APPROVED
By the Chairman of the Board, Rector of the
JSC «International Information
Technology University»
_____ A.K. Khikmetov
«30» 03 2023

EDUCATIONAL PROGRAM

7M06111 "Financial Mathematics"

Code and classification of the field of education: 7M06 – Information and communication technologies

Code and classification of study areas: 7M061 - Information and communication technologies

Group of educational programs: 057 – Information technologies

Level according to ISCE: 7

Level according to NQF: 7

Level according to IQF: 7

Duration of study: 2 years

Credits: 120

Almaty, 2023

Рецензия

на образовательную программу «7М06111 Финансовая математика»

Образовательная программа разработана в соответствии с государственным общеобязательным стандартом высшего и послевузовского образования по направлению подготовки «7М061 Информационно-коммуникационные технологии» (форма обучения очная), утвержденного приказом Министра образования и науки Республики Казахстан от 31 октября 2018 года № 604.

Программа содержит разделы, включая описание общей характеристики, цели, задачи, срок освоения и трудоемкость. Представлены планируемые результаты освоения образовательной программы, включающие базовые, профессиональные компетенции в соответствии с ГОСО высшего и послевузовского образования по соответствующим блокам базовой и вариативной частей. Уровни формирования указанных компетенций приведены в соответствии с рабочими программами дисциплин, практики, итоговой аттестации.

Содержание и организация образовательного процесса при реализации образовательной программы в полном объеме раскрыты в учебном плане и обеспечено необходимым набором локальных нормативных актов.

Образовательная программа составлена в логической последовательности освоения всех ее разделов. Вариативная часть представлена дисциплинами, перечень которых отражает запрос работодателей, учитывает развитие технологий, науки, создает возможность для удовлетворения профессионального и научно-познавательного интереса обучающихся.

Содержание рабочих программ дисциплин, практики, дисциплин вариативной части и порядок освоения в образовательной программе в полной мере обеспечивают уровень подготовки бакалавров. В качестве сильных сторон программы следует отметить, что к ее реализации привлекается опытный профессорско-преподавательский состав.

Таким образом, образовательная программа высшего образования «7М06111 Финансовая математика» соответствует требованиям Государственного общеобязательного стандарта высшего и послевузовского образования по направлению подготовки «7М061 Информационно-коммуникационные технологии». Она отражает комплексный и целевой подход для качественной подготовки кадров в бакалавриате по направлению подготовки 7М061 - Информационно-коммуникационные технологии.

Рецензент,

Иташева Нурсауле Корганбеккызы
Ведущий специалист отдела финансовых рисков Управления риск менеджмента
АО "Шинхан Банк Казахстан"

Content

List of designations and abbreviations

CD	Cycle of core disciplines
CC	Core competency
BM	Basic module
UC	University component
HE	Higher education
NMS	National Mandatory Standards of Higher and Post-Graduate Education
ATT	Additional types of training
EQF	European qualifications framework
EFE	European foundation for education
KSA	Knowledge, Skills and Abilities
FA	Final attestation
OC	Optional component
ISCED	International Standard Classification of Education
NQF	National qualifications framework
NQS	National qualifications system
GHM	General humanitarian module
RC	Required component
GEM	General education module
GED	Cycle of general education disciplines
AP	Academic program
GPM	General professional module
SQF	Sectoral qualifications framework
GEC	General education competence
M	Cycle of majors
PI	Professional internship
PS	Professional standard
PE	Postgraduate education
PC	Professional competence
PM	Professional module
LO	Learning outcome
QMS	Quality Management System

1. Description of the educational program

The educational program "Financial Mathematics" is aimed at training highly qualified. professionals in the sphere of finance with a deeper knowledge in mathematics and its application. Undergraduates will consider questions regarding financial markets, market development, modelling of financial instruments and risk assessment. EP includes topics such as: financial markets, valuation of financial instruments, risk management, data analysis, etc. Undergraduates should have some experience in econometrics and calculus. Undergraduates will receive a wide range of skills: concepts of the financial world and programming.

Financial mathematics studies the problems of financial solutions, combining various methods from applied mathematics. This educational program covers a wide range of topics: from the classical theory of option pricing to post-crisis financial mathematics on optimal hedging, investment and risk management.

Like any branch of applied mathematics, financial mathematics analyzes this problem, first creating a mathematical model for it and then exploring it. Both stages require detailed knowledge in various fields of mathematics, including probability theory, statistics, optimization, programming, and many other traditional areas of mathematics.

