UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA
Dipartimento di Scienze Fisiche, Informatiche e Matematiche

M.Sc. in Physics – Full list of courses by curriculum, A.Y. 2022/2023

Curriculum *Theoretical and Computational Physics*

Year	Name of the course	Hours	ECTS	SSD	Term	Notes	✓
First year	***B - Distinctive courses (Corsi caratterizzanti)***		***42***				
	Mandatory courses						
	Advanced quantum mechanics	48	6	FIS/02	I		
	Quantum field theory	48	6	FIS/02	I		
	Statistical mechanics and phase transitions	48	6	FIS/02	II		
	Quantum physics of matter	48	6	FIS/03	I		
	Choose three courses among						
	Solid state physics	48	6	FIS/03	II		☐
	Laboratory of quantum simulation of materials	60	6	FIS/03	I II		☐
	Nanoscience & Quantum materials	48	6	FIS/03	II		☐
	Quantum many-body theory	36	6	FIS/03	II		☐
	Elementary particles	48	6	FIS/04	I		☐
	C - Related courses (Corsi affini)		***18***				
	Choose three courses among						
	Advanced quantum field theory	48	6	FIS/02	II		☐
	Relativity	48	6	FIS/02	I		☐
	Introduction to conformal field theory	48	6	FIS/02	II		☐
	Quantum information processing	48	6	FIS/02	I		☐
	Physics of semiconductors	48	6	FIS/03	II		☐
	Atomistic simulation methods	48	6	FIS/02	II		☐
	Chemical physics of biomolecules	36	6	FIS/07	I		☐
	Physics education: theoretical and experimental methods	36	6	FIS/08	II		☐
	High-Performance-Computing	48	6	ING-INF/05	II	*M.Sc in Comp. Science – IT*	☐
	Machine learning and deep learning	48	6	ING-INF/05	I	*M.Sc. in Comp. Sc. Eng.*	☐
	Complex systems	42	6	INF/01	II	*M.S. in Computer Science*	☐
Second year	***B - Distinctive courses (Corsi caratterizzanti)***		***6***				
	Choose one course among						
	Laboratory of nanostructures	60	6	FIS/01	I II		☐
	Synchrotron radiation: basics and applications	48	6	FIS/01	I		☐
	D - Free choice courses (Corsi a scelta libera)		***12***				
	Choose at least 12 ECTSs among all courses (of any curriculum), or any other course offered at UNIMORE						
	E - Thesis project and dissertation		***36***				
	F - Professional preparation (Corsi professionalizzanti)		***6***				
	Choose 6 ECTSs among						
	Good practices in research		3		I		☐
	Physics and society		3		I		☐
	Science-based innovation		6			*Attendance of CBI/SUGAR Unimore projects (see https://clab.unimore.it/)*	☐
	High-performance-computing in sciences		3			*Attendance of CINECA HPC courses (see https://eventi.cineca.it/en/hpc/catalogue)*	☐

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Curriculum *Experimental Nano-physics and Quantum Technologies*

