COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**METHODS FOR THE STUDY OF PARTIAL ORDERED SYSTEMS**	
Department	**Physics**		
Domain	**Plasma Physics, Spectroscopy and Self-Organization**	**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	Prof.	Dr.	Dana Ortansa DOROHOI	tenure
Seminar				
Laboratory	Prof.	Dr.	Dana Ortansa DOROHOI	tenure

III. Prerequisites

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

IV. Course objectives

1. Knowledge of the complex problems regarding the structure of liquids and liquid crystals
2. .Knowledge of specific methods to study and to analyse the partially ordered systems of particles
3..To realize the importance of liquid and liquid crystalline phases for life.
4. To know some applications of liquids and liquid crystals

V. Course content

Course	A) Liquid Phase. Basical characteristics of liquid phase; Thermal motion in liquids; Liquid classification; Intermolecular forces in liquids; Empirical Potentials; Notions of Statistical Thermodynamics of simple liquids. B) Theories of liquid phase. Cinetic model of a simple liquid; Cell Eyring Model; Cell Abe Model; Statistical Model of Thernary Solutions; Correlation Functions; Theory of simple liquids on the basis of correlation functions. C) Liquid Crystals. Structural Particularities and Applications Thermotropic liquid crystals; Classification. Structural particularities; Lyotropic liquid crystals; Hydrophobic and hydrophilic interactions; Model membranes. Methods for determination of the ordering degree in liquid crystals. Application of the liquid crystals in science and technique.
Seminar	Models of liquids Methods for determining the order degree of liquid crystalline layers.
Laboratory	1. Dispersion interactions in liquid phase. 2. Spectral method to estimate the supply of intermolecular interactions in simple liquids 3. Average statistic weights of binary solvent molecules in the first solvation sphere 4. Abe statistic model applied to determine the eleectro-optical parameters of the spectrally active moleculas. 5. Study of the specific interactions in liquids. 6. Study of the ultrasounds propagation in liquid sample. 7. Determination of some thermodynamical parameters of liquids 8. Light difraction on ultrasound waves. Propagation speed of ultrasounds in liquids. Compresibility

[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

	coefficients of liquids. 9. Determination of birefringence and of main electric polarizabilities of a nematic liquid crystal 10. Study of lyotropic liquid crystals by FTIR. The degre of order in model memgranes. 11. Influence of external electric field on the degree of order of a lyotropic liquid crystal

VI. Minimal required references

1. I. Georgescu, I. Petra, D. Borşan, Fizica Stării lichide, Ed. Did. Şi Ped. Bucureşti, 1982.
2. D. Dorohoi, Fizica Starii lichide. Modele şi Experimente, Ed. Gama, Iaşi, 1994.
3. C. Moţoc şi I. Muscutariu, Introducere în Fizica Cristalelor lichide, Ed. Facla, Timişoara, 1980.
4. L. Nasta, R. Moldovan, S. Frunză T. Beica, Metode opto-electronice de afişaj, Ed. Univ. Bucureşti, 1992.
5. L. Georgescu, E. Barna, D. Borşan, V. Popa Niţă, V. Dima, N. Stamatin, Fizica Stării lichide şi a cristalelor lichide, Ed. Univ. Bucureşti, 1987.

VII. Didactic methods

Lectures, problems solving, discussions, didactic films

VIII. Assessment

Pre-conditions	Attendance (30% from the final grade), 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 paper	50%
Seminar	Problems solving, presentation of a research topic	20%
Laboratory		