

COURSE SYLLABUS

University	Alexandru Ioan Cuza University of Iași	Course title	
Faculty	Physics	Quantum Generators	
Department	Physics		
Domain	Physics	Course category (FC/SC/CC¹): SC	Term (1-4): 1
Level	Postgraduate (MA)	Course type (Co/EI/F²): 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
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II. Instructors

	Academic degree ⁴	Scientific degree	Name and surname	Faculty position (tenure/associate - organization)
Course	Lecturer	PhD	Pohoata Valentin	tenure
Seminar				
Laboratory	Lecturer	PhD	Pohoata Valentin	tenure

III. Prerequisites

Optics, Atomic and Molecular Physics, Plasma physics
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IV. Course objectives

Learning the fundamental concepts of lasers generation, laser properties and its applications

V. Course content

Course	<p>Classical electromagnetic theory of light. Light propagation in matter.</p> <p>Natural bandwidth Lorentz profile.</p> <p>Bandwidth enlargement mechanisms for dipole ensembles emission spectra: elastic and inelastic collisions, pressure and Doppler effects.</p> <p>Quantum characterization of atomic systems.</p> <p>Laser pumping schemes: with 3 and 4 levels</p> <p>Optical resonators. Light amplification. Laser oscillations.</p> <p>External Littrow resonator for diode lasers.</p> <p>Kinetic equation of laser systems.</p> <p>Steady states lasers.</p> <p>Elements of nonlinear optics.</p>
Seminar	
Laboratory	<p>Fabry-Perot interferometer. Optical resonators.</p> <p>Gaussian laser profile. Oscillation modes: longitudinal and transversal.</p> <p>He-Ne laser. Applications.</p> <p>Nitrogen laser.</p> <p>Argon laser.</p> <p>Solid state laser: (YAG-Nd) and ruby laser</p>

¹ FC – fundamental course, SC – specialty course, CC – complementary course

² Co – compulsory, EI – elective, F – facultative

³ C – colloquium, Ex – exam, CE – colloquium AND exam

⁴ Professor / Associate professor / Lecturer / Assistant professor / Teaching assistant

	Excimer laser XeCl. Laser ablation. Extended cavity diode laser. Littrow configuration. Diode laser. Applications: Atomic absorption profile in plasma (Doppler measurements); Laser induced fluorescence in plasma (LIF)
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VI. Minimal required references

Gh. Singurel, *Fizica laserilor*, Ed. Univ. Al. I. Cuza, Iași (2001)
Wolfgang Demtroder, *Laser Spectroscopy*, Ed. Springer New York, (1998)
M. Strat, Georgeta Strat, *Spectroscopie și laseri*, Ed. Univ. Al. I. Cuza, Iași (2001)
A. Eliășevici, *Spectroscopie atomică și moleculară*, Ed. Acad. Române, București (1966)

VII. Didactic methods

Course exposes, representative's experiments and consultations

VIII. Assessment

Pre-conditions	Active participation to class activities	
Exam dates	1st Assessment	November
	2nd Assessment	January– February

	Assessment means and methods	Percentage of the final grade
Exam/Colloquium	written	50 %
Seminar		
Laboratory	practical work	50 %