Ministry of Education and Science of the Republic of Kazakhstan
Aktobe Regional University named after K. Zhubanov

"APPROVED"
By the decision of the Board of Directors
NAO
"Aktobe Regional
University named after K. Zhubanov"
(Minutes no. ot "__"_____ 202_y.)

MODULAR EDUCATIONAL PROGRAM

Education area code and name: 8D05-Natural Sciences, Mathematics and Statistics
Training area code and name: 8D054/0540-Mathematics and Statistics **OP code and name:** 8D05401-Mathematics
Education level: Doctoral degree
Degree awarded: Doctor of Philosophy (PhD) in the educational program "8D05401-Mathematics"
Total Credits: 180 academic credits / 180 ECTS
Year of admission: 2022

Compiled by:

Full name	Position	Contact information
Employers: Doctorof Technical Sciences, Professor Kenzhegulov Beket Zineshovich Doctor of Physical and Mathematical Sciences, Professor Asanova Anar Turmaganbetkyzy	Director of the Institute of Mathematics and Applied Technologies at Atyrau University named after Kh. Dosmukhamedov Head of the Department of Mathematical Physics and Modeling of the Institute of Mathematics and Mathematical Modeling of KN MES RK 8-701-729-62-84 8-701-738-09-42 PhD	 8-701-729-62-84 8-701-738-09-42
PhD doctoral student Tankeeva Aigerim	PhD 1st year doctoral student	8-705-376-24-29
Responsible compilers of the department: Abdikalikova Galiya Amirgalievna Kokotova Elena Viktorovna	Ph. D., Associate Professor Ph. D., Associate Professor of the Department	8-702-114-91-58 8-701-920-42-53
Reviewer: Alday Maktagul	PhD, Associate Professor, L. N. Gumilyov ENU	8-701-333-25-75

2. Mission, vision, and values of the university

MISSION STATEMENT:
Formation of a qualified specialist and a "perfect person" who has absorbed national values

VISION:
Multidisciplinary classical university that provides the western region of Kazakhstan with qualified specialists and has become the core of applied science

VALUES:

- Academic success
- Integrity
- Openness and collaboration
- The highest quality of education
- Social activism and civic initiative
- Leadership and creativity
- Respect and attention to people
- Unity of science and innovation

3. The university graduate model

- Has a deep knowledge and understanding of the field under study
- Ready for professional self-realization in the modern world
- Enterprising, able to make decisions and create new opportunities
- Adaptive to global challenges
- A person with high intelligence
- Has global citizenship

4. Passport of the educational program

Scope of application	The educational program "8D05401-Mathematics" (hereinafter - OP) is intended for training doctors of Philosophy (PhD) at Aktobe Regional University named after K. Zhubanov. The EP is a system of documents developed and approved by Aktobe Regional University named after K. Zhubanov independently on the basis of the State Air Defense Standard for the corresponding training area, the classifier of training areas for personnel with higher and postgraduate education in accordance with the code in the International Standard Classification of Education, the Professional Standard "Teacher". When developing the OP ofhigher professional education, the established scientific schools of the ARUnamed after K. Zhubanov were taken into account, as well as the needsof the regional and republican labor markets.
Code and name of the educational program	8D05401 – Mathematics
Regulatory support	1. Law of the Republic of Kazakhstan "On Education"dated June 27, 2007 No. 319-III (with amendments and additions) 2. " Rules of organization of the educational process on credit technology of training "(Order No. 563 of the Minister of Education and Science of the Republic of Kazakhstan dated October 12, 2018) 3. Guidelines for the use of the European System of Transfer and Accumulation of Accounting Units (ECTS) 2015 4. State Mandatory Standard of Higher Education(Order No. 604 of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018) 5. Classifier of training areas for personnel with higher and postgraduate education (Order No. 569 of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018) 6. Rules for organizing dual education(Order of the Minister of Education and Science of the Republic of Kazakhstan No. 50 dated January 21, 2016 (as amended on September 11, 2018) 7. Standard rules of activity of educational organizations implementing educational programs of higher and (or) postgraduate education(Order No. 595 of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018) 8. Standard curricula of the cycle of general education disciplines for organizations of higher and (or) postgraduate education(Order No. 603 of the Minister of Education and Science of

