated by L. 264/1999 and subsequent amendments and supplements.

Art. 6
Teaching activities and university training credit
(Teaching activities and CFU)

Each training activity, prescribed by the Degree course detail sheet, is measured in CFU. Each CFU corresponds to 25 hours of overall training commitment[3] per student and includes the hours of teaching activities specified in the curriculum as well as the hours reserved for personal study or other individual training activities.
For the Degree Program covered by this Didactic Regulations, the hours of teaching specified in the curriculum for each CFU, established in relation to the type of training activity, are as follows [4]:

- Lecture or guided teaching exercises: 8hours per CFU;
- Laboratory activities or fieldwork: 8 hours per CFU;
- For Internship and Thesis activities, each credit corresponds to 25 hours of overall training commitment [5].

The CFU corresponding to each training activity acquired by the student is awarded by satisfying the assessment procedures (examination, pass mark) indicated in the Course sheet relating to the course/activity attached to this Didactic Regulations.

Art. 7
Description of teaching methods

The didactic activity is carried out in conventional modality. [6]
If necessary, the CCD decides which courses also include teaching activities offered online, according to Ministerial Decree 289 of 25 March 2021 (general guidelines for the three-year planning of universities 2021-2023), in Annex 4, letter A.
Some courses may also take place in seminar form and/or involve classroom exercises, language, and computer laboratories.

[3] 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 above or below the aforementioned hours for individual classes, by a limit of 20 per cent".

[4] The number of hours considers the instructions in Art. 6, c. 5 of the RDA: "of the total 25 hours, for each CFU, are reserved: a) 5 to 10 hours for lectures or guided teaching exercises; b) 5 to 10 hours for seminars; c) 8 to 12 hours for laboratory activities or fieldwork, 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.".

[5] For Internship activities (Inter-ministerial Decree 142/1998), subject to further specific provisions, the number of working hours equal to 1 CFU may not be less than 25.]

[6] Please note that, according to Ministerial Decree 289 of 25 March 2021 (general guidelines for the three-year planning of universities 2021-2023), in Annex 4, letter A, the types of programs are as follows:

a) Conventional Degree Programs. Degree Programs delivered entirely in person, or which provide - for activities other than practical and laboratory activities - a limited teaching activity delivered electronically, to an extent not exceeding one tenth of the total.

b) Degree Programs with mixed modality. Degree Programs that provide - for activities other than practical and laboratory activities - a significant proportion of the training activities delivered electronically, but no more than two-thirds.

c) Degree Programs mainly delivered by distance teaching. Degree Programs delivered predominantly by telematic means, to an extent exceeding two-thirds (but not all) of the training activities.

d) Degree Programs delivered entirely by distance. In these Degree Programs all the training activities are delivered electronically; the presence of the examinations of profit and discussion of the final examinations remains unaffected.

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

Art. 8
Testing of training activities[7]

1. The CCD, within the prescribed regulatory limits[8], 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 course sheets and the examination schedule will be made known to students before the start of classes on the Department's website.[9]
3. Examinations are held subject to booking, which is made electronically. In case the student is unable to book an exam for reasons that the President of the Board considers justifiable, the student may still be admitted to the examination, following those students already booked.
4. Before 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[10].

Art. 9
Degree Program structure and Study Plan

1. The legal duration of the Degree Program is 2 years.

[7] Article 22 of the University Didactic Regulations.

[8] Pursuant to the DD.MM. 16.3.2007 in each Degree Programs 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). Pursuant to the RDA, Art. 13, c. 4, "the assessments that constitute an eligibility evaluation for activities referred to in Art. 10, c. 5, letters c), d), and e) of Ministerial Decree no. 270/2004, including the final examination for obtaining the degree, are excluded from the calculation." For Master's Degree Program and single-cycle Master's Degree Program, however, pursuant to the RDA, Art. 14, c. 7, "the assessments that constitute a progress evaluation for activities referred to in Art.10, c. 5, letters d) and e) of Ministerial Decree no. 270/2004 are excluded from the exam count; the final examination for obtaining the Master's Degree and single-cycle Master's Degree is included in the maximum number of exams".

[9] Reference is made to Art. 22, c. 8, of the University Teaching Regulations, which states that "the Department or School ensures that the dates for progress assessments are published on the portal with reasonable advance notice, which normally cannot be less than 60 days before the start of each academic period, and that an adequate period of time is provided for exam registration, which is generally mandatory."

[10] Reference is made to Art. 22, paragraph 4 of the RDA according to which "Examination Boards and other assessments committees are appointed by the Director of the Department or by the President of the School when provided for in the School's Regulations. This function may be delegated to the CCD Coordinator. The Commissions comprise of the President and, if necessary, other professors or experts in the subject. In the case of active courses, the President is the course instructor, and in such cases, the Board can validly make decisions even in the presence of the President alone. In other cases, the President is a professor identified at the time of the Board's appointment. In the comprehensive evaluation of the overall performance at the conclusion of an integrated course, the professors in charge of the coordinated modules participate, and the President is appointed when the Commission is appointed."

