UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2026/27
MASTER DEGREE
PHYSICS (Classe LM-17 R)
Enrolled in academic year 2026/2027

HEADING

Degree classification - Denomination and code:	LM-17 R
Degree title:	Dottore Magistrale
Curricula currently available:	SPECIALISTIC / MULTI-SECTOR
Length of course:	2 years
Credits required for admission:	180
Total number of credits required to complete programme:	120
Years of course currently available:	1st
Access procedures:	Open, subject to entry requirements
Course code:	FBP

PERSONS/ROLES

Head of Study Programme

Prof.ssa Alessandra Guglielmetti

Tutors - Faculty

Tutor per l'orientamento (Academic guidance tutor)
F. Camera, S. Cialdi, G. Colò, L. Gariboldi, M. Giudici, A. Guglielmetti, G. Lodato, N. Manini, S. Olivares, P. Piseri, M. Sorbi, G. Tiana, B. Vacchini, A. Vicini, M. Zaro

Tutor per i piani di studio (Study plan tutor)
A. Guglielmetti

Tutor per la mobilità internazionale e l'Erasmus (Erasmus and International mobility)
N. Piovella

Tutor per stage e tirocini (Internship tutor)
A. Guglielmetti, N. Piovella

Tutor per laboratori e altre attività (Laboratory Classes)
R. Vecchi

Tutors - Students

BEDODI NICOLA
DE NARDI ANGELO MARIA
LONARDONI STEFANO
MAURI FILIPPO
PICONE FEDERICO
SANA ANDREA
TESSITORE NICOLA

Degree Course website

https://fisica-lm.cdl.unimi.it/it

Admission

G. Maero, C. Barbieri, M. Genoni, S. Riboldi

Dissertation and Final Exam

L. Bonizzoni (Presidente), C. Benedetti, F. Camera, S. Carrazza, V. Liberali, D. Maino

Enrolment

https://www.unimi.it/it/node/183

Laboratory Security

M. Potenza

Library

Via Celoria 18 - 20133 Milano http://www.sba.unimi.it/Biblioteche/bicf/13453.html

Outreach

https://unimibox.unimi.it/index.php/s/d3z27gH8KLosixk

PLS Program Chair

M. Giliberti

Program Transfer

G. Maero, C. Barbieri, M. Genoni, S. Riboldi

Reference Office

Via Celoria 16 - 20133 Milano Phone 02.50317401 https://informastudenti.unimi.it/saw/ess?AUTH=SAML

Schedule of Classes

S. Bottoni, M. Gherardi

Specific Learning Disabilities

L. Carminati

Student registrar

Phone 0250325032 https://www.unimi.it/it/studiare/servizi-gli-studenti/segreterie-informastudenti

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

General and Specific Educational Objectives

The Master's Degree Program in Physics is designed to provide a deep and up-to-date specialized education across all sectors of contemporary physics. The specific educational objectives of the program aim to train graduates who:

- Possess a thorough understanding of classical, relativistic, and quantum physics, encompassing phenomenological and theoretical aspects, their mathematical formalization, and numerical modeling.
- Have solid knowledge of technologies and analytical methods for processing large amounts of structured and unstructured, and even heterogeneous, data.
- Are equipped with training that can easily adapt to technological and scientific innovations, applying scientific research methods to the modeling of complex systems, even in fields beyond traditional physics.

Specifically, the degree program aims to achieve the following objectives:

- Provide a solid cultural foundation in the fields of experimental and applied physics; theoretical and foundational physics; microphysics and material structure; astrophysics, geophysics, and space physics.
- Offer advanced scientific and operational training with significant expertise in at least one of the following areas: Astrophysics, Biophysics, Accelerator Physics, Plasma Physics, Complex Systems Physics, Nuclear Physics, Condensed Matter Physics, Applied Physics for Medicine, Physics for Cultural Heritage, Experimental Particle Physics and Fundamental Interactions, Environmental Physics, Electronics, History and Teaching of Physics, Quantum Technologies, Theory of Fundamental Interactions, Models and Methods of Theoretical Physics, and Quantum Computing.
- Prepare graduates with a strong aptitude for problem-solving.
- Train graduates capable of describing natural phenomena rigorously using a mathematical-statistical approach, and of working autonomously, including taking managerial responsibility for projects.
- Equip graduates with tools for high-level scientific communication and dissemination.
- Prepare graduates with solid expertise in both content and methodologies for teaching.

These educational objectives are tailored to provide Physics graduates with a curriculum suitable for:

- Admission to third-level education programs, such as doctoral studies, medical physics specialization schools, and second-level master's programs.
- Entry into the workforce with qualifications for high-level professional roles involving research and development in science- and technology-based sectors (e.g., energy, electronics, mechanics, materials, telecommunications, environment, cultural heritage, medicine) or areas requiring data analysis and modeling of complex phenomena using scientific methods (e.g., economics and finance).

The program's educational offerings are closely linked to the research lines in physics developed at the university, ensuring students achieve solid scientific preparation and expertise in specific fields.

The academic pathway includes lectures, exercises, laboratory work, elective courses, participation in seminars, and internships. The program also includes related disciplines alongside in-depth English language proficiency.

The program covers the following learning areas:

- Experimental Physics Area for Specialized Training: To deepen knowledge in one of the specialized sectors listed above, aligned with the student's interests and the program's educational objectives.
- Theoretical Physics and Mathematical Physics Area: To advance knowledge in the foundational, theoretical, and mathematical aspects of physics, including advanced mathematics and methodologies for teaching technologies.
- Physics Laboratory Area for Research: Comprising advanced laboratory courses that typically provide access to instrumentation used by faculty and researchers in fundamental and applied research.

The program concludes with the preparation of a thesis, which may be carried out in university facilities or at external institutions such as qualified research entities, companies in the technological sector, organizations focused on environmental and/or cultural heritage preservation, hospitals, or banks. The thesis results are presented orally before a dedicated committee.