This program includes the basic skills necessary for successful risk management, trading and research in the field of quantitative financing: probabilities, statistics, optimization, calculations and financial markets.

The program also includes the main topics of a professional certificate in Financial Risk Management. Those who wish, upon completion of the program, can take the exam and get international certificate in FRM.

For the undergraduates there are employment opportunities at the end of the course: risk management, investment banks, banks, consulting firms, insurance companies, corporations.

Our approach involves both covering the basic skills of the MCM specialty, and through the possibilities of optional subjects covering the necessary elements of training in the direction of "Financial Mathematics".

At the same time, the undergraduate is left with the opportunity to take at his discretion even additional subjects as free electives.

2. Goals and objectives of the educational program

The purpose of the educational program is to understand the quantitative methodologies and methods that are important for several jobs in investment banks and other financial institutions; increase critical evaluation of major problems and emerging theories in the field of financial mathematics; and improve personal skills, including critical reasoning, quantitative analysis, and presentation of technical results.

The objectives of the educational program "Financial Mathematics" are:

- statistical analysis tools sufficient to understand probability distributions that are key observables;
- methods of mathematical modelling, covering classical stochastic and pragmatic models;

- Computational skills needed to implement pricing, hedging, trading and risk management tools.

3. Requirements for evaluation of learning outcomes of the educational program

By the end of the Data Science program, undergraduates will be able to:

- Analyze the main financial transactions with a fixed interest rate, such as loan valuation, fixed interest rate securities (for example, bonds).
- To demonstrate sociability, initiative and psychological preparedness for work, including when working in a team and making management and technical decisions.
- Be able to use modern derivative financial instruments.
- Extract the desired information from various sources, including information flows in real time.
- Be able to apply statistical methods of financial risk analysis.
- Distinguish between types of annuities and perpetual payments and their use to solve problems of financial transactions.
- Be able to identify and describe models of cash flows, simple and complex interest rates and discounts.
- Apply mathematical methods in solving financial problems.
- Apply data science research methodologies.
- To analyze financial data using programming.

The following examination forms are used as an assessment of learning outcomes: computer testing, written exam (answers on the sheets), oral exam, project (passing a course project), practical (open questions on a computer, solving problems on a computer, including in ACM format) comprehensive (test / written / oral + others). In accordance with table 1, the following ratio of exam forms is recommended:

№	Exam format	Suggested ratio, %
1	Computer test	20%
2	Written	10%
3	Oral	5%
4	Project	30%
5	Practical	30%
6	complex	5%

Final certification ends with the defense of a master's thesis.

4. Passport of the educational program

4.1 General information

№	Field name	Note
1	Code and classification of the field of education	7M06 - Information and communication technologies
2	Code and classification of training areas	7M061 - Information and communications technology
3	Group of educational programs	M094 Information technologies
4	Name of educational program	7M06111 "Financial mathematics"
5	Brief description of the educational program	The educational program "Financial Mathematics" is aimed at training highly qualified specialists in the field of finance with a deeper knowledge of mathematics and its application. Undergraduates will consider questions regarding financial markets, market development, modeling of financial instruments and risk assessment. EP includes topics such as: financial markets, valuation of financial instruments, risk management, data analysis, etc. Undergraduates should have some experience in econometrics and calculus. Undergraduates will receive a wide range of skills: technologies and concepts of the financial world and programming. Structure of the EP: - Python/R for data analysis; - Machine Learning; - Financial risk management; - Financial markets and intermediaries; - Mathematical Modeling methods;
6	The purpose	The purpose of the "Financial Mathematics" educational program is to train highly professional, competitive and managerial personnel in the financial sector in the private and public sectors of the economy, who have in-depth professional training and are able to apply theoretical and practical knowledge in professional activities.
7	ISCE level	7
8	NQF level	7
9	IQF level	7
10	The list of competencies of the educational program: GEC1: Know: socio-ethical values based on public opinion, traditions, customs, social norms and to be guided by them in their professional activities; traditions and culture of the peoples of Kazakhstan; human and civil rights and freedoms; fundamentals of the legal system and legislation of Kazakhstan; trends in the social development of society; the basics of physical culture and the principles of a healthy lifestyle. GEC2: Have an idea: about ethical and spiritual values; on sociological approaches to personality, basic laws and forms of regulation of social behavior; about the essence of power and political life, political relations and processes, the role of political systems in the life of society and various social groups; about the role of consciousness and self-awareness in the behavior, communication and activities of people, the formation and formation of personality.	

