Università degli Studi di PADOVA
Dipartimento di Fisica e Astronomia "Galileo Galilei" - DFA

GUIDELINES FOR FILLING IN A "SUBJECT TO APPROVAL" PLAN MASTER's DEGREE IN PHYSICS OF DATA FIRST ENROLLMENT A.Y. 2024/2025

Study plans **should be completed exclusively online through Uniweb (deadlines are listed on the website)**.

Please note that once the study plan has been approved, it will be possible to modify it **ONLY IF STRICTLY NECESSARY** (**WARNING**: once the graduation application has been submitted, it won't be possible to insert or modify the study plan).

The Uniweb procedure will guide you step by step to choose the courses for your study plan; these guidelines should be considered are an additional help to understand the procedure and complete it correctly.
The procedure for filling in the study plan in Uniweb is organized in **Rules (Regole)**. It is important to read the diagrams below to decide in which Rules the chosen exams should be inserted.

Courses and activities take the definition of "**characterizing**", "**integrative**", and "**free choice**" based on where they are inserted.
It is recommended that the activities you choose, in addition to the mandatory exams, contribute to the overall consistency of your study plan.

Within the Physics of Data educational offer, it is possible to identify six possible *tracks - Fundamental Physics (**Track 1**), Astrophysics and Cosmology (**Track 2**), Physics of Matter (**Track 3**), Quantum (**Track 4**), Complex Systems and Interdisciplinary Physics (**Track 5**), Machine Learning and Industrial Application **(Track 6)*** - which are to be intended as suggested paths in case your interest is focussed on specific research areas. The Tracks can help you achieve a coherent study plan, but should not be considered as binding, as your choice of exams is not limited to those in any given Track.
Additional information on the Tracks can be found on the website.

Mandatory courses of the first year (regola 1)

Study plans not including all the exams reported below cannot be approved.

SCP8082524 LABORATORY OF COMPUTATIONAL PHYSICS (C.I.)
SCP8082533 MANAGEMENT AND ANALYSIS OF PHYSICS DATASET (C.I.)
SCP8082660 MACHINE LEARNING
SCP8082557 ADVANCED STATISTICS FOR PHYSICS ANALYSIS

One course among - (regola 2)

Study plans not including one of the exams reported below cannot be approved.

SCP7081638 THEORETICAL PHYSICS (recommended for Track 1)

SCP8083597 MODELS OF THEORETICAL PHYSICS (recommended for Tracks 3-4-5-6)
SCP7081661 GENERAL RELATIVITY (recommended for Track 2)

One or two courses among - (regola 3)

SCP7081658 NUCLEAR PHYSICS
SCQ2101440 INTRODUCTION TO QUANTUM HARDWARE
SCQ1097938 PHYSICAL MODELS OF LIVING SYSTEMS
SCQ2101439 QUANTUM INFORMATION WITH ATOMS AND PHOTONS
SCP9086381 FUNDAMENTALS OF ASTROPHYSICS AND COSMOLOGY
SCP7081657 THEORETICAL PHYSICS OF THE FUNDAMENTAL INTERACTIONS
SCP7081659 STATISTICAL MECHANICS
SCP8082536 STATISTICAL MECHANICS OF COMPLEX SYSTEMS
SCP8082721 QUANTUM INFORMATION AND COMPUTING

F-Integrative courses (30 CFU) - (regola 4)

In this block, you must list your choice of integrative exams. The exams chosen under this Rule should be coherent with the study plan of Physics of Data, and not exceed 30 CFU.

F-Integrative courses among the courses proposed by the master's degree (6 - 30 CFU) (regola 5), Integrative courses among the courses proposed in other degree courses (regola 6) and Integrative courses (choosing from the courses available in the University) (regola 7)

The master's program allows 30 credits from integrative courses to be acquired over the two years. You can choose integrative credits in these Rules, choosing them from the list proposed by the Master's degree (Regola 5) or picking them autonomously from the pool of courses available in the whole University (Regola 6).

The approval of the integrative credits is linked to the scientific coherence with the education path of the master's program.
Courses can be chosen among those suggested in the Tracks, including courses listed under different tracks (e.g., including courses from Track 4 while ideally following Track 1). However, the courses added should be consistent with the scientific goals of the master's.

Activities suggested for Track 1 (Fundamental Physics)

ADVANCED PHYSICS LABORATORY A (6 CFU)
ADVANCED PHYSICS LABORATORY B (6 CFU)
MODERN COMPUTING FOR PHYSICS (6 CFU)
NEURAL NETWORKS AND DEEP LEARNING (6 CFU)
NUCLEAR PHYSICS (6 CFU)
PROGRAMMABLE HARDWARE DEVICES (6 CFU)
SUBNUCLEAR PHYSICS (6 CFU)
STANDARD MODEL (6 CFU)
THEORETICAL PHYSICS (6 CFU)
THEORETICAL PHYSICS OF THE FUNDAMENTAL INTERACTIONS (6 CFU)

Activities suggested for Track 2 (Astrophysics and Cosmology)