The degree program offers a choice of curricula:

1. A curriculum allowing the selection of courses focused on a specific area of physics, such as those listed above.
2. A curriculum offering a more uniform coverage of different fields, oriented toward teaching and scientific dissemination.

Expected learning outcomes

Expected Learning Outcomes

The main competencies developed by graduates of the Master's Degree in Physics, according to the Dublin Descriptors system, are as follows:

Knowledge and Understanding

Through in-depth study of disciplines related to theoretical and experimental physics research, graduates will acquire:

- Knowledge and understanding of core disciplines characterizing the degree program in experimental, theoretical, and foundational physics, microphysics of matter and fundamental interactions, astrophysics/geophysics/space physics.
- Knowledge and understanding of classical physics: mechanics, thermodynamics, electrodynamics, optics and wave propagation, fluid dynamics, and analytical mechanics.
- Knowledge and understanding of modern physics: quantum mechanics, quantum theory of matter, nuclear physics, elementary particle physics, and special relativity.
- Understanding of interdisciplinary aspects of physical phenomena and the ability to frame research problems within a broad and historical-scientific context.
- Advanced mathematical knowledge, including calculus, linear algebra and geometry, complex analysis, and elements of functional analysis.
- Advanced computer science skills, including procedural and object-oriented programming, problem-solving with numerical techniques, and computer networks.
- Knowledge of electronics and electronic instrumentation, such as analog and digital- electronics, instrumentation control, and data acquisition systems.

These competencies are achieved through lectures, exercises, laboratories, and individual study. -They are assessed through written and/or oral exams, which may include interim written tests. Laboratory courses require oral or practical evaluations, as well as written reports on experiments to assess critical thinking and mastery of experimental techniques and data analysis.

Applying Knowledge and Understanding

Thanks to the reinforcement of methodological, technological, and instrumental competencies, even in multidisciplinary and applied contexts, graduates will acquire:

- The ability to use the scientific method to study physical phenomena and analyze experimental data.
- The ability to construct and/or develop mathematical models of reality.
- Proficiency in performing laboratory measurements using modern instrumentation and processing data with statistical methods and computer networks.
- The ability to use sensors and detectors for physical signals as well as measurement instruments, including computer-controlled systems.
- Expertise in utilizing specific instrumentation for one or more areas of physics.
- Teamwork skills, acquired through experimental and computational physics labs and research groups during thesis preparation.

These abilities are developed during lectures, experimental and computational laboratory activities, internships, and thesis preparation. They are assessed through oral and written exams, as well as the final thesis, which demonstrates the student's ability to apply their knowledge.

Making Judgements

Graduates will develop:

- The ability to evaluate the implications of experimental data obtained in laboratories or provided by research agencies.
- The capacity to reflect on the social and ethical responsibilities associated with applying knowledge.
- The ability to work independently and assume scientific responsibilities.
- Self-assessment capabilities within a scientific context or for entering the workforce.

Judgment autonomy is fostered through group work in teaching labs, writing related reports, participating in study groups and scientific seminars, critical interaction with faculty during exams, and thesis research and writing. It is assessed by evaluating laboratory reports, examination performance, and the final thesis.

Communication Skills

Graduates will be able to communicate information, ideas, problems, and solutions to both specialist and non-specialist audiences. Specifically, they will acquire:

- Skills to effectively communicate orally and in writing to expert or non-expert counterparts, with scientific rigor, appropriate language, and tailored focus.
- The ability to present experimental and theoretical results using modern multimedia presentation techniques.
- Proficiency in the English language, both written and spoken, in their field of expertise and for general information exchange, with particular attention to scientific lexicon and technical terminology.
- The ability to use English effectively in scientific, outreach, and teaching contexts.

These communication skills are developed through exams, laboratory reports, seminars, active participation in exercises and courses, and the preparation and presentation of thesis work. They are assessed during exams and the final thesis defense.

Learning Skills

Graduates will develop a strong aptitude for deepening and extending their competencies. Specifically, they will acquire:

- The ability to conduct complex bibliographic research.
- The ability to analyze and solve complex problems.
- The capacity to stay updated on advancements.
- The ability to consult databases and electronic journals.
- The ability to use advanced textbooks and specialized research journals, even in English, base-d on a solid foundational knowledge.

Learning skills are acquired throughout the program and during thesis preparation. They are evaluated during the final exam and through assignments requiring independently developed reports.

Professional profile and employment opportunities

Professional Profile and Career Opportunities

Professional Profile: Master's Degree Physicist

Roles in a Work Context

Graduates in physics can perform a variety of roles in the workplace, including:

- Responsible for the scientific analysis and interpretation of measurable phenomena.
- Designer and developer of prototypes.
- Specialist in the use and development of instrumentation.
- Expert in performing measurements of natural phenomena (e.g., radioactivity, electromagnetic fields).
- Support leader in decision-making processes, particularly in risk assessment related to radiation protection.
- Data analyst, including statistical approaches ("data scientist").
- Developer of mathematical-statistical predictive models in diverse contexts (mechanics, finance, medicine, etc.).
- Team coordinator.
- Head of research and development activities.
- Promoter of scientific culture and outreach.
- Trainer in technical and scientific education for personnel or external users.
- Designer of innovative teaching proposals.
- Author of scientific documents (articles, books, essays, etc.).

To reach higher levels of responsibility, further training through doctoral programs or specialization schools is required.

Skills Associated with These Roles

Graduates in physics will acquire the following competencies, enabling them to perform the above-mentioned roles. These skills are based on a strong scientific foundation and an open-minded approach:

- Expertise in all aspects of classical and modern physics, with a strong inclination for in-depth analysis.
- Ability to apply the scientific method.
- Capacity to coordinate, harmonize, and motivate team efforts in research and development.
- Advanced mathematical, statistical, and computational skills.
- Ability to process statistical data and interpret it using theoretical or physical models.
- Proficiency in using complex instrumentation and interfacing it with computers for optimizing and automating measurements.
- Effective communication on scientific topics, including proficiency in English.

