

Studies Plan

Science et ingénierie quantiques 2024-25

Block "Projects & SHS"

Courses				Master 1					Master 2					Exam Session	Exam	Credit		
Lang.	Code	Sect.	Teacher	Specialization	En	L	T	P	I	C	E	L	T	P	I			
Project in quantum science I																		
E	QUANT-401	SIQ	Profs divers							8h						8h Sum Win	During the semester	8
Project in quantum science II																		
E	QUANT-402	SIQ	Profs divers							8h						8h Sum Win	During the semester	8
HSS : Introduction to project SHS																		
																Win		3
HSS : Project SHS																		
																Sum		3

Group "options"

Courses				Master 1					Master 2					Exam Session	Exam	Credit		
Lang.	Code	Sect.	Teacher	Specialization	En	L	T	P	I	C	E	L	T	P	I			
Advanced cryptography																		
E	COM-501	SC	Vaudenay							2h	2h					Sum	Written	6
Algorithms II																		
E	CS-450	IN	Kapralov Svensson		4h	3h										Win	Written	8
Aspects of quantum science and sustainability																		
E	QUANT-411	SIQ	Ionescu Macris							1h			1h			Sum	During the semester	3
Atomistic and quantum simulations of materials																		
E	MSE-468	MX	Pizzi							3h			1h			Sum	During the semester	4
Classical and quantum photonic transducers																		
E	MICRO-410	MT								2h	1h					Sum	Oral	3
Computational methods in molecular quantum mechanics																		
E	CH-452	CGC	Bonella		2h	1h										Win	Oral	4
Cryptography and security																		
E	COM-401	SC	Vaudenay		4h	2h										Win	Written	8
Deep learning																		
E	EE-559	EL	Cavallaro							2h	2h					Sum	During the semester	4
Deep reinforcement learning																		
E	CS-456	IN								2h	1h	1h				Sum	Written	6
Distributed algorithms																		
E	CS-451	SC	Guerraoui		2h	1h	3h									Win	Written	8
Foundations of Data Science																		
E	COM-406	IN	Gastpar Urbanke		4h	2h										Win	Written	8
Fundamentals of integrated photonic components																		
E	MICRO-471	MT			2h	2h										Win	Oral	4
Information theory and coding																		
E	COM-404	SC	Telatar		4h	2h										Win	Written	8
Interacting quantum matter																		
E	PHYS-502	PH			3h	1h										Win	Oral	4
Introduction to crystal growth by epitaxy																		
E	MSE-442	MX								2h						Sum	During the semester	2
Introduction to electronic structure methods																		
E	CH-353	CGC	Röthlisberger		2h	2h										Win	During the semester	4

