COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**TRANSPARENT AND CONDUCTIVE OXIDE SEMICONDUCTOR THIN FILMS**	
Department	**Physics**		
Domain	**Advanced Materials. Nanotechnologies**	**Course category** (FC/SC/CC[1]):SC	**Term** (1-4): 2
Level	**Postgraduate (MA)**	**Course type** (Co/El/F[2]):El	

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	**5**	**28**	**28**	**Ex**	**English**
2		**2**						

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Professor	PhD	Iacomi Felicia	tenure
Seminar				
Laboratory	Professor	PhD	Iacomi Felicia	tenure

III. Prerequisites

Quantum mechanics, Physical statistics, Solid state Physics

IV. Course objectives

This course concerns deposition and characterization methods for transparent and conductive oxide thin films. Electrical and optical properties are described.Theoretical models are prezented. TCO thin film applications are discussed.

V. Course content

Course	**I. Introduction in the physics TCO thin films.** **II. Experimental techniques for TCO thin films depozition: Vacuum thermal evaporation, DC and RF sputtering, piroliza-spray, spin-coating, CVD, bath chemical depozition** **III. Influence of deposition conditions and substrate nature on the structure, morphology and electrical and optical properties of TCO thin films** **IV. Influence dopands on the structure and electrical and optical properties of TCO thin films. p- and n- type TCO for electronic devices** **V. Multilayered structures. Applications (transparent electronics, optoelectronics, sensors).**
Seminar	
Laboratory	I. TCO thin films, in the systhem $In_{2-(x+y)}Sn_xZn_yO_3$, depozited by vacuum thermal evaporation method on different substrates II. Depozition of p-type TCO thin films, in the system $Ni_{1-x}Co_xO$, by using spin-coating method. III. Study of dopant content and annealing conditions on optical and electrical properties of TCO thin films IV. Study of DC sputtering depozition conditions on ZnO:Al thin films properties V.Study of substrate nature on the structure, morphology of TCO thin films. VI. Study of charge carriers nature and content on TCO thin films properties and

[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

	functionalities.

VI. Minimal required references

[1] G.I.Rusu, G.M.G.Rusu, Bazele Fizicii semiconductorilor, Ed. Tehn. şi Did. CERMI, Iaşi, 2005
[2] Z. Qiao, Fabrication and study of ITO thin films prepared by magnetron sputtering, disertaţie, 2003
[3] X. Li, S.E. Asher, B.M. Keyes, et al, p-type ZnO thin films grown by MOCVD, online pe http://www.osti.gov/bridge
[4] M. Purica, F. Iacomi, C. Baban, P. Prepelita, N. Apetroaei, D. Mardare, D. Luca, "Investigation of structural properties of ITO thin films deposited on different substrates", Thin Solid Films, 515 p. 8674 - 8678 2007.
[5] E. Budianu, M. Purica, F. Iacomi, C. Baban, P. Prepelita and E. Manea , "Silicon metal-semiconductor–metal photodetector with zinc oxide transparent conducting electrodes", Thin Solid Films, 516, p. 1629-1633, 2008.
[6] N, Iftimie, F. Iacomi, N. Rezlescu, "High performance gas sensing materials based on nanostructured zinc oxide films", JOAM, 10, 7, 2008, p.1810.

VII. Didactic methods

Explaining, Demonstrating, Power Point Presentation

VIII. Assessment

Pre-conditions	Attendance, active participation to lab activities, resolve homework	
Exam dates	**1st Assessment**	November
	2nd Assessment	January

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	written	60%
Seminar		
Laboratory	Practical work, homework.	40%