Career Opportunities

Graduates can pursue careers in various industries and public or private organizations, working in:

- Research centers and laboratories.
- Hospitals and healthcare facilities utilizing diagnostic, therapeutic, and radiation protection techniques.
- Astronomical observatories.
- Museums and other institutions dedicated to scientific outreach.
- Banks and insurance companies.
- Facilities for developing mathematical-statistical models of phenomena.
- Facilities for the use and development of complex systems and instruments.
- Institutions involved in the restoration of artistic heritage and environmental protection.

- Energy production plants (e.g., nuclear power plants).
- Facilities for data acquisition and processing.

For graduates interested in careers requiring additional specialization, further education through doctoral programs or specialization schools is a common path.

Initial knowledge required

Admission requirements:

Bachelor's graduates in Physics (degree class L-30 and corresponding class pursuant to Ministerial Decree 509/99) can access the Master's degree programme in Physics.

Those who have a Bachelor's degree in another class can also access the programme, provided they have earned

- 24 CFU, i.e. university credits, in the scientific-disciplinary sectors (SSD) FIS/01-08, of which at least 12 in FIS/02 and at least 6 in total in FIS/03, FIS/04, FIS/05;
- 20 CFU in the scientific-disciplinary sectors (SSD) MAT/01-09

Those who have obtained an equivalent qualification abroad can also access the programme, provided that they prove to meet skills requirements.

Admission assessment

Applicants must prove in-depth knowledge of classical physics and mathematical analysis, and basic knowledge of geometry, computer science, analytical mechanics, quantum mechanics, the structure of matter, nuclear and subnuclear physics, as well as laboratory work skills (data acquisition and processing).

All candidates will be assessed through an interview on subjects covered by the core courses of the aforementioned degree programme in Physics.

The interviewing board will include faculty members appointed by the Academic Board. The interview may also take place before graduation. However, the candidate must obtain their degree by 31 December 2025.

For the 2026/2027 academic year, interviews are scheduled on the following dates:

19 June 2026, 9.00 am
11 September 2026, 9.00 am
6 November 2026, 10:45 am
8 January 2026, 10:45 am

The interviews will take place online using the Zoom platform by connecting to the following link: https://zoom.us/my/aula.consiglio

Candidates who fail the interview, whether graduates or upcoming graduates, may not enrol on the Master's degree programme for the current year.

Admission requirements

Proficiency in English at level B1 or higher according to the Common European Framework of Reference for Languages (CEFR) is required for admission.

The B1-level requirement will be ascertained by the University Language Centre (SLAM) upon admission as follows:

• Valid language certificate at B1 level or higher, issued no more than three years before the application date. The list of language certificates recognized by the University is available at https://www.unimi.it/en/node/39322 .The certificate must be uploaded when submitting the online application;

• English level achieved during a University of Milan degree programme and certified by the University Language Centre (SLAM) no more than four years before the application date, including levels based on language certificates submitted by the applicant during their Bachelor’s degree at the University of Milan. Verification will be carried out automatically, no documents need to be uploaded.

• Entry test administrated by the University Language Centre (SLAM) according to the calendar published on the website: (https://www.unimi.it/en/node/39267/)

Applicants who fail to submit a valid certificate or do not meet the required proficiency level will be instructed during the admission procedure to take the Entry test.

Applicants who do not take or pass the Entry test will be required to obtain a language proficiency certificate recognized by the University (see https://www.unimi.it/en/node/39322) and submit it to SLAM via the InformaStudenti service by the deadline set by the master’s degree programme (https://www.unimi.it/en/node/39267/).

Applicants who fail to meet the requirement by said deadline will not be admitted to the master's degree programme and may not sit any further tests.

Compulsory attendance

Attendance is compulsory and will be monitored in each class for laboratory courses.

Internship criteria

The Specialist Curriculum foresees a compulsory training and orientation internship which can also be correlated with the preparation of the thesis. The internship must be followed by a professor the degree program who will certify the quality of the activity carried out. The internship lasts approximately 2 months and allows you to acquire 6 credits. Furthermore, it is possible to include additional internship periods in the study plan within the 12 University Training Credits (CFU) envisaged for free-choice activities. The guidelines for this second type of internship are given at the link https://fisica-lm.cdl.unimi.it/it/studiare/stage-e-tirocini

An essential condition for the approval of this type of training activity in the study plan is the presence of a teacher-tutor who guarantees the quality of the activity, quantifies its extent in terms of credits, and certifies the achievement through a written report of the pre-established learning objectives.

Degree programme final exams

Final exam
For their final exam, upcoming graduates will have to present and defend an original thesis written under the guidance of a supervisor.
This thesis must relate to theoretical or experimental research conducted independently at research groups, institutions or firms with the aim of solving a physics problem.
The thesis will document research design and implementation steps, and form part of the state of the art in the field.
This complex work will award a high number of credits (36 CFU).

Before starting thesis work, the student is required to submit an application (with a tentative thesis title) to the Degree Board for approval. The board will grant any applications that are consistent with the study programme, and assign each student their supervisor(s) and co-supervisor(s).
The official thesis assignment is a MANDATORY step to be taken before starting thesis work. Thesis supervisors and co-supervisors thereby take responsibility for and are required to check all formal aspects, including for insurance purposes. The thesis application must be submitted online at https://registrazione.fisica.unimi.it/richiesta-tesi/login.

Criteria for admission to the final exam
To be admitted to the final exam, the student must have earned 84 CFU. Moreover, there must be consistency between academic records and the last approved study plan.