The student must acquire 120 CFU[11], attributable to the following Types of Training Activities (TAF):
B) characterising,
C) related or complementary,
D) at the student's choice[12],
E) for the final exam,
F) further training activities.

2. The degree is awarded after having acquired 120 CFU by passing a number of exams not exceeding 12 and carrying out other training activities [13]
   Unless otherwise provided for in the legal framework 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) are taken into consideration for counting purposes. Examinations or assessments relating to activities independently chosen by the student may be considered in the overall calculation corresponding to one unit[14]. Tests constituting an assessment of suitability for the activities referred to in Article 10, paragraph 5, letters d) and e) of Ministerial Decree 270/2004[15] are excluded from the count. Integrated Courses comprising of two or more modules are subject to a single examination.
   To acquire the CFU relating to independent choice activities, as well as training activities that are not teaching activities, the student is free to choose among all the Course 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 CFU relating to autonomous choice activities the "passing the exam or other form of profit verification" is required (Art. 5, c. 4 of Ministerial Decree 270/2004).
3. The student can also include internship credits in excess of those foreseen by the regulation among the credits of his choice, subject to approval by the CCD.
4. It is possible to take elective credits even in years other than the one foreseen, as long as they do not exceed, in total, those required for the entire degree course.
5. The study plan summarises the structure of the Degree Program, listing the envisaged teachings broken down by course year and, in case, by curriculum. At the end, the propedeuticities envisaged by the Degree Program are listed. The study plan offered to students, with an

[11] The total number of CFU for the acquisition of the relevant degree must be understood as follows: six-year single-cycle Degree, 360 CFU; five-year single-cycle Degree, 300 CFU; Bachelor's Degree, 180 CFU; Master's Degree, 120 CFU.
[12] Corresponding to at least 12 ECTs for Bachelor's Degrees and at least 8 CFU for Master's Degrees (Art. 4, c. 3 of Ministerial Decree 16.3.2007).
[13] Art. 14, c. 7 of the University Didactic Regulations ('the final exam for the Master's Degree is included in the calculation of the maximum number of exams').

[14] Pursuant to the D.M. 386/2007.
[15] Art. 10, c. 5 of Ministerial Decree. 270/2004: "In addition to the qualifying training activities, as provided for in paragraphs 1, 2 and 3, Degree Programs shall provide for: a) training activities autonomously chosen by the student as long as they are consistent with the training project [TAF D]; b) training 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) training 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 job sector to which the qualification may give access, including, in particular, training and guidance programs 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".

indication of the scientific-disciplinary sectors and the area to which they belong, of the credits, of the type of educational activity, is set out in Annex 1 to this Didactic Regulations.

6. Pursuant to the Art. 11, paragraph 4-bis, of Ministerial Decree 270/2004, it is possible to obtain the Degree according to an individual study plan that also includes educational activities different from those specified in the Didactic Regulations, if they are consistent with Degree course detail sheet of the academic year of enrollment. The individual study plan is approved by the CCD.

Art. 10
Attendance requirements[16]

1. In general, attendance of lectures is strongly recommended but not compulsory
   In the case of individual courses with compulsory attendance, this option is indicated in the relative teaching/activity course sheet available in Annex 2.
2. If the lecturer envisages a different syllabus modulation for attending and non-attending students, this is indicated in the individual Course detail published on the Degree course web page and on the teacher's UniNA website.
3. Attendance at seminar activities that award training credits is compulsory. The relative modalities for the attribution of CFU are the responsibility of the CCD.

Art. 11
Prerequisites and prior knowledge

1. The list of incoming and outgoing propedeuticities (necessary to sit a particular examination) can be found at the end of Annex 1 and in the teaching/activity course sheet (Annex 2).
2. Any prior knowledge deemed necessary is indicated in the individual Teaching Schedule published on the course webpage and on the teacher's UniNA website.

Art. 12
Degree Program Calendar

The Degree Program calendar can be found on the Department's website well in advance of the start of the activities (Art. 21, c. 5 of the RDA).

Art. 13
Criteria for the recognition of credits earned in other Degree Programs in the same Class[17]

For students coming from Degree Programs of the same class, the Didactic Coordination Commission ensures the full recognition of CFU, when associated with activities that are culturally compatible with the training Degree Program, acquired by the student at the originating Degree Program, according to the criteria outlined 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 by the student may not be less than 50% of those previously achieved. If the course of study of origin is carried out in distance mode, the minimum quota of 50% is recognized only if the course of origin is accredited pursuant to the ministerial regulation referred to in article 2, paragraph 148, of the decree-law 3 October 2006, n. 262, converted by law 24 November 2006, n. 286.

[16] Art. 22, c. 10 of the University Didactic Regulations.
[17] Art. 19 of the University Didactic Regulations.

