



## M.Sc. in Physics – Full list of courses by curriculum, A.Y. 2023/2024

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



## Curriculum *Experimental Nano-physics and Quantum Technologies*

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



## 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	<input type="checkbox"/>	
	Advanced spectroscopic and imaging methods	48	6	FIS/01	II	<input checked="" type="checkbox"/>	
	Magnetism, spintronics and quantum technologies	48	6	FIS/01	I	<input type="checkbox"/>	
	Choose four courses among						
	Quantum physics of matter	48	6	FIS/03	I	<input type="checkbox"/>	
	Physics of semiconductors	48	6	FIS/03	II	<input type="checkbox"/>	
	Nanoscience and quantum materials	48	6	FIS/03	II	<input type="checkbox"/>	
	Laboratory of quantum simulation of materials	60	6	FIS/03	I II	<input type="checkbox"/>	
	Elementary particles	48	6	FIS/04	I	<input type="checkbox"/>	
	C - Related courses (Corsi affini)		24				
	Choose four courses among						
	Nano-mechanics	48	6	FIS/01	I	<input type="checkbox"/>	
	Laboratory of electron microscopy and holography	48	6	FIS/01	I	<input type="checkbox"/>	
	Synchrotron radiation: basics and applications	48	6	FIS/01	I	<input type="checkbox"/>	
	Biological physics with laboratory	60	6	FIS/07	I II	<input type="checkbox"/>	
	Chemical physics of biomolecules	36	6	FIS/07	I	<input type="checkbox"/>	
	Medical physics	48	6	FIS/07	II	<input type="checkbox"/>	
	Physics education: theoretical and experimental methods	36	6	FIS/08	II	<input type="checkbox"/>	
	High-Performance-Computing	48	6	NG-INF/05	II	M.Sc in Comp. Science – IT <input type="checkbox"/>	
	Numerical algorithms for signal and image processing	36	6	MAT/08	II	M.Sc in Mathematics - IT <input type="checkbox"/>	
	Machine learning and deep learning	48	6	INF-INF/05	I	M.Sc. in Comp. Sc. Eng <input type="checkbox"/>	
Second year	B - Distinctive courses (Corsi caratterizzanti)		6				
	Choose one course among						
	Statistical mechanics and phase transitions	48	6	FIS/02	II	<input type="checkbox"/>	
	Atomistic simulation methods	48	6	FIS/02	II	<input type="checkbox"/>	
	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	<input type="checkbox"/>	
	Physics and society		3		I	<input type="checkbox"/>	
	Science-based innovation		6	Attendance of CBI/SUGAR Unimore projects (see <a href="https://clab.unimore.it/">https://clab.unimore.it/</a> )			<input type="checkbox"/>
	High-Performance-Computing in sciences		3	Attendance of CINECA HPC courses (see <a href="https://eventi.cineca.it/en/hpc/catalogue">https://eventi.cineca.it/en/hpc/catalogue</a> )			<input type="checkbox"/>