CURRICULUM
applicable beginning with the academic year 2023-2024

University of Bucharest

Master study program	**Fotonică, Plasmă şi Laseri/*Photonics, Plasma and Lasers***
Academic field	**PHYSICS**
Faculty	**FACULTY OF PHYSICS**
Duration	**2 years (4 semesters)**
Type of study full-time(IF)/ part-time (IFR)/ distance-learning (ID)	**full-time (IF)**

1. OBJECTIVES AND COMPETENCIES:

The Master's degree *Photonics, Plasma and Lasers* offers additional education to graduates in Physics and related fields competences related to theoretical and experimental methods in the areas of optics/photonics, plasma and lasers, modeling of specific phenomena. Upon successful completion of the program, students will have mastered the following competencies:

- Apply scientific physical knowledge to understand and model processes and phenomena specific to photonics, plasma and laser, to plan and perform specific experiments;
- Develop applications of photonics, plasma and lasers in various fields
- Use of specific fabrication and characterization techniques for materials and nanostructures;
- Analyse research findings or experimental data (including the use or development of specific scientific software);
- Ability to communicate their own results and observations to a qualified audience;
- Work in a research team, observing field specific ethical issues and responsibilities;
- Utilize development skills to obtain post-graduate employment in the field, including research positions in institutes or companies;

2. STRUCTURE OF THE ACADEMIC YEAR

Number of semesters: 2/year (4/program)
Number of ECTS: 30/semester
Number of face-to-face activities/week: 22-23
Structure of academic year (in weeks):

	Face-to-face learning		Exam session			Research intern-ship	Holidays		
	1-st sem.	II-nd sem.	Winter	Summer	Re-exam		Winter	Spring	Summer
1-st year	14	14	3	4	3	0	3	1	9
II-nd year	14	10+4	3	3	2	0	3	1	

3. FLEXIBILITY OF STUDY ROUTE

Flexible study routes are insured by elective and optional courses/disciplines. Elective disciplines are proposed in each year. In the case of optional (facultative) courses, the corresponding supplementary credits (ECTS) are added to the academic record (diploma supplement), in conformity with the student's option. Credits for optional courses are obtained after passing a form of examination, as defined in the course information sheet. Credits corresponding to optional courses cannot substitute for credits corresponding to compulsory courses

4. STUDY PROGRESS REQUIREMENTS

Requirements for passing a year of study are defined in the *Rules and Regulations regarding proffessional activity of students* adopted by the Senate of the University of Bucharest

5. FINAL EXAM

Finalization of master thesis: 4th semester
Master's thesis defense session: June, after 4th semester

Number of credits for final exam: 10 (for defending the master thesis) in addition to the compulsory 120 credits.

6. SYLLABUS

UNIVERSITY OF BUCHAREST, FACULTY OF PHYSICS
Field of study: PHYSICS
MASTER PROGRAM: *Photonics, Plasma and Lasers*
Applies beginning with: autumn 2023
Type of study: full-time
Duration of study: 4 semesters/120 ECTS

SYLLABUS
Academic year 2020-2021
1st year

C = course; L = laboratory; T = tutorial; P = research project; E = exam; CL = colloquium; A = assessment; ECTS = number of credits; DI.xxx = compulsory course; DO.xxx = elective course, DF.xxx = optional/facultative course; DA = knowledge-deepening course; DS = course of advanced knowledge in the field of study program; SI = number of hours of individual study