	GEC3: To own ethical and legal norms of behavior; a system of practical knowledge and skills that ensure the acquisition, development, improvement and activation of psychophysical abilities and qualities, the acquisition, preservation and strengthening of health, the ability to work in a team, correctly defend one's point of view, and propose new solutions. GEC4: Ability for written and oral communication in a foreign language; to give reasoned and clearly build oral and written speech; willingness to use one of the foreign languages. GEC5: The ability to use modern information technology, manage information using application programs of the business sphere of activity; use network computer technologies, databases and application packages in their subject area GEC6: The ability to model financial and economic processes to solve specific problems BC1: Ability to predict financial and economic data using modern information technologies, computer technologies, databases and application packages in their area BC2: The ability to understand the basics of economic knowledge, scientific ideas about finance, economics. BC3: Ability to possess the skills of using algorithms and programs for calculating the parameters of business processes. BC4: The ability to be competent in the choice of mathematical modeling methods for solving specific financial problems, including the willingness to identify the natural science essence of the problems that arise in the process of professional activity, and the ability to attract an appropriate physical and mathematical apparatus for its solution. BC5: The ability to identify, evaluate and determine how best to mitigate each threat. BC6: The ability to conduct empirical research using current methods for economic problems. PC1: The ability to conduct statistical analysis sufficient to understand the probability distributions that are key observables. PC2: The ability to conduct economic forecasting. PC3: Ability to develop mathematical modeling methods covering classical stochastic and pragmatic models. PC4: The ability to calculate the implementation of pricing, hedging, and trading tools. PC5: Risk management ability. PC6: Know key concepts about financial markets, their products, prices, risks and market participants. PC7: Ability to study the principles of organizing trade in the market for futures and options contracts. PC8: Ability to conduct research in financial mathematics.
11	Learning outcomes of the educational program: LO1: Analyze the main financial transactions with a fixed interest rate, such as loan valuation, fixed interest rate securities (for example, bonds). LO2: To demonstrate sociability, initiative and psychological preparedness for work, including when working in a team and making management and technical decisions. LO3: Be able to use modern derivative financial instruments. LO4: Extract the desired information from various sources, including information flows in real time. LO5: Be able to apply statistical methods of financial risk analysis. LO6: Distinguish between types of annuities and perpetual payments and their use to solve problems of financial transactions. LO7: Be able to identify and describe models of cash flows, simple and complex interest rates and discounts. LO8: Apply mathematical methods in solving financial problems. LO9: Apply data science research methodologies. LO10: To analyze financial data using programming.

12	Form of training	Full-time
13	Learning languages	English
14	Loan Amount	120
15	Awarded Academic Degree	Master of Technical Sciences/Master of Engineering and Technology in the educational program "7M06111 - Financial Mathematics"
16	Developer (s) and authors:	JSC "International University of Information Technologies", MCM Department: - Ydyrys A.Zh. - Maulenov A.O. - Marat G.S.

4.2 Correlation matrix of learning outcomes of the educational program with the formed competencies

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
BC1		V		V	V		V			V
BC2						V	V			
BC3		V			V				V	V
BC4			V					V	V	
BC5	V			V						
BC6	V								V	
PC1	V				V					
PC2							V			
PC3					V		V	V	V	
PC4	V		V			V				V
PC5		V							V	
PC6						V	V			
PC7	V					V	V			
PC8		V						V	V	

4.3. Information about disciplines

№	Name of the module/ discipline	Brief description of the subject (30-50 words)	Number of credits	Formed competences (codes)	Prerequisites	Post-requisites
	General disciplines University component					
1.	History and philosophy of science	The main stages of development and paradigm shift in the evolution of science, the environment and innovation, the meaning of cognition of the world, analysis, evaluation and comparison of various theoretical concepts in the field of scientific research, a critical analysis of current events, work with the scientific apparatus and sources, scientific methods, analysis and synthesis , scientific ethics of a research scientist	4	GEC1 GEC2	-	-
2.	Foreign language	The language environment in the context of	4	GEC4	-	-

