



MASTER (LM) DEGREE COURSE IN
PHYSICS

Study programme for students enrolled in the academic year 2025-2026 entirely held in English

CURRICULUM PHYSICS OF THE FUNDAMENTAL INTERACTIONS	
1st YEAR	
MANDATORY UNITS	CREDITS
PHYSICS LABORATORY	6
THEORETICAL PHYSICS OF THE FUNDAMENTAL INTERACTIONS (C.I.)	12
NUCLEAR PHYSICS	6
SUBNUCLEAR PHYSICS	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING:	CREDITS
INTRODUCTION TO RADIATION DETECTORS	6
STANDARD MODEL	6
INTRODUCTION TO MANY BODY THEORY	6
2 UNITS TO CHOOSE AMONG THE FOLLOWING:	CREDITS
ADVANCED PHYSICS LABORATORY A	6
APPLIED DIGITAL ELECTRONICS	6
QUANTUM INFORMATION WITH ATOMS AND PHOTONS	6
INTRODUCTION TO QUANTUM HARDWARE	6
QUANTUM FIELD THEORY	6
ASTROPARTICLE PHYSICS	6
GENERAL RELATIVITY	6
NUCLEAR ASTROPHYSICS	6
MULTIMESSENGER ASTROPHYSICS	6
RADIOACTIVITY AND NUCLEAR MEASUREMENTS	6
OBSERVATIONAL ASTROPARTICLE PHYSICS	6
ADVANCED TOPICS IN PHYSICS	6
2nd YEAR	
1 UNIT TO CHOOSE AMONG THE FOLLOWING:	CREDITS

STATISTICAL MECHANICS	6
SOLID STATE PHYSICS	6
FUNDAMENTALS OF ASTROPHYSICS AND COSMOLOGY	6
2 UNITS TO CHOOSE AMONG THE FOLLOWING:	CREDITS
ADVANCED PHYSICS LABORATORY B	6
EFFECTIVE FIELD THEORIES	6
ADVANCED QUANTUM FIELD THEORY	6
NON-PERTURBATIVE QUANTUM FIELD THEORY	6
EXPERIMENTAL SUBNUCLEAR PHYSICS	6
COSMOLOGY OF THE EARLY UNIVERSE	6
THEORY OF STRONGLY CORRELATED SYSTEMS	6
NUMERICAL METHODS IN SOFT MATTER	6
MEDICAL PHYSICS	6
QUANTUM GRAVITY	6
QUANTUM CHROMODYNAMICS	6
ADVANCED ELECTRONICS FOR PHYSICS APPLICATIONS	6
COMPUTATIONAL ASTROPARTICLE PHYSICS	6
FREE-CHOICE UNITS AMONG THE FOLLOWING:	CREDITS
TEACHING AND LEARNING PHYSICS	6
INTRODUCTION TO REASERCH	6
12 ADDITIONAL FREE-CHOICE CREDITS	
SOFT-SKILLS AND RESEARCH PROJECT MANAGEMENT	2
FINAL THESIS/DISSERTATION	40

ANY FURTHER NOTES

- Attendance is mandatory according to the didactic regulamentation.
- Free-choice credits can be chosen among the university's educational offer as long as they are consistent with the educational path. Units specifically for free choice have been introduced into the offer, shown in the table, the contents of which are certainly consistent with the educational path of the study programme.