Link for admission to the final exam
https://www.unimi.it/en/study/bachelor-and-master-study/graduation

Notes

In order to obtain their degree, students are required to have a B2 level of English proficiency, certified as follows:
? By summitting a valid language certificate at B2 level or higher, issued no more than three years prior to the application date. The list of language certificates recognized by the University is available at https://www.unimi.it/en/node/39322. If not submitted during the application process, the certificate must be uploaded when enrolling, or later through the portal: http://studente.unimi.it/uploadCertificazioniLingue;
? B2 level or higher achieved earlier and validated during the application process;
? B2 level or higher achieved during the Entry test;
? By taking a Placement test administered by the University Language Centre (SLAM) between October and January of year 1.
Students who do not meet the B2 requirement will be required to attend a B2-level English course offered by the University Language Centre (SLAM) during the second semester of the first year.
Those who do not attend the course or fail the end-of-course test after six attempts must obtain a language certificate privately before graduating

EXPERIENCE OF STUDY ABROAD AS PART OF THE TRAINING PROGRAM

The University of Milan supports international mobility by providing its students with the opportunity to spend study and internship periods abroad. It is a unique chance to enrich your educational path in a new exciting environment.

The agreements entered into by the University with over 300 universities from the 27 EU member countries under the European Erasmus+ programme allow regularly enrolled students to carry out part of their studies at one of the partner universities or to undertake internships at companies, training and research centres and other organisations.

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

The University of Milan is a member of the 4EU+ European University Alliance that brings together eight public multidisciplinary universities: University of Milan, Charles University of Prague, Heidelberg University, Paris-Panthéon-Assas University, Sorbonne University of Paris, University of Copenhagen, University of Geneva, and University of

Warsaw. The 4EU+ Alliance offers integrated educational pathways and programmes to promote the international mobility of students (physical, blended and virtual).

Study and internships abroad

Students have the opportunity to conduct their thesis work abroad at prestigious research institutions, such as the CERN in Geneva or the GSI in Darmstadt, or at renowned foreign universities.
These opportunities are made possible within the framework of international collaborations associated with the research activities of the faculty.
Additionally, students may undertake internships as part of these international collaborations.

How to participate in Erasmus mobility programs

How to participate in Erasmus+ mobility programmes

The students of the University of Milan can participate in mobility programmes, through a public selection procedure.
Ad hoc commissions will evaluate:
• Academic career
• the candidate's proposed study programme abroad
• his/her foreign language proficiency
• the reasons behind his/her application

Call for applications and informative meetings
The public selection for Erasmus+ mobility for study generally begins around February each year with the publication of a call for applications specifying destinations and requirements. Regarding the Erasmus+ Mobility for Traineeship, the University of Milan usually publishes two calls a year enabling students to choose a destination defined by an inter-institutional agreement or to find a traineeship position on their own.

The University organises informative meetings to illustrate mobility opportunities and rules for participation.

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

Language courses
Students who pass the selections for mobility programmes can benefit from intensive foreign language courses offered each year by the University Language Centre (SLAM).
https://www.unimi.it/en/node/8/

Learn more at https://www.unimi.it/en/node/274/

For assistance, please contact:
International Mobility Office
Via Santa Sofia 9 (second floor)
Tel. 02 503 13501-12589-13495-13502
Contacts: InformaStudenti;
Student Desk booking through InformaStudenti

1st COURSE YEAR Core/compulsory courses/activities common to all curricula			
Learning activity		**Ects**	**Sector**
CLASSICAL ELECTRODYNAMICS		6	(3) PHYS-03/A, (3) PHYS-01/A
English proficiency B2 (3 ECTS)		3	NN
INFORMATICS ABILITY		3	NN
	Total compulsory credits	12	
End of course requirements common to all curricula			
FINAL EXAM		36	NN
	Total compulsory credits	36	

ACTIVE CURRICULA LIST

SPECIALISTIC Course years currently available: 1st
MULTI-SECTOR Course years currently available: 1st

Procedure for choosing a curriculum

When enrolling in the program students must choose between:
- Specialist Curriculum, oriented to gaining a deep knowledge in one field of Physics
- Multi-Sector Curriculum, oriented to teaching and Science dissemination

CURRICULUM: [FBP-A] SPECIALISTIC

Further elective courses Curriculum-specific features SPECIALISTIC

Courses of type "CARATTERIZZANTI" (42 credits)
The student must complete 42 credits of this type by choosing a minimum of 6 credits in each of the groups below. The Classical Electrodynamics course (6 credits) belongs to the "Experimental Application" group and therefore covers the minimum request for this group.

