

COURSE SYLLABUS

University	Alexandru Ioan Cuza University of Iași	Course title	
Faculty	Physics	Methods for Surface Analysis	
Department	Physics		
Domain	Physics	Course category (FC/SC/CC¹): SC	Term (1-4): 2
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
2	-	2	-					

II. Instructors

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

III. Prerequisites

Mechanic and acoustics, Electricity, Magnetism, Optics.

IV. Course objectives

Imparting knowledge concerning fundamentals on physical principles and measurement methods used for the surfaces characterisation. Understanding the theoretical knowledge by experiments. Capacities development for establishing measurement methods.

V. Course content

Course	Surface properties. Optical microscopy. Interferometric methods. Elipsometric methods. Holographic methods. Magneto-optical methods. Atomic force microscopy. Diffraction methods. Fourier transform Infrared Absorption Spectroscopy: Attenuated total reflection (ATR) and Diffuse reflectance (DRIFTS). Auger electrons spectroscopy. Photoelectrons spectroscopy. Raman spectroscopy. Scanning electronic microscopy.
Seminar	-
Laboratory	Study of the surfaces by optical microscopy. Determination of the optical constants and the thickness of the thin films using the ellipsometry. Determination of the magneto-optic Kerr rotation and ellipticity for the soft magnetic thin films. Linnik interferometer: the study of the surfaces and determination of the thin films thickness. Recording of the surface magnetic hysteresis of the magnetic thin films by magneto-optical Kerr effect. The study of the surfaces by atomic force microscopy. Recording and analysis of the oscillation spectra by attenuated total reflection method. Recording and analysis of the spectra by diffuse reflectance method. Study of the surfaces by scanning electron microscopy.

VI. Minimal required references

1. J. M. Walls, R. Smith, *Surface science techniques*, Elsevier Science Ltd (1994)
2. A. Eliașevici, *Spectroscopie atomică și moleculară*, Editura Academiei Române, București (1966)

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

3. R. M. A. Azzam, N. M. Bashara, *Ellipsometry and polarized light*, North Holland Physics Publishing (1987)

VII. Didactic methods

Lecturing. Laboratory experiments.

VIII. Assessment

Pre-conditions	Active participation to class activities.	
Exam dates	1st Assessment	April
	2nd Assessment	June

	Assessment means and methods	Percentage of the final grade
Exam/Colloquium	written	50%
Seminar	-	-
Laboratory	laboratory colloquium	50%