	(professional)	globalization and internationalization, English as a language of communication in the scientific community, sources of information and a knowledge base, a foreign language for scientific communication and international cooperation				
3.	Higher Education pedagogy	"To be competent: in the field of scientific and scientific-pedagogical activity in the conditions of rapid updating and growth of information flows; in carrying out theoretical and experimental scientific research; in matters of university training of specialists; responsibility and creative attitude to scientific and scientific-pedagogical activity. "	4	GEC3	-	-
4.	Psychology of management	"Leadership of management and team leadership; conducting a professional and comprehensive analysis of problems in the relevant field; competence in interpersonal communication and human resource management; oratory in public speaking at international scientific forums, conferences and seminars; knowledge of patent search and experience in transferring scientific information from using modern information and innovative technologies; protection of intellectual property rights to scientific discoveries and developments. "	4	GEC3	-	-
5.	Teaching practice	Practical skills and competencies in teaching at the university; responsibility and creative attitude to scientific and scientific-pedagogical activity.	4	GEC3	-	-
		The cycle of basic disciplines Elective component				
6.	Python/R for data analysis	Data science is one of the rapidly increasing areas to date, and Python is one of the most popular data analysis tools. In this course, you will learn how to apply your programming skills to build predictive models, visualize data, and work with neural networks. The course is practice-oriented and will allow you to immediately start working with data and building models.	5	BC3	Programming in Python	-
7.	Elective course No. 1	Undergraduates are given a choice of elective courses.	5	BC1 BC3		
8.	Elective course No. 2	Undergraduates are given a choice of elective courses.	5	BC4 PC1		
		The cycle of profiling disciplines University component				
9.	Fundamentals of research work	The study of types of scientific research, the methodology of scientific knowledge, research, the formation of conclusions and conclusions, writing scientific articles and reports at the conference, summarizing the results of research work in a dissertation, its structure and content.	5	BC6 PC8		
10.	Research practice	The practice is overseen by the undergradutes' supervisor and the head of the research unit. The purpose of research practice: systematization, expansion and consolidation of professional knowledge, the formation of graduate skills in independent scientific work, research	8	PC8		

		and experimentation.				
Cycle of profiling disciplines Elective component						
11.	Mathematical modelling methods	The basic mathematical models of the dynamics of liquid and gas, physics, chemistry, biology, mechanics, economics, finance, mainly consist of a system of differential equations, partial differential equations, stochastic equations, random processes. The modern theoretical apparatus of mathematics does not allow obtaining exact solutions of these models in general cases. The role of numerical methods and computational experiments in the field of mathematical modeling is great. Therefore, the goal of this course is to study approximate methods for solving various applied problems of hydrodynamics and gas dynamics. Each method is accompanied by the compilation of an algorithm and the development of a software product. Based on computational experiments, various properties of the method and the process under study are investigated.	5	BC4 PC3	Numerical methods	ED from CED
12.	Elective course No.3	Master's students are given elective courses to choose. Введение в фин	5	BC2 PC7		
13.	Elective course No. 4	Master's students are given elective courses to choose. Фининвестиции	5	PC5 PC4		
14.	Elective course No. 5	Master's students are given elective courses to choose. Управление портфелемценныхбумаг	5	PC6		
15.	Elective course No. 6	Master's students are given elective courses to choose. Финтех	5	BC5		
16.	Elective course No. 7	Master's students are given elective courses to choose.продфинмен	5	PC4		
17.	Elective course No. 8	Master's students are given elective courses to choose.продфинмоделирование	5	PC2		
18.	Elective course No. 9	Master's students are given elective courses to choose.рискменвфинорг	5	PC5 PC6		
19.	Scientific research work of a master's student, including an internship and writing a master's thesis	Scientific research work of a master's student, including an internship and writing a master's thesis in 2-nd (2 credits), 3-rd (4 credits) and 4th semester (18 credits).	24	PC8		

4.4. List of modules and learning outcomes

Name of educational program: "Financial Mathematics"
Qualification: Master of Technical Sciences/Master of Engineering and Technology in the educational program «7M06111 - Financial Mathematics»

