

1.	Course title	Computational and mathematical models of neural networks		
2.	Course code	БИО-И-06		
3.	Study program	<b>Master studies in Information Science and Computer Engineering, module Bioinformatics</b>		
4.	Unit offering the course	<b>FCSE</b>		
5.	Undergraduate/master/PhD	<b>Master</b>		
6.	Year/semester 1/summer/optional	7. ECTS: <b>6</b>		
8.	Teacher(s)	Ph. D. Ljupco Kocarev, Ph. D. Andrea Kulakov		
9.	Course prerequisites	None		
10.	Goals (competences): The student will be capable to use different computational techniques and mathematical models for modelling and analysis of neural systems.			
11.	Course content: Neural coding and decoding: statistical of neural impulses, revers correlation and visual receptive fields, neural decoding, information theory. Neurons and neural circuits: neuroelectronics, conductivity and morphology, network models. Adaptation and learning: plasticity and learning, learning methods, representative learning.			
12.	Teaching methods: Lectures supported by slide presentations, interactive lectures, trainings (using lab equipment and software packages), team work, case studies, invited guests and lectures, individual practical assignments presentations, seminar paper, e-learning (forums, consultations).			
13.	Total available time	6 ECTS x 30 hours = 180 hours		
14.	Distribution of the available time	100 + 0 + 80 = 180 hours		
15.	Teaching activities	15.1.	Lectures	100 hours
		15.2.	Training (labs, problem solving), seminar and team work	0 hours
16.	Other activities	16.1.	Project work	20 hours
		16.2.	Self study	20 hours
		16.3.	Home work	30 hours
17.	<b>Grading</b>			
	17.1.	Tests		65 points
	17.2.	Seminar work/project (written or oral presentation)		25 points
	17.3.	Active participation		10 points
18.	Grading criteria	to 59 points		5 (five) (F)
		from 60 to 68 points		6 (six) (E)
		from 69 to 76 points		7 (seven) (D)
		from 77 to 84 points		8 (eight) (C)

		from 85 to 92 points	9 (nine) (B)			
		from 93 to 100 points	10 (ten) (A)			
19.	Final exam prerequisites	Successfully completed activities 15.1 and 15.2				
20.	Course language	Macedonian and English				
21.	Quality assurance methods	Internal evaluation and student questionnaires				
22.	Literature					
	22.1.	Compulsory				
		No.	Authors	Title	Publisher	Year
		1.	P. Dayan and L. F. Abbott	Theoretical Neuroscience Computational and Mathematical Modeling of Neural Systems	The MIT Press	2001
		2.	T. J. Sejnowski and J. L. van Hemmen	23 problems in systems neuroscience	Oxford University Press	2006
	3.	M. A. Arbib, Shun-ichi Amari, P. H. Arbib	The Handbook of Brain Theory and Neural Networks	The MIT Press	2002	
	22.2.	Additional				
		No.	Authors	Title	Publisher	Year
		1.				
		2.				
3.						