

SYLLABUS
starting the academic year 2021-2022

University of Bucharest

MASTER'S PROGRAMME	THEORETICAL AND COMPUTATIONAL PHYSICS
Science field	PHYSICS
Faculty	FACULTY OF PHYSICS
Duration	2 years (4 semesters)
Type of study full time (F)/ part-time (IFR)/ distance (ID)	full time (IF)

Master's Programme Syllabus

UNIVERSITY OF BUCHAREST

FACULTY OF PHYSICS

Science field: PHYSICS

MASTER'S PROGRAMME: THEORETICAL AND COMPUTATIONAL PHYSICS (TCP)

Established: 2016 / Revised: 2019

Syllabus applies from: autumn 2021

Type of study: full time

Duration: 4 semesters/120 ECTS

SYLLABUS

Academic year 2021-2022

1-st year of study

L = lecture; S = tutorial/seminar; PL = practicals/laboratory; P = research project; E = exam; C = viva voce/oral examination; A = assessment; V = project assessment; ECTS = No. of credits; DI.xxx = compulsory course unit; DO.xxx = elective course unit, DFC.xxx = optional course unit; DA = thoroughgoing/deepening type course unit; DS = synthesis/advanced type course unit; SI = self-study hours

Crt. No.	Code	Course unit	1 st semester						2 nd semester						Type	SI
			L	S	PL	P	A	ECTS	L	S	PL	P	A	ECTS		
1	DI.101.FTC	Quantum Statistical Physics	2	2	0	0	E	6	-	-	-	-	-	-	DA	90
2	DI.102.FTC	Group Theory and Applications in Physics	2	2	0	0	E	6	-	-	-	-	-	-	DA	90
3	DI.103.FTC	Experimental Methods in Physics	2	0	3	0	E	6	-	-	-	-	-	-	DA	76
4	DO.104.1.FTC	Nonlinear dynamics, chaos, physics of complex systems	2	2	0	0	E	6	-	-	-	-	-	-	DS	90
	DO.104.2.FTC	Special chapters of Mathematics														
5	DI.105.FTC	Ethics in research	1	0	0	0	C	3	-	-	-	-	-	-	DA	57
6	DI.106.FTC	Research activity (traineeship)	0	0	0	4	V	3	-	-	-	-	-	-	DS	15
7	DO.107.1.FTC	Interaction of laser radiation with matter	-	-	-	-	-	-	2	2	0	0	E	6	DS	90
	DO.107.2.FTC	Quantum Optics														
8	DI.108.FTC	Theory of nuclear systems and photonuclear reactions	-	-	-	-	-	-	2	2	0	0	E	6	DS	90
9	DI.109.FTC	Simulation methods in theoretical physics	-	-	-	-	-	-	2	0	2	0	E	5	DA	65
10	DO.110.1.FTC	Introduction to quantum theory of identical particles	-	-	-	-	-	-	2	2	0	0	E	5	DS	65
	DO.110.2.FTC	Theory of critical phenomena														
11	DO.111.1.FTC	Quantum information and communication	-	-	-	-	-	-	2	0	2	0	E	5	DS	65
	DO.111.2.FTC	Collision theory														
12	DI.112.FTC	Research activity (traineeship)	-	-	-	-	-	-	0	0	0	4	C	3	DS	15
		Total	9	6	3	4		30	10	6	4	4		30		
13	DFC.113.FTC	Physics of mesoscopic systems	-	-	-	-	-	-	2	2	0	0	E	4	DA	40
14	DFC.114.FTC	Advanced methods for parallel computing	-	-	-	-	-	-	2	0	2	0	E	4	DA	40

Academic year 2022-2023

2-nd year of study

L = lecture; PL = practicals/laboratory; S = tutorial/seminar; P = research project; E = exam; C = viva você/oral examination; A = assessment; V = project assessment; ECTS = No. of credits; DI.xxx = compulsory course unit; DO.xxx = elective course unit, DFC.xxx = optional course unit; DA = thoroughgoing/deepening type course unit; DS = synthesis/advanced type course unit; SI = self-study hours

Crt. No.	Code	Course unit	1 st semester						2 nd semester						Type	SI
			L	S	PL	P	A	ECTS	L	S	PL	P	A	ECTS		
1	DI.201.FTC	Introduction to quantum theory of fields	2	2	0	0	E	6	-	-	-	-	-	-	DS	90
2	DO.202.1.FTC	Advanced methods in statistical physics	2	0	2	0	E	6	-	-	-	-	-	-	DA	90
	DO.202.2.FTC	Computational methods for electronic structures of condensed systems														
3	DI.203.FTC	Relativistic quantum mechanics and Quantum electrodynamics	2	2	0	0	E	6	-	-	-	-	-	-	DS	90
4	DO.204.1.FTC	Computational methods in modern physics	2	0	2	0	E	6	-	-	-	-	-	-	DA	90
	DO.204.2.FTC	Theory of intense laser radiation interaction with atomic and nuclear systems														
5	DI.205.FTC	Research activity (traineeship)	0	0	0	6	V	6	-	-	-	-	-	-	DS	62
6	DI.206.FTC	Introduction to gravity theory and cosmology	-	-	-	-	-	-	2	1	1	0	E	5	DS	81
7	DO.207.1.FTC	Non-abelian gauge theories and standard model of elementary particles	-	-	-	-	-	-	2	1	1	0	E	5	DA	81
	DO.207.2.FTC	Theory of hadronic matter in extreme conditions and quark-gluon plasma														
8	DI.208.FTC	Research activity (traineeship)	-	-	-	-	-	-	0	0	0	18	V	15	DS	191
9	DI.209.FTC	Research activity for dissertation thesis	-	-	-	-	-	-	-	-	-	-	V	5	DS	121
Total			8	4	4	6		30	4	2	2	18		30		
Dissertation thesis			-	-	-	-	-	-	-	-	-	-	-	10		
10	DFC.210.FTC	Computational approaches in high-energy physics	-	-	-	-	-	-	2	0	2	0	E	3	DS	31
11	DFC.211.FTC	Extensions of the standard model of elementary particles	-	-	-	-	-	-	2	2	0	0	E	3	DS	31