COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**Experimental Methods in Physics of Materials**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]): FC	**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	Assoc. Prof.	PhD	Baban Cristian-Ioan	tenure
Seminar	Assoc. Prof.	PhD	Baban Cristian-Ioan	tenure
Laboratory				

III. Prerequisites

Solid state physics, Quantum mechanics, Physics of atoms and molecules

IV. Course objectives

The student will obtain good understanding of materials characterization by introducing the basic principles and performing experiences of a large range of techniques used to characterize different types of materials. After completion of the course, the student shall: have the ability to recommend appropriate methods for particular problems; be able to apply the knowledge obtained to elaborate a work plan in solving a particular problem; be able to explain the data obtained and the phenomena exhibited in the materials analysis

V. Course content

Course	X-ray diffraction technique. Neutron diffraction Fundamentals of electron microscopy (SEM, TEM, Electron diffraction, STEM). Electron Probe Micro Analisys (EPMA) (EDS, WDS) Electron Energy-Loss Spectroscopy (EELS) Scanning tunneling microscopy and atomic force microscopy. Electron emission spectroscopies (XPS, AES, UPS). X-Ray Fluorescence (XRF) Ion scattering techniques and mass spectroscopy Vibrational spectroscopy (IR, Raman) Resonance techniques (NMR, ESR) Thermal analysis (DSC and DTA). Low temperature techniques.
Seminar	
Laboratory	1. Qualitative and quantitative analysis of XRD patterns

[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

	2. Interpretation of XPS spectra 3. Electrical conduction at low temperatures 4. Differential thermal analysis 5. Presentation on site of experimental equipments for materials characterization (SEM, XRD, XPS, XRF, AFM, IR, Raman) 6. Individual work for project elaboration and presentation

VI. Minimal required references

1. V. Pop, I. Chicinaş, N. Jumate, Fizica Materialelor: Metode experimentale, Presa Universitară Clujeană, 2001
2. P.E.J. Flewitt, R.K. Wild, Physical Methods for Materials Characterisation, Institute of Physics, Bristol and Philadelphia, 1994.
3. R.C. Brundle et al., Encyclopedia of materials characterization :surfaces, interfaces, thin films London: Butterworth-Heinemann, 1992

VII. Didactic methods

lecture, explanation, conversation, debate, examples
multimedia presentation
experiment

VIII. Assessment

Pre-conditions	Students should attend at least 50 % of course hours and 100 % laboratory work	
Exam dates	**1st Assessment**	Individual project
	2nd Assessment	Written examination

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	written	50 %
Seminar		
Laboratory	free presentation of a specific project	50 %