1.	Course title	Numerical and wavelet methods		
2.	Course code	BIO-I-09		
3.	Study program	Bioinformatics		
4.	Unit offering the course	**FCSE**		
5.	Undergraduate/master/PhD	**Master**		
6.	Year/semester 1/summer/compulsory	7. ECTS: **6**		
8.	Teacher(s)	Prof. dr. Katerina Hadzi-Velkova Saneva		
9.	Course prerequisites	None		
10.	Goals (competences): The student will be able to use various numerical and wavelet methods in defining and solving mathematical models from the field of bioinformatics.			
11.	Course content: Mathematical modeling of problems in the field of bioinformatics. Elements of the theory of errors, sources of errors. Numerical solving of matrix equations. Eigenvalues and eigenvectors. LR and LDR decomposition. Numerical solving of operator equations. Interpolation: polynomial, rational, spline and wavelet. Approximation of functions: techniques of least squares, minimum and maximum error techniques, multiresolution approximation, nonlinear wavelet approximation. Numerical integration. Numerical solving of differential equations. Wavelet methods for partial differential and integral equations. Using program packages. Application in bio engineering.			
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	30+15+135 = 180 hours		
15.	Teaching activities	15.1.	Lectures	30 hours
		15.2.	Training (labs, problem solving), seminar and team work	15 hours
16.	Other activities	16.1.	Project work	60 hours
		16.2.	Self study	25 hours
		16.3.	Home work	50 hours
17.	Grading			
	17.1.	Tests		45 points
	17.2.	Seminar work/project (written or oral presentation)		45 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.	S. C. Chapra, R. P. Canale	Numerical methods for engineers	McGraw-Hill Education (ISE Editions); 5th edition	2008
		2.	R. W. Hamming	Numerical methods for scientists and engineers	Dover Publications, second edition	1986
		3.	A. Ralston, P. Rabinowitz	A first course in numerical analysis	Dover Publications	2001
	22.2.	Additional				
		No.	Authors	Title	Publisher	Year
		1.	A. H. Siddigi	Applied Functional Analysis: numerical methods, wavelet methods, and image processing	CRC	2003
		2.	K. Urban	Wavelets in numerical simulations	Springer	2002
		3.				