Article 14

Criteria for the recognition of credits acquired in Degree Programs of different classes, in university or university-level Degree Programs, through single courses, at online Universities and in international Degree Programs[18]; criteria for the recognition of credits acquired in extra-curricular activities

1. Regarding the criteria for the recognition of CFU acquired in Degree Programs of different Classes, in university or university-level Degree Programs, through single courses, at online Universities and in International Degree Programs, the credits acquired are recognised by the CCD on the basis of the following criteria:
   - analysis of the activities 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 Degree Program and of the individual training activities to be recognised.

   Recognition is carried out up to the number of credits envisaged by the didactic system of the Degree Program. Failure to recognise credits must be adequately justified. Pursuant to the Art. 5, c. 5-bis, of Ministerial Decree 270/2004, the acquisition of CFU from other Italian universities is also possible, based on agreements established between the concerned institutions in accordance with the current regulations[19].
2. Any recognition of CFU relating to examinations passed as single courses may take place within the limit of 36 CFU, upon request of the interested party and following the approval of the CCD. Recognition may not contribute to the reduction of the legal duration of the Degree Program, 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[20].
3. With regard to the criteria for the recognition of CFU acquired in extra-curricular activities, pursuant to Art. 3, par. 2, of Ministerial Decree (D.M.) 931/2004, within the limit of 24 CFU, the following activities may be recognised (Art. 2 of D.M. 931/2024):
   - Professional knowledge and skills, certified in accordance with the current regulations as well as knowledge and skills acquired in post-secondary-level training activities.
   - Training activities carried out in the cycles of study at the public administration training institutions as well as knowledge and skills acquired in post-secondary-level training activities, which the University contributed to developing and implementing.
   - Achievement of an Olympic or Paralympic medal or the title of absolute world champion, absolute European champion or absolute Italian champion in disciplines recognized by the Italian National Olympic Committee or the Italian Paralympic Committee.

Art. 15

Criteria for enrolment in individual teaching courses

Enrolment in individual teaching courses, provided for by the University Didactic Regulations[21], is governed by the "University Regulations for enrolment in individual teaching courses activated as part of the Degree Program"[22].

[18] Art. 19 of the University Didactic Regulations.

[19] Art. 6, c. 9 of the University Didactic Regulations.

[20] R.D. No. 3241/2019.

[21] Art. 19, c. 4 of the University Didactic Regulations.

[22] R.D. No. 3241/2019.

Article 16
Features and modalities for the final examination

The master's degree in 'Biology of Extreme Environments' is achieved after passing a final test which consists in the discussion of the results achieved during activities carried out in a research laboratory, both in university facilities and in research centres, companies, or external bodies, including international ones, according to the methods established by the CCS. The completion of a final exam includes the writing of an original paper in English by the student and under the guidance of a supervisor in which the results of the scientific or technological research carried out are reported. The thesis discussion will take place in the presence of a commission appointed for this purpose and may include the use of audio-visual aids. To be admitted to the final test, the student must have obtained all the training credits required by the course's teaching regulations, excluding those reserved for the final test.
The judging commission for the final test, established in accordance with the provisions of paragraph 7 of the art. 29 of the RDA, once the pass has been verified, establishes the degree mark, expressed in one hundred and tenths, considering the curriculum, the thesis and the presentation.
The judging commission for the final test, established in accordance with the provisions of paragraph 7 of the art. 29 of the RDA, once the pass has been verified, establishes the degree mark, expressed in one hundred and tenths, considering the curriculum, of the thesis and presentation. The Commission, in the case of reaching a mark of 110/110, can assign honors with a unanimous decision.

Article 17
Guidelines for traineeship and internship

1. Students enrolled in the Degree Program may decide to carry out internships or training periods with organisations or companies that have an agreement with the University. Traineeship and internship are not compulsory and contribute to the award of credits for the other training 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[23].
2. The modalities and characteristics of traineeship and internship are regulated by the CCD with a specific regulation.
3. The University of Naples Federico II, through the tranship student office **(http://www.unina.ut/didattica/tiricini-studenti)** 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[24]

A student who has not taken any examinations for eight consecutive academic years incurs forfeiture unless his/her 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.

[23] Traineeships ex letter d can be both internal and external; traineeships ex letter e can only be external.
[24] Art. 24, c. 5 of the University Didactic Regulations.

Article 19
Teaching tasks, including supplementary teaching, guidance, and tutoring activities

1. Professors and researchers carry out the teaching load assigned to them in accordance with the provisions of the RDA 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[25].
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 orienting 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.
4. The University ensures guidance, tutoring and assistance services and activities to welcome and support students. These activities are organised by the Schools and/or Departments under the coordination of the University, as established by the RDA in Article 8.

Article 20
Evaluation of the quality of the activities performed

1. The Didactic Coordination Commission implements all the forms of quality assessment of teaching activities envisaged by the regulations in force according to the indications provided by the University Quality Presidium.
2. 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)[26] 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 placement of graduates into the world of work and on post-graduate 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.
3. The QA System 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.

