

COMPUTER BIOLOGY - SECOND CYCLE OF STUDIES

Table 1.

VII semester

Code	Course	Classes	ECTS	Work load
11.9.F.2101.C	Genetics	2+2+0	6	180
11.3.F.2102.C	Programing in biology I	2+2+0	6	180
11.9.F.2103.C	Molecular biology	2+2+0	6	180
One subject from the following list of items (college electives)				
11.2.F.2101.MaE	Probability and statistical analysis	2+2+0	6	180
11.9.F.2102.MaE	Modeling of processes in cell biology	2+2+0	6	180
11.9.F.2103.MaE	Quantitative systems biology	2+2+0	6	180
One subject from the list of electives University				
Elective 1 – (FROM TAB. 3)		2+2+0	6	180
Total		22	30	900

VIII semester

Code	Course	Number of classes	ECTS	Work load
11.9.F.2201.C	Cell biology	2+2+0	6	180
11.9.F.2202.C	Bioinformatics	2+2+0	6	180
Three electives from the following list of items (college electives)				
11.0.F.2201.MaE	Theory of Conduct	2+2+0	6	180
11.9.F.2202.MaE	Statistical Methods for Computational Biology	2+2+0	6	180
11.9.F.2203.MaE	Network analysis in system biology	2+2+0	6	180
11.3.F.2204.MaE	Computer Science for neurons	2+2+0	6	180
Total		20	30	900

IX semester

Code	Course	Number of hours	ECTS	Work load
11.9.F.2301.C	Methodology of scientific research	2+2+0	6	180
11.3.F.2302.C	Programing in biology II	2+2+0	6	180
11.9.F.2303.C	Processing of Biomedical Signals and Images	2+2+0	6	180
One subject from the following list of items (college electives)				
11.9.F.2301.MaE	Algorithms in Biology	2+2+0	6	180
11.9.F.2302.MaE	Genomics	2+2+0	6	180
11.9.F.2303.MaE	Method of dynamic modeling for system biology	2+2+0	6	180
One subject from the list of electives University				
Elective (from TAB. 3)		2+2+0	6	180
Total		20	30	900

X semester

Code	Course	Number of hours	ECTS	Work load
11.9.F.2401.C	Mathematical modeling of biological systems	2+2+0	6	180
11.9.F.2402.C	Master thesis	0+0+8	12	360
Two electives from the following list of items (college electives)				
11.9.F.2401.MaE	Computational Evolutionary Biology	2+2+0	6	180
11.9.F.2402.MaE	Algorithmic bioinformatics	2+2+0	6	180
11.9.F.2403.MaE	Systemic theories of brain function	2+2+0	6	180
Total		20	30	900

Table 2.

No	Study program-subprogram	Duration of study (years) / ECTS	Total number / percentage of subjects	Number / percentage of core courses in the group (60%)	Number / percentage of elective group (30%)	Number / percentage of elective group (10%)
1.	Computational Biology, second cycle (four semesters)	2 years ago 120 ECTS	19 100%	10 52.7%	7 36.8%	2 10.5%

Table 3. A list of free electives proposed by each separate unit of the University, from which he chooses only one course program.

Table 3. List of free elective subjects proposed by each unit of the university in particular, that University electives.

No	Subject courses (subjects)	ECTS
1.	Design of embedded systems and rapidly developing prototypes -11.9.F.2x01.MaE	6
2.	High performance computing - 11.9.F.2x02.MaE	6
3.	Computer vision - 11.9.F.2x03.MaE	6
4.	Data mining - 11.9.F.2x04.MaE	6
5.	Advanced numerical methods - 11.9.F.2x05MaE	6
6.	Advanced algorithms - 11.9.F.2x06MaE	6
7.	Automatic verification - 11.9.F.2x07MaE	6
8.	Database managment systems - 11.9.F.2x06MaE	6
9.	Web technologies - 11.9.F.2x07MaE	6
10.	Mathematics for computer graphics - 11.9.F.2x08MaE	6
11.	Technologies for Image Processing - 11.9.F.2x09MaE	6
12.	Bioinformatics - 11.9.F.2x10MaE	6
13.	Compiler theory – advanced level - 11.9.F.2x11MaE	6
14.	Linear and nonlinear waves - 11.9.F.2x012MaE	6
15.	Advanced cryptography - 11.9.F.2x13MaE	6

16.	Systems management and supervisory data acquisition 11.9.F.2x14MaE	6
17.	Theory of Robotics - 11.9.F.2x15MaE	6
18.	Declarative programming - 11.9.F.2x16MaE	6
19.	Advanced cloud computing - 11.9.F.2x17MaE	6
20.	Advanced service-oriented architectures - 11.9.F.2x18MaE	6

From Table 3 Students choose courses from the university list of free electives proposed by each unit of the university according to the structure of university studies, especially to meet the elective 10% under Article 99 of the Law on Higher Education. As university electives, students can choose subjects that will be part of future accredited study programs of the second cycle studies.

Table 4 shows the required courses for the program in Computational Biology.

Table 4. Study subprogram Computational Biology

No	Required course programs (courses)	ECTS
1.	Molecular biology	6
2.	Genetics	6
3.	Programming in biology I	6
4.	Programming in biology II	6
5.	Cell biology	6
6.	Methodology of scientific research	6
7.	Bioinformatics	6
8.	Processing of Biomedical Signals and Images	6
9.	Mathematical modeling of biological systems	6
10.	Master thesis	12

Table 5 proposed elective faculty courses for Computational Biology program, which can be heard from VII to X semester. From the list of proposed courses (subjects) are selected courses according to the structure of university studies.

Table 5. List of optional subject for study programs subprogram Computational Biology

No	Subject programs (courses)	ECTS
1.	Mathematical modeling of biological systems	6
2.	Probability and statistical analysis	6
3.	Modeling of processes in cell biology	6
4.	Theory of Conduct	6
5.	Computational Evolutionary Biology	6
6.	Statistical Methods for Computational Biology	6
7.	Algorithmic bioinformatics	6
9.	Algorithms in Biology	6
10.	Genomics	6
11.	Methods of dynamic modeling for system biology	6

12.	Systemic theories of brain function	6
13.	Quantitative systems biology	6
14.	Network analysis in system biology	6
15.	Computer Science neurons	6

NOTE: Defines the rules for activating the respective programs in order to regular classes will be realized only where the subject programs are reported at least 5 students. When the number of students is less than 5, organized mentoring classes.

According to the Law on Higher Education and the University Statute instruction in Macedonian and English.