UNIVERSITA' DEGLI STUDI DI MILANO
PROGRAMME DESCRIPTION - ACADEMIC YEAR 2021/22
BACHELOR
Physics (Classe L-30)
Enrolled from 2012/2013 Academic Year

HEADING

Degree classification - Denomination and code:	L-30 Physics
Degree title:	Dottore
Length of course:	3 years
Total number of credits required to complete programme:	180
Years of course currently available:	2nd , 3rd
Access procedures:	Open, subject to completion of self-assessment test prior to enrolment
Course code:	F63

PERSONS/ROLES

Head of Study Programme
Prof. Alessandra Guglielmetti

Degree Course Coordinator
Prof. Stefano Olivares

Tutors - Faculty
Tutor per l'orientamento (Academic guidance tutor)
F. Camera, S. Cialdi, G. Colò, S. D'Auria, L. Gariboldi, A. Guglielmetti, G. Lodato, N. Manini, L.G. Molinari, S. Olivares, M. Paris, P. Piseri, P.M. Pizzochero, M. Sorbi, D. Tamascelli, A. Vicini

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

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
Davide ABRIOLA
Damiano ALIVERTI PIURI
Irene CARRARA
Tommaso COLOMBO
Clara IAQUINTA
Fabiana LAURO
Matteo MARTINELLI
Gilberto NARDI
Giovanni PELLEGRINI
Andrea SALA
Raffaele SALIONI
Irene SPONGANO
Nicola TESSITORE

Degree Course website
https://www.unimi.it/it/corsi/corsi-di-laurea/fisica
https://www.unimi.it/it/node/183

Sedi e orari: https://www.unimi.it/it/node/360

Contatti: https://www.unimi.it/it/node/359 Phone 0250325032

Dissertation and Final Exam

I. Veronese (Presidente), C. Benedetti, S. Carrazza, F. Crespi, V. Liberali, D. Maino,

Laboratory Security

M. Potenza

Outreach

https://unimibox.unimi.it/index.php/s/KE545jyYdi6pdTW

PLS Program Chair

M. Giliberti

Program Transfer

G. Bertin, M. Di Vece, M. Fanti, G. Maero Email: commissione.ammissione@fisica.unimi.it

Schedule of Classes

M. Gherardi, A. Guglielmetti, M. Zaro, F. Cordani

Scientific English

A. Guglielmetti, A. Podestà, A. Pullia

Specific Learning Disabilities

L. Carminati

Statistical Data

G. Colò, A.Guglielmetti, F. Ragusa

Study Program Office

Via Celoria, 16 - 20133 Milano Phone 02.503.17401 Email: cl.fisica@unimi.it

TOLC test coordinator

M. Cavinato

CHARACTERISTICS OF DEGREE PROGRAMME

General and specific learning objectives

The Bachelor's Degree program in Physics aims to enable the student to continue with higher studies or to start a professional activity. The program gives students the methodological, experimental, theoretical, mathematical basis on which Physics is based. Knowledge will be acquired of classical, relativistic and quantum Physics, as focused on phenomenological and theoretical aspects as well as on their mathematical formalization.

Expected learning outcomes

1) MATHEMATICS AREA

By virtue of in-depth studies in the mathematics area, graduates will acquire:

- knowledge of mathematical analysis;
- knowledge of linear algebra and geometry;
- knowledge of elements of functional analysis.

On the basis of the consolidation of mathematical skills, graduates will be able to:

- use mathematics in the study of statistics and therefore in the classification and interpretation of experimental data;
- use mathematics in the study of topics in the physical and application area;
- use mathematical models to describe and predict the trends of physical phenomena.

The above knowledge and understanding and the ability to apply this knowledge are mainly achieved through the participation of students in lectures and classroom exercises (or in the virtual classroom if necessary) and through individual study. Verification takes place through written and/or oral exams. These exams can take advantage of ongoing written tests.