Year	Name of the course	Hours	ECTS	SSD	Term		Notes	✓
	B - Distinctive courses (Corsi caratterizzanti)		***42***					
	Mandatory courses							
	Laboratory of nanostructures	60	6	FIS/01	I	II		
	Magnetism, spintronics and quantum technologies	48	6	FIS/01		II		
	Laboratory of electron microscopy and holography	48	6	FIS/01	I			
	Synchrotron radiation: basics and applications	48	6	FIS/01	I			
	Choose threee courses among							
	Physics of semiconductors	48	6	FIS/03		II		☐
	Solid state physics	48	6	FIS/03		II		☐
	Nanoscience and quantum materials	48	6	FIS/03		II		☐
	Laboratory of quantum simulation of materials	60	6	FIS/03	I	II		☐
	Elementary particles	48	6	FIS/04	I			☐
	Quantum physics of matter	48	6	FIS/03	I			☐
	C - Related courses (Corsi affini)		***18***					
	Choose three courses among							
	Advanced spectroscopic and imaging methods	48	6	FIS/01		II		☐
	Nano-mechanics	48	6	FIS/01	I			☐
	Statistical mechanics and phase transitions	48	6	FIS/02		II		☐
	Advanced quantum mechanics	48	6	FIS/02	I			☐
	Introduction to conformal field theory	48	6	FIS/02		II		☐
	Physics education: theoretical and experimental methods	36	6	FIS/08		II		☐
	Numerical algorithms for signal and image processing	36	6	MAT/08		II	*M.Sc in Mathematics - IT*	☐
	Machine learning and deep learning	48	6	ING-INF/05	I		*M.Sc. in Comp. Sc. Eng.*	☐
	Photonics & microwaves	54	6	ING-INF/02		II	*M.Sc in Electronic Eng.*	☐
	B - Distinctive courses (Corsi caratterizzanti)		***6***					
	Choose one course among							
	Quantum field theory	48	6	FIS/02	I			☐
	Quantum information processing	48	6	FIS/02	I			☐
	Atomistic simulation methods	48	6	FIS/02		II		☐
Second year	***D - Free choice courses (Corsi a scelta libera)***		***12***					
	Choose at least 12 ECTSs among all of the above courses, or any other course offered at UNIMORE							
	E - Thesis project and dissertation		***36***					
	F - Professional preparation (Corsi professionalizzanti)		***6***					
	Choose 6 ECTs among							
	Good practices in research		3		I			☐
	Physics and society		3		I			☐
	Science-based innovation		6				*Attendance of CBI/SUGAR Unimore projects (see https://clab.unimore.it/)*	☐
	High-performance-computing in sciences		3				*Attendance of CINECA HPC courses (see https://eventi.cineca.it/en/hpc/catalogue)*	☐

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Curriculum *Bio-physics and Applied Physics*

Year	Name of the course	Hours		SSD	Term		Notes	✓
First year	***B - Distinctive courses (Corsi caratterizzanti)***		***36***					
	Mandatory courses							
	There is no mandatory courses for this curriculum							
	Choose two courses among							
	Laboratory of nanostructures	60	6	FIS/01	I	II		☐
	Advanced spectroscopic and imaging methods	48	6	FIS/01		II		☐
	Magnetism, spintronics and quantum technologies	48	6	FIS/01	I			☐
	Choose four courses among							
	Quantum physics of matter	48	6	FIS/03	I			☐
	Physics of semiconductors	48	6	FIS/03		II		☐
	Nanoscience and quantum materials	48	6	FIS/03		II		☐
	Laboratory of quantum simulation of materials	60	6	FIS/03	I	II		☐
	Elementary particles	48	6	FIS/04	I			☐
	C - Related courses (Corsi affini)		***24***					
	Choose four courses among							
	Nano-mechanics	48	6	FIS/01	I			☐
	Laboratory of electron microscopy and holography	48	6	FIS/01	I			☐
	Synchrotron radiation: basics and applications	48	6	FIS/01	I			☐
	Biological physics with laboratory	60	6	FIS/07	I	II		☐
	Chemical physics of biomolecules	36	6	FIS/07	I			☐
	Medical physics	48	6	FIS/07		II		☐
	Physics education: theoretical and experimental methods	36	6	FIS/08		II		☐
	High-Performance-Computing	48	6	NG-INF/05		II	*M.Sc in Comp. Science – IT*	☐
	Numerical algorithms for signal and image processing	36	6	MAT/08		II	*M.Sc in Mathematics - IT*	☐
	Machine learning and deep learning	48	6	INF-INF/05	I		*M.Sc. in Comp. Sc. Eng*	☐
Second year	***B - Distinctive courses (Corsi caratterizzanti)***		***6***					
	Choose one course among							
	Statistical mechanics and phase transitions	48	6	FIS/02		II		☐
	Atomistic simulation methods	48	6	FIS/02		II		☐
	D - Free choice courses (Corsi a scelta libera)		***12***					
	Choose At least 12 ECTSs among all of the above courses, or any other course offered at UNIMORE							
	E - Thesis project and dissertation		***36***					
	F - Professional preparation (Corsi professionalizzanti)		***6***					
	Choose 6 ECTSs among							
	Good Practices in Research		3		I			☐
	Physics and society		3		I			☐
	Science-based innovation		6				*Attendance of CBI/SUGAR Unimore projects (see https://clab.unimore.it/)*	☐
	High-Performance-Computing in sciences		3				*Attendance of CINECA HPC courses (see https://eventi.cineca.it/en/hpc/catalogue)*	☐