CURRICULUM PHYSICS OF MATTER	
1st YEAR	
MANDATORY UNITS	CREDITS
PHYSICS LABORATORY	6
MODELS OF THEORETICAL PHYSICS	6
STATISTICAL MECHANICS	6
SOLID STATE PHYSICS	6
STRUCTURE OF MATTER	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING:	CREDITS
ADVANCED PHYSICS LABORATORY A	6
INTRODUCTION TO MANY BODY THEORY	6
2 UNITS TO CHOOSE AMONG THE FOLLOWING:	CREDITS
COMPUTATIONAL METHODS IN MATERIAL SCIENCE	6
INTRODUCTION TO NANOPHYSICS	6
BIOLOGICAL PHYSICS	6
MATHEMATICAL PHYSICS	6
QUANTUM INFORMATION WITH ATOMS AND PHOTONS	6
INTRODUCTION TO QUANTUM HARDWARE	6
OBSERVATIONAL ASTROPARTICLE PHYSICS	6
ADVANCED TOPICS IN PHYSICS	6
2nd YEAR	
1 UNIT TO CHOOSE AMONG THE FOLLOWING:	CREDITS
NUCLEAR PHYSICS	6
GENERAL RELATIVITY FOR ASTROPHYSICS AND COSMOLOGY	6
FUNDAMENTALS OF ASTROPHYSICS AND COSMOLOGY	6
2 UNITS TO CHOOSE AMONG THE FOLLOWING:	CREDITS
ADVANCED PHYSICS LABORATORY B	6
PHYSICS OF SEMICONDUCTORS	6
PHYSICS OF COMPLEX SYSTEMS	6
THEORY OF STRONGLY CORRELATED SYSTEMS	6

PHYSICS OF FLUIDS AND PLASMAS	6
PHYSICS OF NUCLEAR FUSION AND PLASMA APPLICATIONS	6
BIOPHOTONICS	6
OPTICS AND LASER PHYSICS	6
ADVANCED LASER OPTICS	6
NANOFABRICATION	6
NUMERICAL METHODS IN SOFT MATTER	6
PHYSICS OF DISORDERED MATERIALS	6
NON-PERTURBATIVE QUANTUM FIELD THEORY	6
QUANTUM INFORMATION AND COMPUTING	6
FREE-CHOICE UNITS AMONG THE FOLLOWING:	CREDITS
TEACHING AND LEARNING PHYSICS	6
INTRODUCTION TO REASERCH	6
12 ADDITIONAL FREE-CHOICE CREDITS	
SOFT-SKILLS AND RESEARCH PROJECT MANAGEMENT	2
FINAL THESIS/DISSERTATION	40

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CURRICULUM NUPHYS - NUCLEAR PHYSICS (004PD) - international course reserved for students selected following a specific call for applications Path 1 - PERCORSO SPERIMENTALE - Experiments, instrumentation and large accelerators	
1st YEAR	
MANDATORY UNITS HELD IN MADRID (1st SEMESTER):	CREDITS
COMPUTING AND NUMERICAL METHODS	6
QUANTUM MECHANICS	6
BASIC EXPERIMENTAL NUCLEAR PHYSICS	6
NUCLEAR STRUCTURE: PROPERTIES AND MODELS	6
ATOMIC AND PLASMA PHYSICS	6
MANDATORY UNITS HELD IN PADUA (2nd SEMESTER):	CREDITS
RADIOACTIVITY AND NUCLEAR MEASUREMENTS	6
NUCLEAR ASTROPHYSICS	6
HEAVY ION REACTIONS	6
ACCELERATOR PHYSICS	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING HELD IN PADUA (2nd SEMESTER):	CREDITS
ASTROPARTICLE PHYSICS	6
SUBNUCLEAR PHYSICS	6
INTRODUCTION TO RADIATION DETECTORS	6
ADVANCED PHYSICS LABORATORY	6
2nd YEAR	
12 CREDITS TO CHOOSE AMONG THE FOLLOWING UNITS HELD IN FRANCE (1st SEMESTER):	CREDITS
METROLOGY AND DATA ANALYSIS	6
EXPERIMENTAL NUCLEAR PHYSICS AND ACCELERATORS	6
COMMON ADVANCED COURSE	6
RESEARCH INTERNSHIP/THESIS	12
12 ADDITIONAL FREE-CHOICE CREDITS	
MASTER THESIS ON EXPERIMENTAL NUCLEAR PHYSICS, INSTRUMENTATION LARGE ACCELERATORS (SPAIN/FRANCE/PADUA)	30