Crt. no.	Code	Course	1st semester						2nd semester						Type	SI
			C	S	L	P	A	ECTS	C	S	L	P	A	ECTS		
1	DI.101	Quantum statistical physics	2	2	0	0	E	6	-	-	-	-	-	-	DA	94
2	DI.102	Group theory and applications in physics	2	2	0	0	E	6	-	-	-	-	-	-	DA	94
3	DI.103	Optical properties of surfaces and nanostructures	2	0	2	0	E	6	-	-	-	-	-	-	DS	94
4	DI.104	Experimental methods in physics	2	0	3	0	E	6	-	-	-	-	-	-	DA	80
5	DI.105	Ethics and academic integrity	1	0	0	0	V	3	-	-	-	-	-	-	DA	61
6	DI.106	Research activity (traineeship)	0	0	0	4	C	3	-	-	-	-	-	-	DA	19
7	DI.107	Characterization of laser beam	-	-	-	-	-	-	2	0	2	0	E	6	DA	94
8	DI.108	Interferential and polarimetric methods in photonics	-	-	-	-	-	-	2	0	2	0	E	6	DS	94
9	DO.109.1	Spectroscopy of condensed states and of materials for energy conversion	-	-	-	-	-	-	2	0	2	0	E	5	DS	69
	DO.109.2	Processing with laser beams														
10	DO.110.1	High-power ultrashort-pulse lasers	-	-	-	-	-	-	2	0	2	0	E	5	DS	69
	DO.110.2	Modern computational methods in spectroscopy and imaging								2	0					
11	DO.111.1	Digital processing of images and optical fields	-	-	-	-	-	-	2	0	2	0	E	5	DS	69
	DO.111.2	Photonics and optically anisotropic media														
12	DI.112	Research activity (traineeship)	-	-	-	-	-	-	0	0	0	3	C	3	DA	33
		Total	**9**	**4**	**5**	**4**		**30**	**10**	**0/2**	**10/8**	**3**		**30**		
13	DF.113	Fundamental processes in ionized gases	-	-	-	-	-	-	2	0	2	0	C	3	DA	19
14	DF.114	Elements of Complexity theory	-	-	-	-	-	-	2	2	0	0	C	3	DA	19

Academic year 2021-2022
2nd year

C = course; L = laboratory; T = tutorial; P = research project; E = exam; CL = colloquium; A = assessment; ECTS = number of credits; DI.xxx = compulsory course; DO.xxx = elective course, DF.xxx = optional/facultative course; DA = knowledge-deepening course; DS = course of advanced knowledge in the field of study program; SI = number of hours of individual study

Crt. no.	Code	Course	1st semester						2nd semester						Type	SI
			C	S	L	P	A	ECTS	C	S	L	P	A	ECTS		
1	DI.201	Nonlinear optics	2	0	2	0	E	5	-	-	-	-	-	-	DS	69
2	DI.202	Physical processes in intense laser fields	2	2	0	0	E	6	-	-	-	-	-	-	DA	94
3	DO.203.1	Plasma spectroscopy	2	0	2	0	E	6	-	-	-	-	-	-	DS	94
	DO.203.2	Advanced plasma physics														
4	DO.204.1	Thin film optics	2	1	1	0	E	5	-	-	-	-	-	-	DA	69
	DO.204.2	Design of optical systems		0	2				-	-	-	-	-	-	DA	69
5	DI.205	Research activity (traineeship)	0	0	0	7	C	8	-	-	-	-	-	-	DA	102
6	DO.206.1	Quantum optics	-	-	-	-	-	-	2	0	2	0	E	5	DS	85
	DO.206.2	Applications of modeling and simulations in photoncs								2	0					
7	DO.207.1	Modeling methods in plasma physics	-	-	-	-	-	-	2	1	1	0	E	5	DA	85
	DO.207.2	Homogeneous and inhomogeneous waveguides. Applications								2	0					
8	DI.208	Research activity (traineeship)	-	-	-	-	-	-	0	0	0	18	C	15	DA	195
9	DI.209	Finalization of master thesis	-	-	-	-	-	-	0	0	0	0	V	5	DA	125
Total			**8**	**3/2**	**5/6**	**7**		**30**	**4**	**1/4**	**3/0**	**18**		**30**		
Defense of master thesis			**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**10**		
10	DF.210	Applied optics	2	0	2	0	C	3	-	-	-	-	-	-	DA	19
11	DF.211	Plasmonics and metamaterials	2	2	0	0	C	3	-	-	-	-	-	-	DA	19

SYNOPSIS (I)

Crt. no.	Type of courses	Number of hours		Total		Requirements of ARACIS comission
		1st year	2nd year	Hours	%	
1.	Compulsory	462	390	852	70.30	
2.	Elective	168	192	360	29.70	
	TOTAL:	630	582	1212	100	
3.	Optional / Facultative	112	112	224	18.48	

* calculated with reference to total mandatory courses

SYNOPSIS (II)

Crt. no.	Type of courses	Number of hours		Total		Requirements of ARACIS comission
		1st year	2nd year	Hours	%	
1.	advanced knowledge in the field of study program	280	152	432	35.64	
2.	knowledge-deepening courses	350	430	780	64.36	
TOTAL:		630	582	1212	100	