DM 1648 19/12/2023 - Enclosed - extract of class L-30 PHYSICAL SCIENCES AND TECHNOLOGIES

L-30Class of degrees in **SCIENCE AND TECHNOLOGY PHYSICS**

QUALIFYING TRAINING OBJECTIVES

a) Cultural objectives of the class

The aim of the courses in the class is to provide solid basic physics knowledge, both for the purpose of continuing studies in master's degrees and for the purpose of entering the world of work. General methodological tools must be developed in the courses of the class in order to allow for a continuous updating of knowledge during working life; in addition, a significant proportion of training activities characterised by mathematical-conceptual rigour and the acquisition of the correct methodologies of experimental investigation and theoretical elaboration must be provided.
In particular, graduates of the class must:
- possess an adequate basic knowledge of the various fields of classical and modern physics;
- know and be able to apply the basic methods of scientific research, also with applications to elementary modelling of complex systems in interdisciplinary contexts;
- knowledge of measurement techniques and related instrumentation and data analysis methodologies;
- be able to elaborate basic representations and models of physical reality, and to verify them through the experimental method;
- understand and be able to use appropriate mathematical and computer-based methodologies and tools.
Training courses that provide specific skills in fields such as:
- acoustics and sound science, and their technical and environmental applications;
- optics, optometry, vision science, and optoelectronics.

b) Essential disciplinary content for all courses in the class

The training programmes of the degree courses in the class in any case include activities aimed at the acquisition of
- basic knowledge of algebra, geometry, mathematical analysis, probability and statistics, computer science, and chemistry with special reference to molecular and supramolecular structure;
- fundamental knowledge of classical physics, theoretical physics, statistical physics, quantum physics, matter physics, and associated mathematical methods.
In addition, courses in the class include characterising activities in at least three of the following subject areas:
- experimental physics and physics applied to cultural and environmental heritage, biology, and medicine;
- theoretical physics, mathematical models and methods of physics, history and didactics of physics;

- structure of matter and nuclear and subnuclear physics;
- astronomy and astrophysics, geophysics, oceanography, and climate physics.

c) Non-disciplinary transversal competences essential for all courses in the class

Graduates in the courses of the class must be able to
- develop team-working skills and be able to operate with defined degrees of autonomy by readily fitting into working environments;
- communicate the aims and results of their activities;
- quickly and continuously update their knowledge.

d) Possible occupational and professional outlets for the class courses

Graduates of the class will be able to perform:
- professional activities in the applications of physics to industrial production, e.g. acoustics, optics, mechanics, electronics, computer science, biomedical and medical devices;
- support activities in the fields of physics applications in radiation protection, environmental control and protection, materials development and characterisation, telecommunications, remote control, meteorology, life and health sciences, and in all fields, including non-scientific ones, in which the ability to analyse collected data and to model even complex phenomena with scientific methodology is required.

e) Level of foreign language proficiency exiting class courses

In addition to Italian, graduates of courses in the class must be able to use at least one European Union language effectively, in written and oral form, with reference also to disciplinary lexicons.

f) Knowledge and skills required for access to all courses in the class

Basic knowledge of mathematics as provided by secondary schools.

g) Characteristics of the final examination for all courses in the class

The final examination is designed to verify the scientific maturity achieved in relation to the ability to address specific physics topics, applying the knowledge acquired to the identification, formulation and solution of problems.

h) Practical and/or laboratory activities planned for all courses in the class

The training courses must in any case provide an adequate number of training credits for observational and experimental activities aimed at the acquisition of scientific investigation methodologies, as regards both instrumentation and measurement techniques and data analysis. For those areas that require it, laboratory activities may be combined with field activities.

i) Internships provided for all courses in the class

No binding, specific or particular specifications.

SSDs added compared to DM 16.03.2007

ESSENTIAL TRAINING ACTIVITIES			
Basic training activities			
Disciplinary scope	*Description*	*Sectors*	*CFU*
Mathematics and computer science disciplines	Basic knowledge and skills in mathematics and computer science.	INF/01 - Computer Science ING-INF/05 - Systems of information processing MAT/01 - Mathematical logic MAT/02 - Algebra MAT/03 - Geometry MAT/04 - Complementary mathematics MAT/05 - Mathematical analysis MAT/06 - Mathematical probability and statistics MAT/07 - Mathematical physics MAT/08 - Numerical analysis MAT/09 - Operations Research	15
Chemical disciplines	Basic knowledge and skills in chemistry.	CHIM/01 - Analytical chemistry CHIM/02 - Physical chemistry CHIM/03 - General and inorganic chemistry CHIM/06 - Organic chemistry	5
Basic physics	Basic theoretical and experimental knowledge and skills in physics.	FIS/01 - Experimental physics FIS/02 - Theoretical physics, mathematical models and methods FIS/03 - Physics of matter	20
Minimum number of CFUs reserved for core activities			40
Characterising training activities			
Disciplinary scope	*Description*	*Sectors*	*CFU*
Experimental and applied	In-depth knowledge and skills in observational, laboratory, and data analysis techniques of experimental physics, also aimed at applications in biomedical, biophysical, and cultural and environmental heritage disciplines.	FIS/01 - Experimental physics FIS/07 - Applied physics (to cultural heritage, the environment, biology and medicine)	
Theoretical and Fundamentals of Physics	In-depth knowledge and skills of the theories, models, mathematical methods, and conceptual and mathematical-formal structures of physics and its foundations, also in relation to historical and educational aspects.	FIS/02 - Theoretical physics, mathematical models and methods FIS/08 - Didactics and history of physics	

Microphysics of matter and fundamental interactions	Deepening of theoretical and experimental knowledge and skills in the physics of matter and in nuclear and subnuclear physics and fundamental interactions.	FIS/03 - Physics of matter FIS/04 - Nuclear and subnuclear physics	
Astrophysical, geophysical, climate and space	Deepening of theoretical and experimental knowledge and skills in astrophysics, space physi c s , geophysics, and physics of the atmosphere and climate.	FIS/05 - Astronomy and astrophysics FIS/06 - Physics for the earth and circum-earth system GEO/10 - Solid Earth Geophysics GEO/11 - Applied geophysics GEO/12 - Oceanography and physics of the atmosphere	
Minimum number of CFUs reserved for characterising activities			50
Minimum number of CFUs reserved for core and characterising activities			90