COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**STUDY METHODS OF PARTICLES SYSTEMS WITH PARTIAL ORDERING**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]): FC	**Term** (1-4): 4
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	**8**	**56**	**184**	**Ex**	**English**
2	**2**	**-**	**-**					

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Assoc. Prof.	Dr.	Dimitriu Dan-Gheorghe	tenure
Seminar				
Laboratory	Assoc. Prof.	Dr.	Dimitriu Dan-Gheorghe	tenure

III. Prerequisites

Statistics, Thermodynamics, Atomic and Molecular Physics, Optics, Spectroscopy

IV. Course objectives

The students become accustomed with the main characteristics of the particles systems with partial ordering. The students become accustomed with the main methods applied in the study of the particles systems with partial ordering. The students will develop abilities to investigate some complex particles systems. The students develop practical abilities to apply different theoretical and experimental methods to the study of the particles systems with partial ordering.

V. Course content

Course	1. Intermolecular interactions in biological mediums 2. Structure, properties and the role of water in biological processes 3. Theoretical models for some solutions of biological and medical interest 4. UV-VIS spectroscopy applied for the study of macromolecular superstructures 5. Fluorescence spectroscopy as indicator of structural properties of complex molecules 6. Proteins study using IR vibration spectroscopy 7. Determination of the structural properties of macromolecules through NMR spectroscopy 8. Applications of chemo- and bioluminescence
Seminar	
Laboratory	1. Cromophors based on delocalized π electrons – the vibronic structure in benzene derivatives spectra 2. Spectral properties related to the orientation and interaction of dipole moments. Determination of the electron transitions dipole moments 3. Linear dichroism and birefringence of oriented probes 4. Medium effects on fluorescence spectra. Fluorescence quenching. Life time of the excited electron levels with applications in photosynthesis 5. Fluorescence depolarization 6. IR spectra of the organic molecules. Molecular imprint 7. Application of FTIR spectroscopy to the characterization of the order degree in the artificial membranes 8. ATR-FTIR to characterize the surface of the polymer foils 9. Determination of the peroxide containing and of the degradation level of the vegetal oils 10. Identification of insecticides in water

VI. Minimal required references

[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

1. D. Dorohoi, Fizica Starii lichide. Modele şi Experimente, Ed. Gama, Iaşi, 1994.
2. L. Georgescu, E. Barna, D. Borşan, V. Popa Niţă, V. Dima, N. Stamatin, Fizica Stării lichide şi a cristalelor lichide, Ed. Univ. Bucureşti, 1987;
3. I.-C. Khoo – Liquid crystals, 2nd edition, Wiley-Interscience, Hoboken, 2007;
4. N. H. March, M. P. Tosi – Introduction to liquid state physics, World Scientific, Singapore, 2002.

VII. Didactic methods

Lectures, problems solving, discussions, didactic films

VIII. Assessment

Pre-conditions	Active participation to class activities	
Exam dates	**1st Assessment**	**8th week**
	2nd Assessment	**16th week**

	Assessment means and methods	**Percentage of the final grade**
Exam/Colloquium	Written	70%
Seminar		
Laboratory	Laboratory colloquium	30%