2) PHYSICS AREA

By virtue of the teachings in the Physics area, graduates will acquire:

- Knowledge of classical Physics: mechanics, thermodynamics, electromagnetism, optics and wave propagation, fluid dynamics, analytical mechanics.
- Knowledge of modern Physics: quantum mechanics, quantum theory of matter, nuclear Physics, Physics of elementary particles, restricted relativity, general relativity (introductory level)

On the basis of the consolidation of skills in the Physics area, graduates will be able to:

- use the scientific method in the representation and modeling of physical phenomena;
- apply their knowledge in the physical area to solve qualitative and quantitative problems in countless application and/or theoretical areas.

The above knowledge and understanding and the ability to apply this knowledge are mainly achieved through the participation of students in classroom lectures and exercises (or in the virtual classroom if necessary), and through individual study. Verification takes place through written and/or oral exams. These exams can take advantage of ongoing written tests.
3) APPLICATION AND COMPUTER AREA
By virtue of the courses in the application, computer science and chemistry area, graduates will acquire:
- Knowledge of the working modes and proper use of laboratory instruments for carrying out physical measurements
- Computer skills: procedural programming and object-oriented programming, solving problems with numerical techniques, computer networks, instrumentation control and data acquisition.
- Electronics knowledge: use of oscilloscopes, function generators, power supplies. Analysis and sizing of simple and electronic devices, including physical signal sensors and amplifiers.
- Chemistry knowledge: periodic properties of elements, covalent, ionic bonds, Arrhenius' law, electrochemical potentials.
By virtue of the consolidation of skills in the application, computer science and chemistry area, graduates will be able to:
- use laboratory equipment efficiently and safely;
- manage measurement systems and procedures;
- use software and IT tools for data collection;
- elaborate the experimental data with statistical methods and IT tools
- design and use simple electrical and electronic circuits;
- use the skills of chemistry in the most varied applications;
- work in a group in a synergistic and efficient way.
The above knowledge and understanding and the ability to apply this knowledge are achieved through the participation of students in lessons, practical exercises and/or in the laboratory. A distance teaching method could also be proposed for practical exercises if the health emergency prevented the provision of didactic activities in the presence.
The verification takes place through exams, which may include written or oral tests or the presentation of laboratory reports with multimedia instruments.

Professional profile and employment opportunities

The study program is structured in such a way as to stimulate attitudes to physical-mathematical modeling and enhance the ability to use adequate methods and tools to face and solve different problems. The given skills are useful also for work activities not directly connected with Physics such as, for example, the economy, health, finance, public administration, security. The graduates can be employed in different sectors of the world of work, industry, and science education.

Notes

To obtain the degree, students are required to demonstrate an English language proficiency at level B1 within the Common European Framework of Reference for Languages (CEFR). This level can be assessed in the following ways:
- by submitting the language certificate achieved no more than three years prior to the submission, at level B1 or higher, recognised by the University (the list of recognised language certificates can be found at: https://www.unimi.it/en/node/297/). The language certificate must be uploaded during the admission process;
- by taking the Placement Test, organised by SLAM exclusively during the first year, from October to December. Students who fail to reach level B1 or B2 will have to attend an English course organised by SLAM. The Placement Test is compulsory for all students who do not have a valid language certificate.

Students who do not take the Placement Test within the deadline and students who fail the SLAM end-of-course test within six attempts will have to obtain a language certificate within the year in which the language exam is scheduled

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 30 different 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 organizations.

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

Study and internships abroad

The thesis work may be occasionally carried out in prestigious research centers like CERN or GSI, or important Universities worldwide, in the frame of international collaborations and research programs.

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 generally begins around February each year with the publication of a call for applications specifying the destinations, with the respective programme duration (from 2/3 to 12 months), requirements and online application deadline.

Every year, before the deadline for the call, the University organizes informative meetings to illustrate opportunities and rules for participation to students.

Erasmus+ scholarship
The European Union grants the winners of the Erasmus+ programme selection a scholarship to contribute to their mobility costs, which is 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.