Module code / Module name	Complexity of the module in credits	Learning outcome	Learning outcomes evaluation criteria	Module shaping disciplines Code / Name
BASIC MODULES				
BM01 Pedagogical-language module	4	Understands the meaning of world knowledge, analysis evaluation and comparison of various theoretical concepts in the field of scientific research. Knows critical analysis of current events. Works with scientific apparatus and sources.	Oral interview, testing, report, midterm calculation and graphic works	History and philosophy of science
	4	Knows English as the language of communication in the scientific environment, sources of information and knowledge bases.		Foreign Language (professional)
	4	They are competent in the field of scientific and scientific-pedagogical activity in the conditions of rapid updating and growth of information flows.		Higher school pedagogy
	4	Team management. Able to conduct a professional and comprehensive analysis of problems in the relevant field.		Management psychology
BM02 Mathematical Modeling Module	5	Knows mathematical models of liquid and gas dynamics, physics, chemistry, biology, mechanics, Economics, Finance, which consist mainly of a system of differential equations, partial differential equations, stochastic equations, random processes.	Oral interview, testing, report, midterm calculation and graphic works	Methods of mathematical modeling
	5	Can use programming skills to build predictive models, visualize data, and work with neural networks.		Python/R for data analysis
	5	Has professional skills		Elective discipline №1

	5			Elective discipline №2
PROFILING MODULES				
PM01 Elective discipline module	5	Has professional skills	Oral interview, testing, report, midterm calculation and graphic works	Elective discipline №3
	5			Elective discipline №4
	5			Elective discipline №5
	5			Elective discipline №6
	5			Elective discipline №7
	5			Elective discipline №8
	5			Elective discipline №9
PM02 Research module	5	Knows the organizational structure and complex of technical means of the information and analytical center (IAC) of the organization. Can identify the main tasks solved by the IAC. Knows the mathematical support for the selected task (set of tasks or subsystem) and software for the selected task (set of tasks or subsystem), organizational and legal support for the selected task (set of tasks or subsystem). systematization and analysis of actual materials required for writing a course paper, scientific report, and internship report.	Oral interview, report	Fundamentals of research work
	4		Report	Teaching practice
	8			Research practice
	24			Research work of a master's student

5. Curriculum of the educational program

№	Module code	Module name in three languages (kaz / rus / eng)	Discipline Code	Discipline name in three languages (kaz / rus / eng)	Cycles (GED, CD, M)	Components (RC, OC, UC)	Total number of credits (ECTS)	Total number of academic hours	Number of classroom hours				Number of SIS hours		Form of control (Midterm, End-of-term, examination, CP defense, differential test, DP defense)	Prerequisites (Discipline Code)
									Total number of classroom hours	Including			Total number of SIS hours	Including TSIS		
										lectures	practical classes (sem.)	laboratory classes				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 year																
1 semester																
1	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	RW7001	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	RW	RC	2	60	0	0	0	0	60	15	Report Dif.test	-
2	BM01	Педагогикалық-тілдік модуль / Педагогическо-языковой модуль / Pedagogical-language module	SPS7001	Тарих және ғылым философиясы / История и философия науки / History and philosophy of science	GED	UC	4	120	30	15	15	0	90	15	M, E, Exam	-
3	BM01	Педагогикалық-тілдік модуль / Педагогическо-языковой модуль / Pedagogical-language module	SPS7002	Жоғары мектеп педагогикасы / Педагогика высшей школы / High School of Pedagogy	GED	UC	4	120	30	15	15	0	90	15	M, E, Exam	-
4	BM02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT7531	Математикалық модельдеудің әдістері / Методы математического моделирования / Methods of mathematical modelling	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	

5	BM02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT7506	Деректерді талдау үшін Python/R / Python/R для анализа данных / Python/R for analysing data	BD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
6	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	MAT7581	Қаржыға кіріспе / Введение в финансы / Introduction to Finance	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			PM7701	Жобаларды қаржылық басқару / Финансовое управление проектами / Financial project management												
7	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7705	Қаржылық инвестициялар / Финансовые инвестиции / Financial investments	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			MAT7579	Корпоративтік қаржы / Корпоративные финансы / Corporate Finance												
				Total number for a 1 semester:			**30**	**900**	**240**	**90**	**150**	**0**	**660**	**105**		
				2 semester												
8	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	RW7002	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	RW	RC	3	90	0	0	0	0	90	15	Report Dif.test	
9	BM01	Педагогикалық-тілдік модуль / Педагогическо-языковой модуль / Pedagogical-language module	LAN 7001A	Шет тілі (кәсіби) / Иностранный язык (профессиональный) / Foreign language (professional)	GED	UC	4	120	30	15	15	0	90	15	M, E, Exam	-
10	BM01	Педагогикалық-тілдік модуль / Педагогическо-языковой модуль / Pedagogical-language module	SPS7003	Басқару психологиясы / Психология управления / Psychology of management	GED	UC	4	120	30	15	15	0	90	15	M, E, Exam	-
11	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	PP7501	Педагогикалық тәжірибе / Педагогическая практика / Teaching practice	GED	UC	4	120	0	0	0	0	120	15	report	
12	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	RM7502	Ғылыми-зерттеу жұмысының негіздері / Основы научно-исследовательской работы / Fundamentals of research work	CD	OC	5	150	45	15	30	0	105	15	M, E, Exam	
13	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7706	Бағалы қағаздар портфелін басқару / Управление портфелем ценных бумаг / Portfolio management	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	