"Experimental Application"		
ACCELERATOR PHYSICS	6	PHYS-01/A
DATA STRUCTURES AND ALGORITHMS OF PHYSICS OF DATA	6	(3) PHYS-01/A, (3) PHYS-06/A
DOSIMETRY	6	PHYS-06/A
ELECTRONICS 1	6	PHYS-01/A
ELECTRONICS 2	6	PHYS-01/A
ELECTRONICS LABORATORY *Course offered every other year: not available in the academic year 2026/27. Its activation is scheduled for the academic year 2027/28*	6	PHYS-01/A
ELEMENTS OF SUPERCONDUCTIVITY AND PHYSICS OF HIGH FIELD MAGNETS	6	(3) PHYS-03/A, (3) PHYS-01/A
ENVIRONMENTAL PHYSICS	6	PHYS-06/A
HEALTH PHYSICS	6	PHYS-06/A
IMAGING TECHNIQUES FOR BIOMEDICAL APPLICATIONS	6	(3) PHYS-01/A, (3) PHYS-06/A
MODELLING APPLICATIONS FOR ENVIRONMENTAL AND CULTURAL HERITAGE PHYSICS	6	PHYS-06/A
OPTICAL ANALYSIS FOR CULTURAL HERITAGES	6	PHYS-06/A
RADIOBIOLOGY	6	PHYS-06/A
"Theory and Fundamentals of Physics"		
GRAVITY AND SUPERSTRINGS 1	6	PHYS-02/A
MANY BODY THEORY 1	6	PHYS-02/A
MANY BODY THEORY 2	6	PHYS-02/A
MATHEMATICAL METHODS IN PHYSICS: DIFFERENTIAL EQUATIONS	6	PHYS-02/A
MATHEMATICAL METHODS IN PHYSICS: GEOMETRY AND GROUP THEORY 1	6	PHYS-02/A
MATHEMATICAL METHODS IN PHYSICS: GEOMETRY AND GROUP THEORY 2	6	PHYS-02/A
QUANTUM FIELD THEORY 1	6	PHYS-02/A
QUANTUM FIELD THEORY 2	6	PHYS-02/A
STATISTICAL MECHANICS	6	(3) PHYS-02/A, (3) PHYS-04/A
STATISTICAL PHYSICS OF COMPLEX SYSTEMS	6	PHYS-02/A
THEORY OF FUNDAMENTAL INTERACTIONS 1	6	PHYS-02/A
THEORY OF QUANTUM OPEN SYSTEMS	6	PHYS-02/A
"Microphysics and Structure of Matter Field"		
ACCELERATOR PHYSICS LABORATORY	6	PHYS-01/A
ADVANCED STATISTICAL PHYSICS	6	PHYS-04/A
ASTROPARTICLE PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
COHERENCE AND CONTROL OF QUANTUM SYSTEM	6	PHYS-04/A
ELECTRONIC STRUCTURE	6	PHYS-04/A
ELECTROWEAK INTERACTIONS	6	(3) PHYS-02/A, (3) PHYS-01/A
INTERACTION AND DETECTION OF NUCLEAR RADIATION	6	PHYS-01/A
LABORATORY OF SPACE INSTRUMENTATION *Course offered every other year: not available in the academic year 2026/27. Its activation is scheduled for the academic year 2027/28*	6	PHYS-03/A
LASER PHYSICS LABORATORY	6	PHYS-03/A
MACHINE LEARNING	6	(3) PHYS-02/A, (3) PHYS-04/A
MAGNETIC PROPERTIES AND FINE ANALYSIS OF LOW DIMENSIONAL MATTER	6	PHYS-03/A
NANOSCALE SOLID STATE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NUCLEAR ELECTRONICS	6	PHYS-01/A
NUCLEAR PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
NUCLEAR SPECTROSCOPY LA	6	PHYS-01/A
OPTICS	6	PHYS-03/A
OPTICS LABORATORY AND APPLICATION	6	PHYS-03/A
OPTICS LABORATORY AND APPLICATION	6	PHYS-03/A
PARTICLE DETECTORS	6	PHYS-01/A
PARTICLE PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
PHYSICS OF ELECTRONIC DEVICES	6	PHYS-03/A
PHYSICS OF SOLIDS	6	(3) PHYS-03/A, (3) PHYS-04/A
PHYSICS PROTEIN	6	(3) PHYS-03/A, (3) PHYS-04/A
PLASMA PHYSICS AND CONTROLLED FUSION	6	(3) PHYS-03/A, (3) PHYS-04/A

