COURSE SYLLABUS

University	**Alexandru Ioan Cuza University of Iaşi**	**Course title**	
Faculty	**Physics**	**NEUROTRANSMITTERS AND NEUROPHARMACEUTICALS**	
Department	**Physics**		
Domain	**Physics**	**Course category** (FC/SC/CC[1]):	**Term** (1-4):
Level	**Postgraduate (MA)**	**Course type** (Co/El/F[2]):	

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					**English**

II. Instructors

	Academic degree[4]	Scientific degree	Name and surname	Faculty position (tenure/ associate - organization)
Course	Professor	Ph. D.	Luchian Tudor	tenure
Seminar				
Laboratory	Teachuing assist	Ph.D.	Loredana MEREUTA	tenure

III. Prerequisites

General physics, Mathematical analysis, General biophysics, Physiology, Electricity and magnetism, Biochemistry

IV. Course objectives

The layout of essential concepts and paradigsm which underlie the description of neurotransmitters and neuropharmaceuticals, as well as their interaction with ion channels. We will follow and describe particular hypothesis and experimental data that led to the discovery of neurotransmitters. A particular emphasis will be put on the presentation of physical and chemical results which explain the molecular interaction between neurotransmitters and ion channels.

V. Course content

Course

1. Molecular description of physical processes associated to neuronal excitation.
2. Particular natural and artificial toxins used to isolate and purify various ion channels involed in cellular excitability.
3. Chemical synapses.
4. Physical and chemical principles of synapses functioning.
5. Neurotransmitters exocytose.
6. Excitatory and inhibitory post-synaptic potentials.
7. Cellular signaling.
8. Molecular mechanism of signal transduction mediated by membrane receptors.
9. Natural systems for the exogenous expression and study of ion channels.
10. Stochastic methods and principles to studying the kinetics of various ion channels and their interaction with various chemicals.
11. The description of an experimental setup used in patch-clamp experiments.
12. Principles of calcium channels identification in excitable membranes.
13. The general description of structure and function of calcium channels.
14. The general description of structure and function chemically-modulated ion channels involved in synaptic communication.

[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

Seminar	
Laboratory	Biostatistics and statistical description of experimantal data; Numerical analysis of the 1-D diffusion equation; Recording of extracellular potentials; Intracellular recordings of action potentials; The numerical simulation of ion channels activity; Statistical analysis of stochastic time-series data; Quantitative analysis of Markov data series; Solving of the diffusion equation for the stationary and non-stationary case; Specific projects related to dissertation thesis.

VI. Minimal required references

1. T. Luchian – 'Introducere in biofizica moleculara si celulara', 'Alexandru I. Cuza' University Publishing House, Iasi, 2001
2. Molecular Cell Biology (3rd edition), 1995. Lodish, H., Baltimore, D., Berk, A., Zipursky, S. L., Matsudaira, P., Darnell, J. W. H. Freeman and Company, New York
3. Ionic Channels of Excitable Membranes, 1992. Hille, B., Sinauer Associates, Inc.
4. T. Luchian – 'Electrofiziologie moleculara. Teorie si Aplicatii', Sedcom Libris, Iasi, 2006
5. Trimmer, J. S. and W. S. Agnew 1989. Annu. Rev. Physiol. 51: 401-418
6. Duch, D. S. and S. R. Levinson 1987. J. Membr. Biol. 98: 43-52
7. Tamkun, M., Talvenheimo, J., Catterall, W. 1984. J. Biol. Chem. 259: 1688
8. Furman, R., Tanaka, J., Mueller, P., Barchi, R. L. 1986. Proc. Natl. Acad. Sci. USA. 83: 488
9. Roberts, R. H. and R. L Barchi 1987. J. Biol. Chem. 262: 2298
10. R. J. Lewis, K. J. Nielsen, D. J. Craik, M. L. Loghnan, D. A. Adams, I. A. Sharpe, T. Luchian, D. J. Adams, T. Bond, L. Thomas, A. Jones, J. L. Matheson, R. Drinkwater, P. R. Andrews, P. F. Alewood. J. Biol. Chem. 2000, 275:45 35335
11. T. Luchian BBA-Biomembranes, 2001, 1512:2 329

VII. Didactic methods

Direct lecturing, demonstration, observation.

VIII. Assessment

Pre-conditions	attendance, 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 şi oral	80
Seminar		
Laboratory	project	20