E	Lab in nanoelectronics EE-490(i)	EL	Kis		4h		Win	During the semester	4	
E	Machine learning CS-433	IN	Flammarion Jaggi	4h 2h	2h		Win	Written	8	
E	Machine learning for physicists PHYS-467	PH	Zdeborová	2h 2h	1h		Win	Written	6	
E	Machine learning II MICRO-570	MT	Billard			3h 1h	1h	Sum	Oral	4
E	Mathematics of data: from theory to computation EE-556	EL	Cevher	3h	3h			Win	Written	6
E	Metrology MICRO-428	MT	Bruschini Charbon Fantner			2h 1h		Sum	Written	3
E	Metrology practicals MICRO-429	MT	Bruschini Charbon Fantner				3h	Sum	During the semester	3
E	Microwave engineering in physics QUANT-410	SIQ	Manucharyan			2h 1h	1h	Sum	Oral	4
E	Molecular dynamics and Monte-Carlo simulation CH-351	CGC	Röthlisberger			1h 1h		Sum	During the semester	2
E	Molecular quantum dynamics CH-453	CGC	Vanicek			2h 1h		Sum	Oral	3
E	Nanoelectronics EE-535	EL	Ionescu	2h				Win	Written	2
E	Nanotechnology MICRO-530	MT	Boero Brugger			3h		Sum	Oral	3
E	Nonlinear optics for quantum technologies PHYS-470	PH	Galland			2h 2h		Sum	Written	4
E	Optimization for machine learning CS-439	IN	Flammarion			2h 2h 1h		Sum	Written	8
E	Photonic systems and technology EE-440	EL	Brès			2h 2h		Sum	Written	4
E	Physics of photonic semiconductor devices PHYS-434	PH	Butté			2h 2h		Sum	Written	4
E	Properties of semiconductors and related nanostructures MSE-484	MX	Piazza			3h 2h		Sum	During the semester	5
E	Quantum computing PHYS-541	PH	Savona	3h 2h				Win	Oral	6
E	Quantum information theory PHYS-550	PH	Holmes			2h 2h		Sum	Written	4
E	Quantum optics and quantum information PHYS-454	PH	Brantut			2h 2h		Sum	Written	6
E	Quantum physics II PHYS-314	PH	Holmes	3h 2h				Win	Written	6
E	Quantum physics IV PHYS-426	PH	Carleo Rossi			2h 2h		Sum	Written	6
E	Quantum transport in mesoscopic systems PHYS-462	PH	Banerjee			2h 2h		Sum	Oral	4
E	Randomized matrix computations MATH-403	MA	Kressner	2h 2h				Win	Oral	5
E	Semiconductor devices II EE-567	EL	Ionescu Kis			2h 2h		Sum	During the semester	4

Semiconductor physics and light-matter interaction						
E	PHYS-433	PH	Butté	2h 2h	Win	Written 4
Solid state physics III						
E	PHYS-419	PH	Läuchli Herzig	3h 2h	Win	Oral 6
Statistical mechanics						
E	MSE-421	MX	Cerioti	2h 1h 1h	Sum	Oral 4
Statistical physics IV						
E	PHYS-436	PH	Kippenberg	2h 2h	Sum	Written 6

Groupe 1 : Bases

Courses			Master 1			Master 2			Exam Session	Exam	Credit				
Lang.	Code	Sect.	Teacher	Specialization	En	L	T	P	I	C	E	L	T	P	I
Computational complexity															
E	CS-524	IN	Göös			2h	2h				Win		During the semester		6
Computational quantum physics															
E	PHYS-463	PH	Carleo					2h	2h		Sum		Oral		4
Fundamentals of solid-state materials															
E	MSE-423	MX	Marzari			3h	1h				Win		Written		4
Introduction to quantum computation															
E	CS-308	IN	Lévêque Urbanke							3h	1h		Sum		Written 5
Introduction to quantum information processing															
E	COM-309	SC	Macris			3h	1h				Win		Written		5
Introduction to quantum science and technology															
E	QUANT-400	SIQ	Carleo Charbon Ionescu Macris Scarlino			3h	1h				Win		Written		5
Quantum and nanocomputing															
E	MICRO-435	MT				4h	2h				Win		Written		6
Quantum electrodynamics and quantum optics															
E	PHYS-453	PH	Kippenberg			2h	2h				Win		Written		6
Quantum mechanics for non-physicists															
E	PHYS-344	PH	Manucharyan			2h	2h				Win		Oral		5
Semiconductor devices I															
E	EE-557	EL	Matioli			3h	1h				Win		During the semester		4
Solid state systems for quantum information															
E	PHYS-464	PH	Scarlino							2h	2h		Sum		Oral 4

Internship

Courses			Master 1			Master 2			Exam Session	Exam	Credit				
Lang.	Code	Sect.	Teacher	Specialization	En	L	T	P	I	C	E	L	T	P	I
Engineering internship (master in Quantum science and engineering)															
E	QUANT-597	SIQ	Profs divers							320h			320h Sum Win		During the semester 12

Master project

Courses			MP Autumn	MP Spring	Exam Session	Exam	Credit
Lang.	Code	Sect. Teacher	Specialization	C E L T P I	C E L T P I		
Master project in quantum science and engineering							
E	QUANT-599	SIQ Profs divers		900h	900h	Sum Win	Oral 30