PLASMA PHYSICS LABORATORY	6	PHYS-03/A
PROBABILITY AND STATISTICS	6	(3) PHYS-02/A, (3) PHYS-04/A
QUANTUM INFORMATION THEORY	6	PHYS-04/A
QUANTUM OPTICS	6	(3) PHYS-03/A, (3) PHYS-04/A
QUANTUM THEORY OF MATTER 2	6	(3) PHYS-03/A, (3) PHYS-04/A
RADIOACTIVITY	6	PHYS-01/A
SEMICONDUCTOR PHYSICS	6	PHYS-03/A
SURFACE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
"Astrophysics, Geophysics, Climatic and Space Science Field"		
ASTROPHYSICAL FLUID DYNAMICS	6	PHYS-05/A
ATMOSPHERIC PHYSICS	6	PHYS-05/B
COSMOLOGY 1	6	PHYS-05/A
DYNAMICS OF GALAXIES	6	PHYS-05/A
EXTRAGALACTIC ASTROPHYSICS	6	PHYS-05/A
GENERAL ASTROPHYSICS 1	6	PHYS-05/A
GENERAL ASTROPHYSICS 2	6	PHYS-05/A
INTRODUCTION TO CONTINUUM PHYSICS	6	PHYS-05/B
LABORATORY OF DATA MODELLING	6	(3) PHYS-05/B, (3) PHYS-05/A
NUCLEAR RELATIVISTIC ASTROPHYSICS 1	6	PHYS-05/A
PHYSICS OF THE HYDROSPHERE AND THE CRYOSPHERE	6	GEOS-04/C
RADIO ASTRONOMY 1	6	PHYS-05/A
TECTONOPHYSICS	6	(3) GEOS-04/A, (3) PHYS-05/B
The student must also complete 18 credits by choosing from the following courses of type "AFFINI E INTEGRATIVI"		
ADVANCED GRAVITATIONAL PHYSICS	6	(3) PHYS-02/A, (3) PHYS-05/A
ALGEBRAIC TOPOLOGY	6	MATH-02/B
ATOMIC PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
BIOPHYSICS	6	(3) PHYS-03/A, (3) PHYS-06/A
CLASSICAL MECHANICS 2	6	MATH-04/A
COMPUTATIONAL LABORATORY FOR PARTICLES, ASTROPARTICLES, AND FUNDAMENTAL INTERACTIONS	6	PHYS-01/A
COMPUTATIONAL PHYSICS LABORATORY	6	PHYS-02/A
CONDENSED MATTER PHYSICS LABORATORY 2	6	PHYS-03/A
COSMOLOGY 2	6	PHYS-05/A
DATA ANALYTICS, FORWARD AND INVERSE MODELING: GEOPHYSICAL AND ENVIRONMENTAL FLUID DYNAMICS	6	GEOS-04/C
DEEP LEARNING WITH APPLICATIONS	6	PHYS-02/A
DIFFERENTIAL GEOMETRY 1	6	MATH-02/B
DIGITAL ELECTRONICS	6	IINF-01/A
DYNAMICAL SYSTEMS 1	6	MATH-04/A
EARTH PHYSICS LABORATORY	6	GEOS-04/C
ENVIRONMENTAL PHYSICS LABORATORY	6	PHYS-06/A
FORMATION OF STARS AND PLANETS	6	PHYS-05/A
FOUNDATIONS OF ENERGY PRODUCTION	6	IIND-07/A
FOUNDATIONS OF ENERGY PRODUCTION	6	PHYS-03/A
FOUNDATIONS OF PHYSICS	6	PHYS-02/A
FOUNDATIONS OF QUANTUM MECHANICS	6	(3) PHYS-02/A, (3) PHYS-04/A
GEOMETRY 2	6	MATH-02/B
GRAVITY AND SUPERSTRINGS 2	6	PHYS-02/A
HEALTH PHYSICS LABORATORY	6	PHYS-06/A
HISTORY OF PHYSICS	6	PHYS-06/B
INSTRUMENTATION APPLIED TO MEDICINE	6	PHYS-06/A
INTRODUCTIO TO GEOPHYSICS	6	(2) GEOS-04/A, (2) GEOS-04/B, (2) GEOS-04/C
INTRODUCTION TO ASTROPHYSICS	6	PHYS-05/A
INTRODUCTION TO GENERAL RELATIVITY	6	PHYS-02/A
INTRODUCTION TO HEALTH AND MEDICAL PHYSICS	6	PHYS-06/A
LIQUID-STATE AND SOFT-MATTER PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
MATHEMATICAL ANALYSIS 4	6	MATH-03/A
METHODS OF DATA ANALYSIS	6	PHYS-01/A
MICROELECTRONICS	6	IINF-01/A
NANOPARTICLE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NONLINEAR OPTICS AND QUANTUM PHOTONICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NUCLEAR MAGNETIC RESONANCE TECNIQUES: PHYSICS PRINCIPLES AND APPLICATIONS	6	PHYS-06/A
NUMERICAL SIMULATION LABORATORY	6	(3) PHYS-02/A, (3) PHYS-04/A
NUMERICAL TECNIQUES FOR PHOTOREALISTIC IMAGE GENERATION	6	(3) PHYS-05/B, (3) PHYS-05/A
PARTICLE DETECTORS LABORATORY INSTRUMENTATION	6	PHYS-01/A
PARTICLE PHYSICS LABORATORY	6	PHYS-01/A
PERTURBATION THEORY OF HAMILTONIAN SYSTEMS	6	MATH-04/A
PHENOMENOLOGY OF THE STANDARD MODEL OF PARTICLE PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
PHYSICS LABORATORY FOR THE ENVIRONMENT AND CULTURAL HERITAGE *Course is not available*	6	PHYS-06/A
PHYSICS LABORATORY OF CLIMATOLOGY AND ATMOSPHERIC PHYSICS	6	(3) PHYS-05/B, (3)

Course offered every other year: not available in the academic year 2026/27. Its activation is scheduled for the academic year 2027/28		PHYS-06/A
PHYSICS OF MEDICAL IMAGING	6	PHYS-06/A
PREPARATION OF DIDACTICAL EXPERIENCES 1	6	PHYS-06/B
PREPARATION OF DIDACTICAL EXPERIENCES 2	6	PHYS-06/B
QUANTUM COMPUTING	6	PHYS-04/A
QUANTUM WALKS	6	PHYS-04/A
RADIATIVE PROCESSES IN ASTROPHYSICS	6	PHYS-05/A
RADIO ASTRONOMY 2	6	PHYS-05/A
SIMULATION OF CONDENSED MATTER AND BIOSYSTEMS	6	(3) PHYS-04/A, (3) BIOS-07/A
SPACE INSTRUMENTATION LABORATORY	6	PHYS-05/A
STOCHASTIC PROCESSES	6	(2) PHYS-02/A, (2) PHYS-03/A, (2) PHYS-04/A
THEORY OF FUNDAMENTAL INTERACTIONS 2	6	PHYS-02/A
THIN FILM AND NANOSTRUCTURES CHARACTERIZATION	6	PHYS-03/A

The student must also complete another 12 credits freely choosing from all the courses activated by the University, provided that they are culturally coherent with his/her educational path and cannot be superimposed, in content, to the fundamental and optional teachings already used in the Study Plan. All the teachings shown in this "Manifesto" that meet these criteria may be included in the selection.

End of course requirements Curriculum-specific features SPECIALISTIC

MANDATORY TRAINING INTERNSHIP		6	NN
	Total compulsory credits	6	

CURRICULUM: [FBP-B] MULTI-SECTOR

Further elective courses Curriculum-specific features MULTI-SECTOR

Courses of type "CARATTERIZZANTI" (48 credits)
The student must complete 48 credits of this type by choosing 12 credits in each of the groups below. The Classical Electrodynamics course belongs to the "Experimental Application" group and therefore covers 6 credits for this group.