Learn more at https://www.unimi.it/en/international/study-abroad/studying-abroad-erasmus

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

1st COURSE YEAR (disactivated from academic year 2021/22) Core/compulsory courses/activities common

Learning activity		Ects	Sector
COMPUTER SCIENCE		6	INF/01
English assessment B1 (2 ECTS)		2	ND
GEOMETRY 1		7	MAT/03
MATHEMATICAL ANALYSIS 1		8	MAT/05
MATHEMATICAL ANALYSIS 2		8	MAT/05
MECHANICS		7	FIS/01
PHYSICS LABORATORY WITH INTRODUCTION TO STATISTICS		10	FIS/01
WAVES AND OSCILLATIONS		7	FIS/01
	Total compulsory credits	55	

2nd COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
CLASSICAL MECHANICS		7	MAT/07
ELECTROMAGNETISM		15	FIS/07, FIS/01
EXPERIMENTAL DATA PROCESSING LABORATORY		6	FIS/01
MATHEMATICAL ANALYSIS 3		6	MAT/05
MATHEMATICAL METHODS IN PHYSICS		7	FIS/02
OPTICS,ELECTRONICS AND MODERN PHYSICS LABORATORY		10	FIS/01
QUANTUM PHISYCS 1		7	FIS/02
THERMODYNAMICS		6	FIS/07, FIS/01
	Total compulsory credits	64	

3rd COURSE YEAR Core/compulsory courses/activities common

Learning activity		Ects	Sector
CHEMISTRY 1		6	CHIM/03
INTRODUCTION TO NUCLEAR AND PARTICLE PHYSICS		9	FIS/04
QUANTUM PHISYCS 2		8	FIS/02
STRUCTURE OF MATTER 1		9	FIS/03
	Total compulsory credits	32	

Elective courses

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.

ASTRONOMY LAB	6	FIS/05, FIS/01
COMPUTATIONAL PHYSICS LABORATORY	6	FIS/08, FIS/07,

		FIS/06, FIS/05, FIS/04, FIS/03, FIS/02, FIS/01
CONDENSED MATTER PHYSICS LABORATORY	6	FIS/03, FIS/01
EARTH PHYSICS LABORATORY	6	FIS/07, FIS/06, FIS/01
ELECTRONICS 1	6	ING-INF/01, FIS/01
ELECTRONICS LABORATORY	6	ING-INF/01, FIS/01
ENVIRONMENTAL PHYSICS LABORATORY	6	FIS/07, FIS/06, FIS/01
GAMMA SPECTROSCOPY LABORATORY	6	FIS/04, FIS/01
INTRODUCTION TO ASTROPHYSICS	6	FIS/05
INTRODUCTION TO GENERAL RELATIVITY	6	FIS/02
INTRODUCTION TO HEALTH AND MEDICAL PHYSICS	6	FIS/07
INTRODUCTION TO STATISTICAL PHYSICS	6	FIS/03, FIS/02
NUCLEAR PHYSICS LABORATORY	6	FIS/04, FIS/01
NUMERICAL SIMULATION LABORATORY	6	FIS/08, FIS/07, FIS/06, FIS/05, FIS/04, FIS/03, FIS/02, FIS/01
OPTICS LABORATORY	6	FIS/03, FIS/01

COURSE YEAR UNDEFINED Core/compulsory courses/activities common

Learning activity		Ects	Sector
ENGLISH 2		2	L-LIN/12
	Total compulsory credits	2	

End of course requirements

FINAL EXAM		9	NA
	Total compulsory credits	9	

COURSE PROGRESSION REQUIREMENTS

The course contains the following obligatory or advised prerequisites

Learning activity	Prescribed foundation courses	O/S
MATHEMATICAL ANALYSIS 3	MATHEMATICAL ANALYSIS 1	Core/compulsory
	MATHEMATICAL ANALYSIS 2	Core/compulsory
MATHEMATICAL ANALYSIS 2	MATHEMATICAL ANALYSIS 1	Core/compulsory
ELECTROMAGNETISM	MECHANICS	Core/compulsory
THERMODYNAMICS	MECHANICS	Core/compulsory