[25] R.D No. 2482//2020.

[26] 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.

Article 21
Final Rules

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

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 (Degree course structure) and Annex 2 (Teaching/Activity course sheet) are an integral part of this Didactic Regulations.

ANNEX 1.2

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOLOGY OF EXTREME ENVIRONMENTS

CLASS LM-6

School: Polytechnic and basic Science

Department: Biology

Didactic Regulations in force since the academic year 2025/26

STUDY PLAN

KEY

Type of Educational Activity (TAF):

B = Characterising
C = Related or Supplementary
D = At the student's choice
E = Final examination and language knowledge
F = Further training activities

I Year									
Curriculum Biological resources									
Title Course	**SSD**	**Module**	**Credits**	**Hours**	**Type Activities** ***(lectures, workshops, etc.)***	**Course Modalities** ***(in-person, by distance)***	**TAF**	**Disciplinary area**	**Mandatory/ Optional**
Introduction to Earth system sciences	GEO/02	single	6	48	Frontal lesson	In person	C	Related or supplementary activity	Mandatory
Microbiology of extreme environments	BIO/19	Single	8	64	Frontal lesson	In person	B	Biomolecular	Mandatory
Biodiversity and primary productivity in extreme environments	BIO/01	Single	6	48	Frontal lesson	In person	B	Biodiversity and environment	Mandatory
Chemistry of Biopolymers and metabolites from Extreme Environments	CHIM/06	Single	6	48	Frontal lesson	In person	C	Related or supplementary activity	Mandatory
Biochemistry and molecular adaptation to extreme environments	BIO/10	single	8	64	Frontal lesson	In person	B	Biomolecular	Mandatory
Ecology of extreme environments	BIO/07	single	6	48	Frontal lesson	In person	B	Biodiversity and	Mandatory

								environment	
Applied microbiology of extremophiles	BIO/19	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
At the student's choice activity		single	6	48		In person/by distance	D	At the student's choice	Mandatory
II Year									
Title Course	**SSD**	**Module**	**Credits**	**Hours**	**Type Activities** ***(lectures, workshops, etc.)***	**Course Modalities** ***(in-person, by distance)***	**TAF**	**Disciplinary area**	**Mandatory/ Optional**
Extreme Environments and Public Health	MED/42	single	6	48	Frontal lesson	In person	B	Biomedical	Mandatory
Discovery and applications of extremophilic enzymes	BIO/10	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
Omics data analysis	BIO/18	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
At the student's choice activity		single	6	48		In person/by distance	D	At the student's choice	Mandatory
Further knowledge useful for job placement/Further language knowledge*		Single	6	150		In-person/by-distance	F	Further training activities	Mandatory
Thesis activity		single	38	950			E	Final test	Mandatory

*for international student

I Year									
Curriculum Astrobiology									
Title Course	**SSD**	**Module**	**Credits**	**Hours**	**Type Activities** ***(lectures, workshops, etc.)***	**Course Modalities** ***(in-person, by distance)***	**TAF**	**Disciplinary area**	**Mandatory/ Optional**
Introduction to Earth system sciences	GEO/02	single	6	48	Frontal lesson	In person	C	Related or supplementary activity	Mandatory
Microbiology of extreme environments	BIO/19	single	8	64	Frontal lesson	In person	B	Biomolecular	Mandatory
Extreme environments: Earth and space	BIO/07	single	6	48	Frontal lesson	In person	B	Biodiversity and environment	Mandatory
Astrochemistry and prebiotic process	CHIM/06	single	6	48	Frontal lesson	In person	C	Related or supplementary activity	Mandatory

Astrobotany	BIO/03	single	6	48	Frontal lesson	In person	B	Biodiversity and environment	Mandatory
Biochemistry and molecular adaptation to extreme environments	BIO/10	single	8	64	Frontal lesson	In person	B	Biomolecular	Mandatory
Physiology and Nutrition in Space Conditions	BIO/09	single	6	48	Frontal lesson	In person	B	Biomedical	Mandatory
At the student's choice activity		single	6	48		In person/by distance	D	At the student's choice	Mandatory
II Year									
Title Course	**SSD**	**Module**	**Credits**	**Hours**	**Type Activities** ***(lectures, workshops, etc.)***	**Course Modalities** ***(in-person, by distance)***	**TAF**	**Disciplinary area**	**Mandatory/ Optional**
Microbial metabolism and planetary habitability	BIO/19	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
Emergence of life and exobiology	BIO/10	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
Omics data analysis	BIO/18	single	6	48	Frontal lesson	In person	B	Biomolecular	Mandatory
At the student's choice activity		single	6	48		In person/by distance	D	At the student's choice	Mandatory
Further knowledge useful for job placement/Further language knowledge*		Single	6	150		In-person/by-distance	F	Further training activities	Mandatory
Thesis Activity		single	38	950			E	Final test	Mandatory

