

FINANCIAL ENGINEERING - Second Cycle of Studies

Table 1.

VII semester

Code	Course	Classes	ECTS	Work load
04.9.CSE.2701.C	Fundamentals of Finance	2+2+0	6	210
04.9.CSE.2702.C	Macroeconomics for Computational Finance	2+2+0	6	180
04.9.CSE.2703.C	Fixed Income	2+2+0	6	180
One elective course from the following course list (faculty elective courses)				
11.2.CSE.2704.MaE	Probability and Statistical Analysis	2+2+0	6	180
11.2.CSE.2705.MaE	Methods of Statistical and Machine Learning of Financial Data	2+2+0	6	180
11.3.CSE.2706.MaE	Programming in Finance 1	2+2+0	6	180
One elective course from the University elective courses				
	Elective Course 1 (from Table 3)	2+2+0	6	150
Total		22	30	900

VIII semester

Code	Course	Classes	ECTS	Work load
11.9.CSE.2801.C	Stochastic Calculus in Finance	2+2+0	6	180
04.9.CSE.2802.C	Options	2+2+0	6	180
Three elective courses from the following course list (faculty elective courses)				
11.9.CSE.2803.MaE	Analysis of financial data arrays	2+2+0	6	180
04.9.CSE.2804.MaE	Multi Periodic Valuation of Goods	2+2+0	6	180
04.9.CSE.2805.MaE	Financial Products and Markets	2+2+0	6	180
11.3.CSE.2806.MaE	Programming in Finance 2	2+2+0	6	180
Total		20	30	900

IX semester

Code	Course	Classes	ECTS	Work load
04.9.CSE.2901.C	Methodology of Scientific Research	2+2+0	6	180
11.3.CSE.2902.C	Operations Research in Finance	2+2+0	6	180
04.9.CSE.2903.C	Financial Economics for Computational Finance	2+2+0	6	180
One elective course from the following course list (faculty elective courses)				
11.3.CSE.2904.MaE	Simulation Methods for Valuation of Options	2+2+0	6	180
04.9.CSE.2905.MaE	Advanced Modeling of Derivatives	2+2+0	6	180
One elective course from the University elective courses				
11.9.CSE.1804.MaE	Numerical Methods	2+2+0	6	180
Total		20	30	900

X semester

Code	Course	Classes	ECTS	Work load
04.9.CSE.21001.C	Presentation of Financial Engineers	2+2+0	6	180
	Master Thesis	0+0+8	12	360
Two elective courses from the following course list (faculty elective courses)				
04.9.CSE.21002.MaE	Risk Management	2+2+0	6	180
04.9.CSE.21003.MaE	Credit Derivatives	2+2+0	6	180
11.3.CSE.21004.MaE	Programming in Finance 3	2+2+0	6	180
Total		20	30	900

Table 2.

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

Table 3 provides a list of free electives proposed by each separate unit of the University, from which only one course program can be chosen.

Table 3. List of free elective subjects proposed by each unit of the university in particular, i.e. University elective courses

No.	Предметни програми (наставни предмети)	ECTS
1.	Design of embedded systems and rapidly developing prototypes	6
2.	High performance computing	6
3.	Computer Vision	6
4.	Data Mining	6
5.	Advanced Numerical Methods	6
6.	Advanced Algorithms	6
7.	Automatic Verification	6
8.	Database management systems	6
9.	Web Technologies	6
10.	Mathematics for computer graphics	6
11.	Image Processing Technologies	6
12.	Bioinformatics	6
13.	Compiler Theory – advanced level	6
14.	Linear and Nonlinear Waves	6
15.	Advanced Cryptography	6
16.	Systems management and supervisory data acquisition	6
17.	Robotics Theory	6
18.	Declarative Programming	6
19.	Advanced Cloud Computing	6
20.	Advanced Service Oriented Architectures	6

From Table 3 Students choose courses from the university list of free electives given in Table 3, that are 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 Financial Engineering.

Table 4. Study subprogram in Financial Engineering

No.	Compulsory Course Programs (Courses)	ECTS
1.	Fundamentals of Finance	6
2.	Macroeconomics for Computational Finance	6
3.	Fixed Income	6
4.	Stochastic Calculus in Finance	6
5.	Options	6
6.	Methodology of Scientific Research	6
7.	Operations Research in Finance	6
8.	Financial Economics for Computational Finance	6
9.	Presentation of Financial Engineers	6
10.	Master Thesis	12

Table 5 proposes the elective faculty courses for Financial Engineering study program, which can be attended from VII to X semester. The courses are selected according to the structure of university studies from the list of proposed courses (subjects).

Табела 5. List of optional subject for study programs subprogram Financial Engineering

Ред. број	Предметни програми (предмети)	ECTS
1.	Probability and Statistical Analysis	6
2.	Methods of Statistical and Machine Learning of Financial Data	6
3.	Programming in Finance 1	6
4.	Analysis of financial data arrays	6
5.	Multi Periodic Valuation of Goods	6
6.	Financial Products and Markets	6
7.	Programming in Finance 2	6
8.	Simulation Methods for Valuation of Options	6
9.	Advanced Modeling of Derivatives	6
10.	Risk Management	6
11.	Credit Derivatives	6
12.	Programming in Finance 3	6

NOTE: The rules that define the activation of the respective study programs state that regular classes will be realized only for the course programs where the number of reported students is at least 5 students. When the number of students is less than 5, the classes will be organized under mentorship.

According to the Law on Higher Education and the University Statute the language of instruction is Macedonian and English.