"Experimental Application"		
ACCELERATOR PHYSICS	6	PHYS-01/A
DOSIMETRY	6	PHYS-06/A
ELECTRONICS 1	6	PHYS-01/A
ELECTRONICS 2	6	PHYS-01/A
ELECTRONICS LABORATORY *Course offered every other year: not available in the academic year 2026/27. Its activation is scheduled for the academic year 2027/28*	6	PHYS-01/A
ELEMENTS OF SUPERCONDUCTIVITY AND PHYSICS OF HIGH FIELD MAGNETS	6	(3) PHYS-03/A, (3) PHYS-01/A
ENVIRONMENTAL PHYSICS	6	PHYS-06/A
HEALTH PHYSICS	6	PHYS-06/A
IMAGING TECHNIQUES FOR BIOMEDICAL APPLICATIONS	6	(3) PHYS-01/A, (3) PHYS-06/A
MODELLING APPLICATIONS FOR ENVIRONMENTAL AND CULTURAL HERITAGE PHYSICS	6	PHYS-06/A
OPTICAL ANALYSIS FOR CULTURAL HERITAGES	6	PHYS-06/A
RADIOBIOLOGY	6	PHYS-06/A
"Theory and Fundamentals of Physics"		
HISTORY OF PHYSICS	6	PHYS-06/B
PREPARATION OF DIDACTICAL EXPERIENCES 1	6	PHYS-06/B
PREPARATION OF DIDACTICAL EXPERIENCES 2	6	PHYS-06/B
"Microphysics and Structure of Matter"		
ACCELERATOR PHYSICS LABORATORY	6	PHYS-01/A
ADVANCED STATISTICAL PHYSICS	6	PHYS-04/A
ASTROPARTICLE PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
COHERENCE AND CONTROL OF QUANTUM SYSTEM	6	PHYS-04/A
ELECTRONIC STRUCTURE	6	PHYS-04/A
ELECTROWEAK INTERACTIONS	6	(3) PHYS-02/A, (3) PHYS-01/A
INTERACTION AND DETECTION OF NUCLEAR RADIATION	6	PHYS-01/A
LABORATORY OF SPACE INSTRUMENTATION *Course offered every other year: not available in the academic year 2026/27. Its activation is scheduled for the academic year 2027/28*	6	PHYS-03/A
LASER PHYSICS LABORATORY	6	PHYS-03/A
MAGNETIC PROPERTIES AND FINE ANALYSIS OF LOW DIMENSIONAL MATTER	6	PHYS-03/A
NANOSCALE SOLID STATE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NUCLEAR ELECTRONICS	6	PHYS-01/A
NUCLEAR PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
NUCLEAR SPECTROSCOPY LA	6	PHYS-01/A
OPTICS	6	PHYS-03/A
OPTICS LABORATORY AND APPLICATION	6	PHYS-03/A
OPTICS LABORATORY AND APPLICATION	6	PHYS-03/A
PARTICLE DETECTORS	6	PHYS-01/A
PARTICLE PHYSICS	6	(3) PHYS-02/A, (3)

		PHYS-01/A
PHYSICS OF ELECTRONIC DEVICES	6	PHYS-03/A
PHYSICS OF SOLIDS	6	(3) PHYS-03/A, (3) PHYS-04/A
PHYSICS PROTEIN	6	(3) PHYS-03/A, (3) PHYS-04/A
PLASMA PHYSICS AND CONTROLLED FUSION	6	(3) PHYS-03/A, (3) PHYS-04/A
PLASMA PHYSICS LABORATORY	6	PHYS-03/A
QUANTUM INFORMATION THEORY	6	PHYS-04/A
QUANTUM OPTICS	6	(3) PHYS-03/A, (3) PHYS-04/A
QUANTUM THEORY OF MATTER 2	6	(3) PHYS-03/A, (3) PHYS-04/A
RADIOACTIVITY	6	PHYS-01/A
SEMICONDUCTOR PHYSICS	6	PHYS-03/A
SURFACE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
"Astrophysics, Geophysics, Climatic and Space Science"		
ASTROPHYSICAL FLUID DYNAMICS	6	PHYS-05/A
ATMOSPHERIC PHYSICS	6	PHYS-05/B
COSMOLOGY 1	6	PHYS-05/A
DYNAMICS OF GALAXIES	6	PHYS-05/A
EXTRAGALACTIC ASTROPHYSICS	6	PHYS-05/A
GENERAL ASTROPHYSICS 1	6	PHYS-05/A
GENERAL ASTROPHYSICS 2	6	PHYS-05/A
INTRODUCTION TO CONTINUUM PHYSICS	6	PHYS-05/B
NUCLEAR RELATIVISTIC ASTROPHYSICS 1	6	PHYS-05/A
PHYSICS OF THE HYDROSPHERE AND THE CRYOSPHERE	6	GEOS-04/C
RADIO ASTRONOMY 1	6	PHYS-05/A
TECTONOPHYSICS	6	(3) GEOS-04/A, (3) PHYS-05/B
The student must also complete 12 credits by choosing from the following courses of type "AFFINI E INTEGRATIVI".		
ADVANCED GRAVITATIONAL PHYSICS	6	(3) PHYS-02/A, (3) PHYS-05/A
ALGEBRAIC TOPOLOGY	6	MATH-02/B
ATOMIC PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
BIOPHYSICS	6	(3) PHYS-03/A, (3) PHYS-06/A
CLASSICAL MECHANICS 2	6	MATH-04/A
COMPUTATIONAL LABORATORY FOR PARTICLES, ASTROPARTICLES, AND FUNDAMENTAL INTERACTIONS	6	PHYS-01/A
COMPUTATIONAL PHYSICS LABORATORY	6	PHYS-02/A
CONDENSED MATTER PHYSICS LABORATORY 2	6	PHYS-03/A
COSMOLOGY 2	6	PHYS-05/A
DATA ANALYTICS, FORWARD AND INVERSE MODELING: GEOPHYSICAL AND ENVIRONMENTAL FLUID DYNAMICS	6	GEOS-04/C
DATA STRUCTURES AND ALGORITHMS OF PHYSICS OF DATA	6	(3) PHYS-01/A, (3) PHYS-06/A
DEEP LEARNING WITH APPLICATIONS	6	PHYS-02/A
DIFFERENTIAL GEOMETRY 1	6	MATH-02/B
DIGITAL ELECTRONICS	6	IINF-01/A
DYNAMICAL SYSTEMS 1	6	MATH-04/A
EARTH PHYSICS LABORATORY	6	GEOS-04/C
ENVIRONMENTAL PHYSICS LABORATORY	6	PHYS-06/A
FORMATION OF STARS AND PLANETS	6	PHYS-05/A
FOUNDATIONS OF ENERGY PRODUCTION	6	IIND-07/A
FOUNDATIONS OF ENERGY PRODUCTION	6	PHYS-03/A
FOUNDATIONS OF PHYSICS	6	PHYS-02/A
FOUNDATIONS OF QUANTUM MECHANICS	6	(3) PHYS-02/A, (3) PHYS-04/A
GEOMETRY 2	6	MATH-02/B
GRAVITY AND SUPERSTRINGS 1	6	PHYS-02/A
GRAVITY AND SUPERSTRINGS 2	6	PHYS-02/A
HEALTH PHYSICS LABORATORY	6	PHYS-06/A
INSTRUMENTATION APPLIED TO MEDICINE	6	PHYS-06/A
INTRODUCTIO TO GEOPHYSICS	6	(2) GEOS-04/A, (2) GEOS-04/B, (2) GEOS-04/C
INTRODUCTION TO ASTROPHYSICS	6	PHYS-05/A
INTRODUCTION TO GENERAL RELATIVITY	6	PHYS-02/A
INTRODUCTION TO HEALTH AND MEDICAL PHYSICS	6	PHYS-06/A
LABORATORY OF DATA MODELLING	6	(3) PHYS-05/B, (3) PHYS-05/A
LIQUID-STATE AND SOFT-MATTER PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
MACHINE LEARNING	6	(3) PHYS-02/A, (3) PHYS-04/A
MANY BODY THEORY 1	6	PHYS-02/A
MANY BODY THEORY 2	6	PHYS-02/A
MATHEMATICAL ANALYSIS 4	6	MATH-03/A
MATHEMATICAL METHODS IN PHYSICS: DIFFERENTIAL EQUATIONS	6	PHYS-02/A
MATHEMATICAL METHODS IN PHYSICS: GEOMETRY AND GROUP THEORY 1	6	PHYS-02/A
MATHEMATICAL METHODS IN PHYSICS: GEOMETRY AND GROUP THEORY 2	6	PHYS-02/A
METHODS OF DATA ANALYSIS	6	PHYS-01/A
MICROELECTRONICS	6	IINF-01/A