	the Republic of Kazakhstan dated October 31, 2018) 9. Coding system for academic disciplines of higher and postgraduate education. State Standard of the Republic of Kazakhstan 5.05.001-2005 10. Professional standard " Teacher "(Appendix to the Order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 133 dated June 8, 2017) 11. Industry qualification framework for Education (Approved by the Industry Commission of the Ministry of Education and Science of the Republic of Kazakhstan on social partnership and regulation of social and labor relations in the field of education and science. Protocol No. 3 of 27.11.2019.). 12. Regulations on the construction of a modular educational program (Protocol No. 13 of 12.08.2020; 13. Regulations on Master's and Doctoral studies (Protocol No. 1 dated 08/28/2020). 14. Regulations on doctoral dissertation (Protocol No. 1 dated 08/28/2020). 15. Regulations on the organization and conduct of internships and scientific internships for magicians and doctoral students (Protocol No. 1 dated 08/28/2020).
A map of the training profile within the framework of the educational program	
The purpose of the educational program	The purpose of the educational program "8D05401 – Mathematics" is to train competitive, highly qualified scientific and teaching staff for higher education, postgraduate education and the scientific field with in-depth scientific, pedagogical and research training.
Qualification characteristics of the graduate	
Degree awarded:	Doctor of Philosophy (PhD) in the educational program "8D05401 – Mathematics"
List of specialist positions	Graduates of the doctoral program can carry out professional activities in accordance with the received fundamental and specialized training in the specialty in the position: - researcher (senior, leading, chief) employee in research institutes, laboratories, design and design bureaus, etc.; - teacher of mathematics in higher educational institutions and other educational organizations; - - mathematical analyst, chief specialist in production and management organizations that use mathematical methods in their work, in insurance компаниях, финансовых структурах; - руководитель ВУЗа.
Area of professional activity	- the science;

	- education; - scientific and production sphere, economics and management
Functions and types of professional activity	Types of professional activity: - scientific research; - pedagogical; - administrative and managerial. In accordance with the types of professional activity, a graduate of the OP "8D05401-Mathematics" can perform the following functions: Scientific research activities: - scientific research using mathematical methods and computational technologies to solve fundamental problems of mathematical modeling of processes and objects; - construction and research of mathematical models, development of algorithms, research methods on the subject of ongoing research and applied research; - development of high-tech mathematical and modern high-performance computing technologies, information technologies and software packages for solving applied problems in the field of natural sciences. Teaching activities: - organization of the educational process, teaching of a cycle of mathematical disciplines in an educational institution

5. Educational program learning outcomes

LO 1. plan, coordinate, implement and predict research results, critically analyse, evaluate and compare various scientific theories and ideas;
LO 2. Demonstrate deep and comprehensive knowledge in fundamental areas of mathematics, including Sobolev space theory, noncommutative operator analysis, stochastic analysis, the theory of reducibility of systems of differential equations, and dynamical systems theory. Apply scientific research methods to solve current problems in modern mathematics;
LO 3. to apply methods of theoretical and applied scientific research in the field of systems of differential equations in partial production to study systems in the directions of the vector field, boundary value problems for hyperbolic equations with nonlocal conditions, multiperiodic and almost periodic solutions of applied problems for parabolic equations;
LO 4. generate their own new scientific ideas, synthesize the results of research and analytical work in the form of a doctoral dissertation, be competent in the implementation of scientific projects and research in the professional field;
LO 5. to apply methods for finding periodic solutions of differential and integro-differential equations with multidimensional time, to solve the problem of stability of multiperiodic solution and holomorphism by small parameter;
LO 6. be able to formulate and solve modern scientific and practical problems in mathematics, organize and conduct research, experimental and research activities in the chosen direction;
LO 7. be able to plan and predict their further professional development; have the skills to acquire new knowledge in a special field, in the field of theory and methodology of professional education;
LO 8. use modern methods of data analysis, demonstrating the skills of searching, collecting, processing, storing and transmitting scientific information using modern information and innovative technologies;
LO 9. build and evaluate phase portraits of dynamical systems, distinguish between deterministic chaos and non-deterministic systems; to solve the problems of qualitative research of a dynamic system.