ANY FURTHER NOTES

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CURRICULUM NUPHYS - NUCLEAR PHYSICS (004PD) - international course reserved for students selected following a specific call for applications Path 2 - PERCORSO TEORICO	
1st YEAR	
MANDATORY UNITS HELD IN MADRID (1st SEMESTER):	CREDITS
COMPUTING AND NUMERICAL METHODS	6
QUANTUM MECHANICS	6
BASIC EXPERIMENTAL NUCLEAR PHYSICS	6
NUCLEAR STRUCTURE: PROPERTIES AND MODELS	6
ATOMIC AND PLASMA PHYSICS	6
MANDATORY UNITS HELD IN SPAIN (2nd SEMESTER):	CREDITS
NUCLEAR REACTIONS	6
RELATIVISTIC QUANTUM THEORY: NUCLEAR PROCESSES	6
WEAK INTERACTIONS	6
MANY BODY THEORIES IN NUCLEAR PHYSICS	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING UNITS HELD IN SPAIN (2nd SEMESTER):	CREDITS
HADRON PHYSICS	6
NUCLEAR ASTROPHYSICS	6
2nd YEAR	
12 CREDITS TO CHOOSE AMONG THE FOLLOWING UNITS HELD IN FRANCE (1st SEMESTER):	CREDITS
METROLOGY AND DATA ANALYSIS	6
EXPERIMENTAL NUCLEAR PHYSICS AND ACCELERATORS	6
COMMON ADVANCED COURSE	6
RESEARCH INTERNSHIP/THESIS	12
12 ADDITIONAL FREE-CHOICE CREDITS	
MASTER THESIS ON THEORETICAL NUCLEAR PHYSICS (PADUA/CATANIA)	30

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CURRICULUM NUPHYS - NUCLEAR PHYSICS (004PD) - international course reserved for students selected following a specific call for applications <i>Path 3 - PERCORSO APPLICATIVO - Nuclear phenomena and their applications</i>	
1st YEAR	
MANDATORY UNITS HELD IN MADRID (1st SEMESTER):	CREDITS
COMPUTING AND NUMERICAL METHODS	6
QUANTUM MECHANICS	6
BASIC EXPERIMENTAL NUCLEAR PHYSICS	6
NUCLEAR STRUCTURE: PROPERTIES AND MODELS	6
ATOMIC AND PLASMA PHYSICS	6
MANDATORY UNITS HELD IN CATANIA (2nd SEMESTER):	CREDITS
NUCLEAR REACTION THEORY	6
NUCLEAR ASTROPHYSICS	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING HELD IN CATANIA (2nd SEMESTER):	CREDITS
WEAK INTERACTIONS	6
MANY BODY THEORIES IN NUCLEAR PHYSICS	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING HELD IN CATANIA (2nd SEMESTER):	CREDITS
ACCELERATOR PHYSICS AND APPLICATIONS	6
ARCHAEOMETRY	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING HELD IN CATANIA (2nd SEMESTER):	CREDITS
MEDICAL PHYSICS	6
ADVANCED NUCLEAR TECHNIQUES APPLIED TO MEDICINE	6
1 UNIT TO CHOOSE AMONG THE FOLLOWING HELD IN CATANIA (2nd SEMESTER):	CREDITS
DATA ANALYSIS TECHNIQUES FOR NUCLEAR AND PARTICLE PHYSICS	6
ENVIRONMENTAL RADIOACTIVITY	6
2nd YEAR	
12 CREDITS TO CHOOSE AMONG THE FOLLOWING UNITS HELD IN FRANCE (1st SEMESTER):	CREDITS
APPLICATIONS FOR THERAPY	12

COMMON ADVANCED COURSE	6
RESEARCH INTERNSHIP/THESIS	12
12 ADDITIONAL FREE-CHOICE CREDITS	
Master Thesis on applications and small accelerators SPAIN/France/CATANIA)	30

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