*for international student

At the student's choice courses						
Title Course	**SSD**	**Module**	**Credits**	**Hours**	**Type Activities** ***(lectures, workshops, etc.)***	**Course Modalities** ***(in-person, by distance)***
Astrophysics of life	FIS/05	single	6	48	Frontal lesson	In person
Advanced methodologies for biosignatures detection and analysis in space environments	CHIM/06	single	6	48	Frontal lesson	In person

ANNEX 2.1

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOLOGY OF EXTREME ENVIRONMENTS

CLASS LM-6

School: Polytechnic and basic Science

Department: Biology

Didactic Regulations in force since the academic year 2025/26

Curriculum in *Biological Reseources*

Course: Introduction to Earth system sciences	**Teaching Language:** English
SSD (Subject Areas): GEO/02	**CREDITS:** 6 ECTS
Course year: first	**Type of Educational Activity: C-** Related or Supplementary
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The contents of the SSD include: the geochronological reconstruction of the physical and biological events in the history of the Earth; the analysis of stratigraphic successions, the reconstruction of sedimentary bodies, present and fossil, their description, the description of their spatial organization and of their temporal evolution, their mapping and the interpretation of their genesis; the analysis of sedimentary facies and of the evolution of sedimentary basins; the reconstruction of paleoenvironments, paleoclimates and paleogeography; the study of the composition, of the erosion, transport and deposition of sediments and of their diagenetic transformation; the genesis and classification of sedimentary rocks; the study of present-day marine and continental sedimentary environments and of their dynamics on the Earth and on other planets.	
Objectives: The course aims at providing to the students the basic knowledges and methodologies needed to understand the functioning of the Earth System. It aims to describe the interactions between the atmosphere, biosphere, cryosphere, hydrosphere and lithosphere and their co-evolution during geological time, with special emphasis on climate and on the main biogeochemical cycles. Finally, the course aims to provide to the students the knowledges needed to understand how these interactions contributed to shape the habitability of planet Earth.	
Propaedeutic ties: None **Is a propaedeutic for:** None	
Types of examinations and other tests: Oral examination	

Course: Microbiology of extreme environments	**Teaching Language:** English
SSD (Subject Areas): BIO/19	**CREDITS: 8**
Course year: first	**Type of Educational Activity: B -**Characterising
Teaching Methods:	

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

interactions of all microorganisms, including viruses, as simple models for studying and understanding biological processes; the distribution of microorganisms in nature and the role they play in the environment

Objectives:

The training course aims to provide knowledge relating to microbial life in extreme environments, its adaptations and the role of extremophiles in the cyclisation of elements, with particular attention to the effect on surrounding ecosystems

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Course: Biodiversity and primary productivity in extreme environments	**Teaching Language:** English
SSD (Subject Areas): BIO/01	**CREDITS:** 6
Course year: first	**Type of Educational Activity: B-**Characterising

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The sector studies plant biology at all levels of organization, including autotrophic prokaryotes, algae and fungi, as well as their symbioses. Explores the ways in which cells and organs acquire the ability to perform specialized functions; highlights the relationships between cytological, ultrastructural, histological, anatomical, morphological, organographic, physiological aspects and the role of secondary metabolites, framing them in the characteristics of the environment. It also studies the development and application of functional methods to relevant investigations and related biotechnological applications.

Objectives:

The training path of the course aims to provide students with the basic knowledge and methodological tools necessary to sample, isolate, maintain in culture and cultivate extremophilic and extreme-tolerant cyanobacteria and microalgae on a large scale. This knowledge will allow the acquisition of the basic knowledge required to deal with the laboratory management of these organisms

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Course: Chemistry of biopolymers and metabolites from extreme environments	**Teaching Language:** English
SSD (Subject areas): CHIM/06	**CREDITS:** 6
Course year: first	**Type of Educational Activity: C-** Related or Supplementary

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

Organic Chemistry deals with carbon compounds. In particular, the main classes of natural biopolymers fall within the study of Organic Chemistry. Furthermore, the elucidation of the structure of organic compounds that are formed and transformed in natural and environmental systems, their supramolecular interactions and structure-reactivity relationships are also the object of study.

Objectives:

The course aims to provide students with knowledge on the main classes of biopolymers and metabolites coming from microorganisms isolated in extreme environments. Students will also be provided with knowledge about advanced methodologies for the purification and characterization of these molecules. The course will allow students to understand at a molecular level the structure/activity relationship of the aforementioned molecules, which is fundamental for understanding the mechanisms of adaptation to life in extreme environments.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Written and oral examination

Course: Biochemistry and molecular adaptation to extreme environments	**Teaching Language:** English
SSD (Subject areas): BIO/10	**CREDITS:** 8
Course year: first	**Type of Educational Activity: B –** Characterising

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The chemistry of life starting from its preparatory bases, the biological processes at the molecular level, the structure, properties and functions of biomolecules, including proteins and nucleic acids; industrial biochemistry, the biochemistry of microorganisms and of products of biotechnological origin.

