COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**LOW TEMPERATURE PLASMA PHYSICS AND APPLICATIONS**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]): **SC**	**Term** (1-4): **3**
Level	**Postgraduate (MA)**	**Course type** (Co/El/F[2]): **Co**	

I. Course structure

Number of hours/week				Credits	Total class hours/ semester	Total hours of individual activity	Examination type (C/Ex/CE[3])	Teaching language
Course	Seminar	Lab.	Project	**6**	**56**	**124**	**Ex**	**English**
2		**2**						

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Lecturer	Dr	Claudiu COSTIN	tenure
Seminar				
Laboratory	Lecturer	Dr	Claudiu COSTIN	tenure

III. Prerequisites

Mechanics, Thermodynamics, Electricity and Magnetism, Basics of Plasma Physics, Plasma diagnosis.

IV. Course objectives

- broadening students spectrum of knowledge in plasma physics.
- students become familiar with different types of electrical discharges operating at low temperature.
- developing of theoretical and experimental competences regarding plasma physics applications.

V. Course content

Course	1. Introduction. Different types of low temperature plasma. Applications. 2. Radio-frequency (RF) discharges. Capacitive RF discharge. Inductive RF discharge. Matching circuits. Applications of RF discharges. 3. Microwave discharges. Electron-cyclotron resonance (ECR) discharge. Surface wave discharges. 4. Dielectric barrier discharges. Atmospheric pressure plasmas. Decontamination of gaseous waste. Surface treatments. 5. Magnetron discharge. Reactive sputtering in magnetron discharge. Basic mechanisms (hysteresis effect, instability of the reactive sputtering process, stability criteria). Modelling reactive sputtering in a plane magnetron discharge. 6. Magnetized plasma. Plasma diamagnetism. 7. Plasma processing materials. Etching, thin films deposition and coatings. 8. Dusty plasma. 9. Basics on plasma modelling and simulation.
Seminar	
Laboratory	1. Study of a thermo-ionic vacuum arc. 2. Study of a dielectric barrier discharge at atmospheric pressure. 3. Study of a microwave discharge. 4. LIF and laser absorption diagnosis methods used for the investigation of sputtered material in a magnetron discharge.

[1] FC – fundamental course, SC – specialty course, CC – complementary course
[2] Co – compulsory, El – elective, F – facultative
[3] C – colloquium, Ex – exam, CE – colloquium AND exam
[4] Professor / Associate professor / Lecturer / Assistant professor / Teaching assistant

VI. Minimal required references

1. M. A. Lieberman and A. J. Lichtenberg, *Principles of Plasma Discharges and Material Processing*, John Wiley & Sons Inc., New York, Toronto, Singapore 1994
2. F. F. Chen and Jane P. Chang, *Lecture Notes on Principles of Plasma Processing*, Springer, 2003
3. I. I. Popescu, I. Iova, E. Toader, *Fizica plasmei şi aplicaţii*, Ed. Ştiinţifică şi Enciclopedică, Bucureşti, 1981

VII. Didactic methods

Lecture, debate, problematization, demonstration, PC assisted projections.
Laboratory experiment.

VIII. Assessment

Pre-conditions	Laboratory attendance (at least 70%), written report for every laboratory work, obtaining the minimal grade 5 for practical work.	
Exam dates	**1st Assessment**	**November**
	2nd Assessment	**February**

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	Oral	35% x 2 assessments = 70%
Seminar		
Laboratory	Practical work	30%