			MAT7582	Қаржылық тәуекелдерді басқару / Финансовый риск-менеджмент / Financial risk management												
14	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7702	Fintech заманауи мәселелері / Современные вопросы в Финтех / Contemporary issues in Fintech	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			MAT7580	Қаржы нарықтары және делдалдар / Финансовые рынки и посредники / Financial markets and intermediaries												
				Total number for a 2 semester:			**30**	**900**	**195**	**75**	**120**	**0**	**705**	**105**		
				TOTAL NUMBER FOR THE 1 YEAR:			**60**	**1800**	**435**	**165**	**270**	**0**	**1365**	**210**		
2 year																
3 semester																
15	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	RW7003	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	RW	RC	5	150	0	0	0	0	150	15	Report Dif.test	
16	BM02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT7511	Байестік статистика және талдау / Байесовская статистика и анализ / Bayesian statistics and analysis	BD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			MAT7501	Қолданбалы көп өлшемді статистикалық талдау / Прикладной многомерный статистический анализ / Applied multivariate statistical analysis												
17	BM02	Математикалық модельдеу модулі / Модуль математического моделирования / Mathematical modeling module	MAT7512	Машиналық оқыту / Машинное обучение / Machine Learning	BD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			SFT7302	Кеңейтілген дереккорлар / Продвинутые базы данных / Advanced Databases												
18	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7701	Кеңейтілген қаржылық менеджмент / Продвинутый финансовый менеджмент / Advanced Financial Management	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	
			MAT7519	Туынды қаржы құралдары / Производные финансовые инструменты / Derivative financial instrument												
19	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7703	Жетілдірілген қаржылық модельдеу / Продвинутое финансовое моделирование / Advanced financial modeling	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	

			MAT7577	Қаржылық модельдеу / Финансовое моделирование / Financial modeling												
20	PM01	Элективті пәндер модулі / Модуль элективных дисциплин / Elective disciplines module	FIN7704 MAT7578	Қаржы ұйымдарындағы тәуекелдерді басқару / Риск менеджмент в финансовых организациях / Risk management in financial institutions Банк және сақтандыру ісі / Банковское и страховое дело / Banking and insurance	PD	EC	5	150	45	15	30	0	105	15	M, E, Exam	-
				Total number for a 3 semester:			**30**	**900**	**225**	**75**	**150**	**0**	**675**	**90**		
4 semester																
21	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	RW7008	Магистранттың ғылыми-зерттеу жұмысы, оның ішінде тағылымдама және магистрлік диссертациясының орындалуы / Научно-исследовательская работа магистранта, включая прохождение стажировки и выполнение магистерской диссертации (НИРМ) / The research work of a student, including an internship and implementation of master's thesis	RW	RC	14	420	0	0	0	0	420	15	Report Dif.test	
22	PM02	Ғылыми-зерттеу модулі / Научно-исследовательский модуль / Scientific research module	PP7504	Зерттеу тәжірибесі / Исследовательская практика / Research practice	PD	UC	8	240	0	0	0	0	240	15	Report	
23				Магистрлік диссертацияны тіркеу және қорғау / Оформление и защита магистерской диссертации / Registration and defense of a master's thesis			8	240	0	0	0	0	240	15	Defense MS thesis	
				Total number for a 4 semester:			**30**	**900**	**0**	**0**	**0**	**0**	**900**	**45**		
				TOTAL NUMBER FOR THE 2 YEAR:			**60**	**1800**	**225**	**75**	**150**	**0**	**1575**	**135**		
				TOTAL:			**120**	**3600**	**660**	**240**	**420**	**0**	**2940**	**345**		

6. Agreement sheet with the developers

Name of the educational program: 7M06111 «Financial Mathematics»

№ п/п	Position, scientific or academic degree, name and surname of the developer of the educational program	Date	Signature	Note
1	Assistant professor, PhD Ydyrys A. Zh.			
2	Assistant professor, PhD Maulenov A.O.			
3	Senior-lecturer Marat G.S.			