Objectives:

The aim of the course is to provide knowledge on the molecular basis of the stability of macromolecules under extreme conditions, as well as on the mechanisms underlying adaptation and resilience in environments hostile to human life.

Propaedeuticities:

None

Is a propaedeuticity for:

None

Types of examinations and other tests:

Oral examination

Course: Ecology of extreme environments	**Teaching Language:** English
SSD (Subject areas): BIO/07	**CREDITS:** 6
Course year: first	**Type of Educational Activity: B-** characterising

Teaching Methods:

In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The study of processes inherent the systemic ecology in extreme environments. A synecological approach will be used. Students will be directed towards the understand the processes that drive trophic relationships and influence the structure and spatio-temporal dynamics of communities in extreme environments.

Objectives:

Understand the ecological processes that drive trophic relationships and influence the structure and spatio-temporal dynamics of communities in extreme environments. The student must be able to conceptually connect the different

topics of the course and develop strong critical skills. The student must correctly use the technical-scientific language learned during the course and must be able to transmit the contents to a non-expert audience.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Applied microbiology of extremophiles	**Teaching Language:** English
SSD (subject areas): BIO/19	**CREDITS:** 6
Course year: first	**Type of Educational Activity: B-** characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
distribution of microorganisms in nature and the role they play in the environment, basic and applied microbiological techniques, also in the biotechnological field.

Objectives:
The educational objective of this course is to provide the student with an overview of the application areas of extremophiles with particular attention to their use in the environmental and industrial and biomedical fields, both from a historical and future exploratory perspective

Propaedeuticities:
None

Is a propaedeuticity for:
none

Types of examinations and other tests:
Written and oral examination

Course: Extreme environment and public health	**Teaching Language:** English
SSD (Subject Areas): MED/42	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The sector is involved in scientific and educational activities in the field of general and applied hygiene; the sector has specific expertise in the field of hygiene applied to workplaces, food hygiene, community and social medicine, and public health.

Objectives:
The course provides knowledge regarding the objectives and purposes of general and applied hygiene to public health, the methods for collecting data in the hygiene sector and those for measuring the state of health in the population and public health, also through knowledge of the main epidemiological models, the risk assessment for human health and the related primary, secondary and tertiary prevention in relation to extreme environments, including emerging or re-emerging pathologies.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:

Written examination

Course: Discovery and applications of extremophilic enzymes	**Teaching Language:** English
SSD (Subject Areas): BIO/10	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: Biochemical methodologies for the identification, characterization and analysis of biomolecules. Computational biochemistry and bioinformatics; recombinant molecular technologies for engineering of proteins and organisms; molecular and recombinant biotechnologies, and biochemical and biotechnological applications offered by all the skills listed above at the level of proteins, nucleic acids, lipids and sugars.	
Objectives: The course aims to provide specialized knowledge of biochemistry applied to the study of enzymes from extreme environments, in particular in relation to their identification, characterization and applications in the field of bioresources.	
Propaedeuticities: None **Is a propaedeuticity for:** None	
Types of examinations and other tests: Oral examination	

Course: Omics data analysis	**Teaching Language:** English
SSD (Subject Areas): BIO/18	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising
Teaching Methods: In-person	
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector analyses the structure and evolution of genes and genomes, also at a computational and bioinformatic level. Investigates the genetic and molecular bases of evolution and the practical applications of genetics and the molecular technologies derived from it.	
Objectives: The training objective of the course is to provide the student with the information necessary for understanding the modern omics data analysis technologies that are used in the genomics of model and non-model species. The aim of the course will also be to allow learners to acquire in-depth knowledge about in silico methodologies that permit the study of extremophilic organisms.	
Propaedeuticities: None **Is a propaedeuticity for:** None	
Types of examinations and other tests: Oral examination	

Curriculum in Astrobiology

Course: Introduction to Earth system sciences	**Teaching Language:** English

SSD (Subject Areas): GEO/02	**CREDITS:** 6 ECTS
Course year: first	**Type of Educational Activity: C-** Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The contents of the SSD include: the geochronological reconstruction of the physical and biological events in the history of the Earth; the analysis of stratigraphic successions, the reconstruction of sedimentary bodies, present and fossil, their description, the description of their spatial organization and of their temporal evolution, their mapping and the interpretation of their genesis; the analysis of sedimentary facies and of the evolution of sedimentary basins; the reconstruction of paleoenvironments, paleoclimates and paleogeography; the study of the composition, of the erosion, transport and deposition of sediments and of their diagenetic transformation; the genesis and classification of sedimentary rocks; the study of present-day marine and continental sedimentary environments and of their dynamics on the Earth and on other planets.