ASTRO-STATISTICS AND COSMOLOGY (6 CFU)
ASTROPARTICLE PHYSICS (6 CFU)
COMPUTATIONAL ASTROPHYSICS (6 CFU)
FUNDAMENTALS OF ASTROPHYSICS AND COSMOLOGY (6 CFU)
GENERAL RELATIVITY (6 CFU)
GRAVITATIONAL PHYSICS (6 CFU)
MULTIMESSENGER ASTROPHYSICS (6 CFU)
STATISTICAL MECHANICS (6 CFU)
THEORETICAL COSMOLOGY (6 CFU)

Activities suggested for Track 3 (Physics of Matter)

MODELS OF THEORETICAL PHYSICS (6 CFU)
NUMERICAL METHODS IN SOFT MATTER (6 CFU)
PHYSICAL MODELS OF LIVING SYSTEMS (6 CFU)
PHYSICS OF COMPLEX NETWORKS: STRUCTURE AND DYNAMICS (6 CFU)
PHYSICS OF COMPLEX SYSTEMS (6 CFU)
QUANTUM INFORMATION AND COMPUTING(6 CFU)
SOLID STATE PHYSICS (6 CFU)
STATISTICAL MECHANICS (6 CFU)
STATISTICAL MECHANICS OF COMPLEX SYSTEMS (6 CFU)
STRUCTURE OF MATTER (6 CFU)

Activities suggested for Track 4 (Quantum)

INTRODUCTION TO QUANTUM HARDWARE (6 CFU)
MODELS OF THEORETICAL PHYSICS (6 CFU)
MODERN COMPUTING FOR PHYSICS (6 CFU)
NEURAL NETWORKS AND DEEP LEARNING (6 CFU)
NUMERICAL METHODS IN SOFT MATTER (6 CFU)
PROGRAMMABLE HARDWARE DEVICES (6 CFU)
QUANTUM INFORMATION AND COMPUTING (6 CFU)
QUANTUM INFORMATION WITH ATOMS AND PHOTONS (6 CFU)
STRUCTURE OF MATTER (6 CFU)

Activities suggested for Track 5 (Complex System and Interdisciplinary physics)

BIOLOGICAL DATASET FOR COMPUTATIONAL PHYSICS (6 CFU)
GAME THEORY (6 CFU)
LIFE DATA EPIDEMIOLOGY (6 CFU)
MODELS OF THEORETICAL PHYSICS (6 CFU)
NEURAL NETWORKS AND DEEP LEARNING (6 CFU)
NUMERICAL METHODS IN SOFT MATTER (6 CFU)
PHYSICAL MODELS OF LIVING SYSTEM (6 CFU)
PHYSICS OF COMPLEX NETWORKS: STRUCTURE AND DYNAMICS (6 CFU)
PHYSICS OF COMPLEX SYSTEM (6 CFU)
STATISTICAL MECHANICS (6 CFU)
STATISTICAL MECHANICS OF COMPLEX SYSTEMS (6 CFU)
VISION AND COGNITIVE SYSTEMS (6 CFU)

Activities suggested for Track 6 (Machine Learning and Industrial Application)

MODELS OF THEORETICAL PHYSICS (6 CFU)
MODERN COMPUTING FOR PHYSICS (6 CFU)
NEURAL NETWORKS AND DEEP LEARNING (6 CFU)
NUMERICAL METHODS IN SOFT MATTER (6 CFU)
PHYSICS OF COMPLEX NETWORKS: STRUCTURE AND DYNAMICS (6 CFU)
PROGRAMMABLE HARDWARE DEVICES (6 CFU)
STATISTICAL MECHANICS (6 CFU)
VISION AND COGNITIVE SYSTEMS (6 CFU)

Besides the activities mentioned above, many more are available for you to choose from in Rules 5-6-7 (provided you comply with the requirement not to exceed 30 CFU). They can be included from those available in the whole University of Padova based on your personal interests and the overall coherence of the study plan.
No specific recommendations are available for those activities.

Free credits (between 12 and 15 CFU) - (regola 8)

In this block, you must list your choice of integrative/free exams. While it is suggested that the exams chosen under this Rule should be coherent with the study plan of Physics of Data, there is freedom to choose any course in the University of Padova, while not exceeding 15 CFU.

You can choose your free credits, choosing them from the list of pre-selected activities (Rule 8), or picking them from the pool of courses available in the whole University (Rule 9). The approval of the free credits is linked to scientific coherence with the educational path of the master's program.

Free credits choosing from the list of this and other Master's degrees (regola 9).

Here you find a list of suggested possible additional activities.

Additional optional courses (choosing from the courses available in the University) - (regola 10)

Here you find the possibility to choose from the pool of all courses available in the whole University.

Mandatory course of the second year - (regola 11)
Study plans not including the exam reported below cannot be approved.

SCQ0093479 INFORMATION THEORY AND INFERENCE

Stage – (regola 12)

SCP8082711 STAGE

Final examination (regola 13)

SCP8082717 FINAL EXAMINATION

Please note that the stage and master's thesis should be carried out during the second semester of your second year.

WARNING: To conclude the online procedure, you have to click the "CONFERMA PIANO " button (otherwise the study plan will not be saved).
Plans in draft status (Bozza) are not valid.