NANOPARTICLE PHYSICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NONLINEAR OPTICS AND QUANTUM PHOTONICS	6	(3) PHYS-03/A, (3) PHYS-04/A
NUCLEAR MAGNETIC RESONANCE TECNIQUES: PHYSICS PRINCIPLES AND APPLICATIONS	6	PHYS-06/A
NUMERICAL SIMULATION LABORATORY	6	(3) PHYS-02/A, (3) PHYS-04/A
NUMERICAL TECNIQUES FOR PHOTOREALISTIC IMAGE GENERATION	6	(3) PHYS-05/B, (3) PHYS-05/A
PARTICLE DETECTORS LABORATORY INSTRUMENTATION	6	PHYS-01/A
PARTICLE PHYSICS LABORATORY	6	PHYS-01/A
PERTURBATION THEORY OF HAMILTONIAN SYSTEMS	6	MATH-04/A
PHENOMENOLOGY OF THE STANDARD MODEL OF PARTICLE PHYSICS	6	(3) PHYS-02/A, (3) PHYS-01/A
PHYSICS LABORATORY FOR THE ENVIRONMENT AND CULTURAL HERITAGE *Course is not available*	6	PHYS-06/A
PHYSICS LABORATORY OF CLIMATOLOGY AND ATMOSPHERIC PHYSICS *Course is not available*	6	(3) PHYS-05/B, (3) PHYS-06/A
PHYSICS OF MEDICAL IMAGING	6	PHYS-06/A
PROBABILITY AND STATISTICS	6	(3) PHYS-02/A, (3) PHYS-04/A
QUANTUM COMPUTING	6	PHYS-04/A
QUANTUM FIELD THEORY 1	6	PHYS-02/A
QUANTUM FIELD THEORY 2	6	PHYS-02/A
QUANTUM WALKS	6	PHYS-04/A
RADIATIVE PROCESSES IN ASTROPHYSICS	6	PHYS-05/A
RADIO ASTRONOMY 2	6	PHYS-05/A
SIMULATION OF CONDENSED MATTER AND BIOSYSTEMS	6	(3) PHYS-04/A, (3) BIOS-07/A
SPACE INSTRUMENTATION LABORATORY	6	PHYS-05/A
STATISTICAL MECHANICS	6	(3) PHYS-02/A, (3) PHYS-04/A
STATISTICAL PHYSICS OF COMPLEX SYSTEMS	6	PHYS-02/A
STOCHASTIC PROCESSES	6	(2) PHYS-02/A, (2) PHYS-03/A, (2) PHYS-04/A
THEORY OF FUNDAMENTAL INTERACTIONS 1	6	PHYS-02/A
THEORY OF FUNDAMENTAL INTERACTIONS 2	6	PHYS-02/A
THEORY OF QUANTUM OPEN SYSTEMS	6	PHYS-02/A
THIN FILM AND NANOSTRUCTURES CHARACTERIZATION	6	PHYS-03/A
The student must also complete another 18 credits freely choosing from all the courses activated by the University, provided that they are culturally coherent with his/her educational path and cannot be superimposed, in content, to the fundamental and optional teachings already used in the Study Plan. The insertion of courses in the anthropo-psycho-pedagogical area is strongly recommended as required, based on current legislation, for access to public competitions for teaching.		