Objectives:
The course aims at providing to the students the basic knowledges and methodologies needed to understand the functioning of the Earth System. It aims to describe the interactions between the atmosphere, biosphere, cryosphere, hydrosphere and lithosphere and their co-evolution during geological time, with special emphasis on climate and on the main biogeochemical cycles. Finally, the course aims to provide to the students the knowledges needed to understand how these interactions contributed to shape the habitability of planet Earth.

Propaedeutic ties:
None

Is a propaedeutic for:
None

Types of examinations and other tests:
Oral examination

Course: Microbiology of extreme environments	**Teaching Language:** English
SSD (Subject Areas): BIO/19	**CREDITS: 8**
Course year: first	**Type of Educational Activity: B-**Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
interactions of all microorganisms, including viruses, as simple models for studying and understanding biological processes; the distribution of microorganisms in nature and the role they play in the environment

Objectives:
The training course aims to provide knowledge relating to microbial life in extreme environments, its adaptations and the role of extremophiles in the cyclisation of elements, with particular attention to the effect on surrounding ecosystems

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Extreme environments: Earth and spaces	**Teaching Language:** English
SSD (Subject areas): BIO/07	**CREDITS:** 6
Course Year: first	**Type of educational activity: B –** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Relationship between autotrophic and heterotrophic terrestrial and marine organisms with the environment, with particular attention to ecological interactions and organism responses to abiotic environment. Regulation and population dynamics in response to resources in extreme environments; community dynamics, processes, global change, and anthropic alterations.

Objectives:
The course provides students deep knowledge on life and surviving in extreme terrestrial and extraterrestrial environments and adaptation strategies of the organisms in a such environments enhancing the information on ecological interactions in these ecosystems. Furthermore, it aims to offer cognitive tools allowing students to elaborate in autonomous and personal way the acquired concepts utilizing a proper terminology.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Astrochemistry and prebiotic process	**Teaching Language:** English
SSD (Subject areas): CHIM/06	**CREDITS:** 6
Course Year: first	**Type of educational activity: C -** Related or Supplementary

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Organic chemistry deals with the study of the chemistry of carbon-based compounds. Among the many topics, organic chemistry also includes the study of the natural compounds and in particular of the mechanisms of formation and their reactivity both in the laboratory and in natural systems.

Objectives:
The course aims to provide students with knowledge on the basic concepts necessary for analyzing the chemical processes occurring under extreme conditions of astrochemical relevance. The course will allow students to understand the impact of the complex systems chemistry in the processes responsible for the emergence of the first forms of life.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Astrobotany	**Teaching Language:** English
SSD (Subject areas): BIO/03	**CREDITS:** 6
Anno di corso: first	**Type of educational activity: B** – Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:

The sector studies the distribution, adaptive strategies, ... interrelationships with the environment of prokaryotic and eukaryotic photosynthetic organisms.

Objectives:
Knowledge of the effects of extreme environmental conditions (temperature, light, water stress, microgravity, confined environments) on the growth and development of plant organisms.

Propaedeuticities:
None

Is a propaedeuticity for:
none

Types of examinations and other tests:
Written and oral examination

Course: Biochemistry and molecular adaptation to extreme environments	**Teaching Language:** English
SSD (Subject areas): BIO/10	**CREDITS:** 8
Course year: first	**Type of Educational Activity: B –** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The chemistry of life starting from its preparatory bases, the biological processes at the molecular level, the structure, properties and functions of biomolecules, including proteins and nucleic acids; industrial biochemistry, the biochemistry of microorganisms and of products of biotechnological origin.

Objectives:
The aim of the course is to provide knowledge on the molecular basis of the stability of macromolecules under extreme conditions, as well as on the mechanisms underlying adaptation and resilience in environments hostile to human life.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Physiology and nutrition in space conditions	**Teaching Language:** English
SSD (Subject areas): BIO/09	**CFU:** 6
Course year: first	**Type of Educational Activity: B-** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Physiology analyzes the integrated functioning of different organs and systems in extreme environmental conditions.

Objectives:
The course focuses on the human body's adaptations to extreme conditions, particularly in space. The goal is to address physiological changes in organs and tissues in microgravity conditions. Furthermore, it will be described how nutrition affects the correct functioning of the organism and what nutritional standards are to be applied in space conditions.

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Written and oral examination

Course: Microbial metabolisms and planetary habitability	**Teaching Language:** English
SSD (Subject Areas): BIO/19	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising

Teaching Methods:
In-person teaching

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
Interactions of all microorganisms, including viruses, as simple models for studying and understanding biological processes; the distribution of microorganisms in nature and the role they play in the environment

Objectives:
The course provides detailed knowledge of the interaction between microbial metabolic diversity and its effects on a planetary scale, with particular emphasis on aspects of maintaining habitability on geological scales

Propaedeuticities:
None

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Emergence of life and exobiology	**Teaching Language:** English
SSD (Subject Areas): BIO/10	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course:
The chemistry of living matter starting from its preparatory bases, the properties and functions of biomolecules, including proteins and nucleic acids; metabolism, the biochemical mechanisms of prokaryotic cell functions, the biochemical interactions between organisms and the environment; bioinformatics biochemistry.

Objectives:
This course aims to provide knowledge regarding the synergistic role of biotic and abiotic factors that influenced the origin of life on Earth. Furthermore, it aims to expose the state of the art and deal with experimental approaches concerning the search for extraterrestrial life forms.

Propaedeuticities:
none

Is a propaedeuticity for:
None

Types of examinations and other tests:
Oral examination

Course: Omics data analysis	**Teaching Language:** English
SSD (Subject Areas): BIO/18	**CREDITS:** 6
Course year: second	**Type of Educational Activity: B-** Characterising

Teaching Methods:
In-person

Contents extracted from the SSD declaratory consistent with the training objectives of the course: The sector analyses the structure and evolution of genes and genomes, also at a computational and bioinformatic level. Investigates the genetic and molecular bases of evolution and the practical applications of genetics and the molecular technologies derived from it.
Objectives: The training objective of the course is to provide the student with the information necessary for understanding the modern omics data analysis technologies that are used in the genomics of model and non-model species. The aim of the course will also be to allow learners to acquire in-depth knowledge about in silico methodologies that permit the study of extremophilic organisms.
Propaedeuticities: None **Is a propaedeuticity for:** None
Types of examinations and other tests: Oral examination

At the Student's choice courses

Course: Astrophysics of life		**Teaching Language:** English
SSD (Subject Areas): FIS/05		**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: D -** at the student's choice	
Teaching Methods: In-person		
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The field includes the skills necessary for both the theoretical and observational study of astronomical and astrophysical phenomena, namely celestial bodies and systems of celestial bodies, cosmology, the physics of self-gravitating systems and gravitation, especially in its classical, statistical-mechanical aspects. and computational, as well as space and cosmic physics. It also includes the skills needed to develop innovative, observational and computational methodologies and technologies, aimed at deepening specific knowledge. The skills of this sector also concern research in the fields of physics of the interstellar and intergalactic medium, the study of high-energy emission phenomena as well as field-specific mathematical and computational methods.		
Objectives: The course aims to introduce the fundamental concepts and methods of modern astrophysics, as an introduction to the study of the problem of searching for life in the Cosmos. Students will address the main theories on the formation of the Universe, stars and planets and the methods of contemporary astrophysics for the study of cosmic environments potentially hospitable to life (rocky planets, satellites of giant planets, comets). The final part of the course focuses on some open problems of astrobiology, such as the definition of the astrophysical conditions for life, the astronomical search for tracers of life and intelligence in the Cosmos.		
Propaedeuticities: None **Is a propaedeuticity for:** None		
Types of examinations and other tests: Written examination		

Course: Advanced methodologies for biosignatures detection and analysis in space environments		**Teaching Language:** English
SSD (Subject areas): CHIM/06		**CREDITS:** 6
Course year: first/second	**Type of Educational Activity: D –** at the student's choice	

Teaching Methods: In-person
Contents extracted from the SSD declaratory consistent with the training objectives of the course: The contents of the CHIM/06 sector, ORGANIC CHEMISTRY deals, among other things, with studying carbon compounds of natural origin, going to elucidate the mechanisms through which organic compounds are formed and transformed in the laboratory and in natural and environmental systems
Objectives: The course aims to provide a general and integrated framework of the advanced methodologies used for the isolation and structural characterization of organic compounds of interest as biosignatures in space environments. Students will address the main problems associated with the processing of complex matrices in extreme conditions and will acquire the skills necessary to be able to carry out a comparative structural analysis of the main organic compounds related to life: This will allow them to define the complex series of transformations that could generate the molecules of life in extreme conditions such as those found in space environments. Some case studies will be addressed in more detail through experimental activities conducted in the laboratory.
Propaedeuticities: None **Is a propaedeuticity for:** None
Types of examinations and other tests: Oral examination

ANNEX 2.2

DEGREE PROGRAM DIDACTIC REGULATIONS

BIOLOGY OF EXTREME ENVIRONMENTS

CLASS LM-6

School: Polytechnic of Basic Sciences

Department: Biology

Didactic Regulations in force since the academic year 2025/26

Training activity: under Art. 10, c. 5, letter d	**Activity language:** English/Italian
Activity: For Italian students: other knowledge useful for job placement; IT and telematics skills; training and orientation periods) that contribute to the achievement of the CdS objectives. for foreign students: acquisition of Italian language knowledge.	**CREDITS:** 6
Anno di corso: Second year	**Further training activities: F** – further training activities
Teaching Methods: In person/by-distance	
Objectives: The further training activities are aimed at acquiring further knowledge useful for entering the world of work and aimed at facilitating professional choices.	

Propaedeuticities:
None
Is a propaedeuticity for:
None

Tipologia delle prove di verifica del profitto: aptitude