6. Modular curriculum for 2022-2025 (duration of study is 3 years)

Цикл/ компо-нент	Discipline code	Name of the discipline	semestr	academic credits	ESTS credit	Forms of control	Course paper	Budget of working hours of doctoral students, hour							Distribution by courses and semesters					
								in total	Classroom	Classroom classes			Independent work		1st course		2nd course		3rd course	
										Lectures	Laboratory classes	Practical exercises	SRDP	SDR	1 sem 15 week	2-sem 15 week	3-sem 15 week	4- sem 15 week	5- sem 15 week	6- sem 15 week
Module 1. - Problems of scientific research in fundamental areas of mathematics, 26 academic credits																				
BD UC	AW 7201	Academic writing	1	3	3	exa		90	30	15		15	15	45	3					
BD UC	SRM 7202	Scientific research methods	1	3	3	exa		90	30	15		15	15	45	3					
BD UC	APFAM 7203	Actual problems of fundamental areas of mathematics	1	5	5	exa		150	45	15		30	25	80	5					
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis	1	15	15	report		450							15					
Module 2.1. – Theory of oscillations, 24 academic credits																				
PD CoC	PSDE 7301	Reducibility of a system of differential equations	1	4	4	exa		120	40	20		20	20	60	4					
PD CoC	OSDISEMT 7302	Oscillatory solutions of differential and integro-differential systems of equations with multidimensional time	2	5	5	exa.		150	45	15		30	25	80		5				
PD CoC	MPSPE 7303	Multiperiodic and almost periodic solutions of a system of parabolic equations	2	5	5	exa		150	45	15		30	25	80		5				
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis	2	10	10	report		300								10				
Module 2.2. – Dynamical systems, non-local boundary value problems and methods for solving systems of differential equations, 24 academic credits																				
PD CoC	SMSSDEP 7301	Special methods for solving systems of differential equations in partial productions	1	4	4	exa		120	40	20		20	20	60	4					
PD CoC	DS 7302	Dynamic systems (in English)	2	5	5	exa		150	45	15		30	25	80		5				

PD CoC	NBVPDE 7303	Non-local boundary value problems for partial differential equations (in English)	2	5	5	exa		150	45	15		30	25	80		5				
	NIRD	Doctoral student's research work, including the completion of a doctoral thesis	2	10	10	re-port		300								10				
Module 3. – Scientific and practical, 118 academic credits																				
BD	PP	pedagogical practice	2	10	10	re-port		300								10				
PD	RP	Research practice	4	10	10	re-port		300										10		
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis	3,4, 5,6	98	98	re-port		2940									30	20	30	18
	ИА	**Final certification. Preparation and defense of a doctoral thesis**	6	**12**	**12**			**360**												**12**
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis		**123**	**123**			**3690**							**15**	**10**	**30**	**20**	**30**	**18**
	Total	by cycle BD UC		11	11			330	105	45		60	55	170	11					
	Total	by cycle BD CoC		0	0			0	0	0		0	0	0						
		BD Pedagogical practice		10	10			300	0	0		0	0	0		10				
	Total	by cycle **BD**		**21**	**21**			**630**	**105**	**45**	**0**	**60**	**55**	**170**	**11**	**10**	**0**	**0**	**0**	**0**
	Total	by cycle PD UC		0	0			0	0	0		0	0	0						
	Total	by cycle PD CoC		14	14			420	130	50		80	70	220	4	10				
		PD Research practice		10	10			300	0	0		0	0	0				10		
	Total	by cycle **PD**		**24**	**24**			**720**	**130**	**50**		**80**	**70**	**220**	**4**	**10**	**0**	**10**	**0**	**0**
Total number of credits:				**180**	**180**			**5400**	**235**	**95**	**0**	**140**	**125**	**390**	**30**	**30**	**30**	**30**	**30**	**30**

Abbreviated names:

BD	.-basic discipline
PD	.- profile disciplines
CoC	.- component of choice

UC	.- the university component
exa	.-exam

7.1. Educational program Card

Cycle/ component	Discipline code	Module Components	Semestr	Number of academic credits	Number of ESC loans	Learning outcomes
1	*2*	*3*	*4*	*5*	*6*	*7*
Module 1. - Problems of scientific research in fundamental areas of mathematics, 26 academic credits						
BD UK	AW 7201	Academic writing	1	3	3	PO-4, PO-6
BD UK	SRM 7202	Scientific research methods	1	3	3	PO-2, PO-6, PO-8
BD UK	APFM 7203	Actual problems of fundamental areas of mathematics	1	5	5	PO-1, PO-2
	DSRW	Doctoral student's research work, including the completion of a doctoral dissertation	1	15	15	PO-1, PO-4, PO-6, PO-7, PO-8
Module 2.1 – Theory of oscillations, 24 academic credits						
PD CoC	RSDE 7301	Reducibility of a system of differential equations	1	4	4	PO-2, PO-3
PD CoC	OSDISEMT 7302	Oscillatory solutions of differential and integro-differential systems of equations with multidimensional time	2	5	5	PO-1, PO-4, PO-5, PO-6, PO-7
PD CoC	MPSSPE 7303	Multiperiodic and almost periodic solutions of a system of parabolic equations	2	5	5	PO-1, PO-3, PO-6, PO-7
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis	2	10	10	PO-1, PO-4, PO-6, PO-7, PO-8
Module 2.2 – Dynamical systems, non-local boundary value problems and methods for solving systems of differential equations, 24 academic credits						
PD CoC	SMSPDE 7301	Special methods for solving systems of partial differential equations	1	4	4	PO-1, PO-3, PO-4, PO-7
PD CoC	DS 7302	Dynamic systems (in English)	2	5	5	PO-2, PO-6, PO-9
PD	NBVPPDE	Non-local boundary value problems for partial	2	5	5	PO-1, PO-3, PO-4

CoC	7303	differential equations (in English)				
	DSRW	Doctoral student's research work, including the completion of a doctoral thesis	2	10	10	PO-1, PO-4, PO-6, PO-7, PO-8
Module 3. – Scientific and practical, 118 academic credits						
BD	PP	Pedagogical practice	2	10	10	PO-7, PO-8
PD	IP	Research practice	4	10	10	PO-1, PO-4, PO-6, PO-7, PO-8
	DSRW	Doctoral student's research work, including the completion of a doctoral dissertation	3,4,5,6	98	98	PO-1, PO-4, PO-6, PO-7, PO-8

7.2 Map of compliance of learning outcomes with the studied disciplines

№	Learning outcomes / Name of disciplines	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9
1.	Academic writing				+		+			
2.	Scientific research methods		+				+		+	
3.	Actual problems of fundamental areas of mathematics	+	+							
4.	Reducibility of a system of differential equations		+	+						
5.	Oscillatory solutions of differential and integro-differential systems of equations with multidimensional time	+			+	+	+	+		
6.	Multiperiodic and almost periodic solutions of a system of parabolic equations	+		+			+	+		
7.	Special methods for solving systems of partial differential equations	+		+	+			+		
8.	Dynamic systems (in English)		+				+			+
9.	Non-local boundary value problems for partial differential equations (in English)	+		+	+					
10.	Pedagogical practice							+	+	
11.	Research practice	+			+		+	+	+	
12.	Doctoral student's research work, including the completion of a doctoral dissertation	+			+		+	+	+	
	Total	**7**	**4**	**4**	**6**	**1**	**7**	**6**	**4**	**1**

8. Summary table showing the volume of credits disbursed in the context of educational program modules

Course обуч	Семестр	Number of modules to be mastered	Number of subjects studied		Number of academic credits						Total in hours	ECTS	Number of exams	Number of reports
			UC	CoC	Theoretical learn	Pedagogical practice	Research practice	Doctoral student's research work, including the completion of a doc-	Final certification. Preparation and defense of a doctoral thesis	Total				
1	1	2	3	1	15			15		30	900	30	4	1
	2	2		2	10	10		10		30	900	30	2	2
2	3	1						30		30	900	30		1
	4	1					10	20		30	900	30		2
3	5	1						30		30	900	30		1
	6	1						18	12	30	900	30		1
Total :		**3**	**3**	**3**	**25**	**10**	**10**	**123**	**12**	**180**	**5400**	**180**	**6**	**8**

9. Resource provision of the Educational Program

The resource provision is formed on the basis of the requirements for the conditions for the implementation of doctoral degree programs in the OP "8D05401 – Mathematics" and includes:

- staffing;
- educational, methodological and informational support;
- logistical support.

Staffing

The implementation of the Doctoral Educational Program should be provided by scientific and pedagogical personnel who, as a rule, have a basic education corresponding to the profile of the discipline being taught, and who are systematically engaged in scientific and (or) scientific and methodological activities.

The graduate department is the Department of Mathematics. The staff of the department is staffed in accordance with the legislation of the Republic of Kazakhstan and the Rules of competitive filling of positions of scientific and pedagogical staff of higher educational institutions.

The total number of full-time teachers at the Department of Mathematics is 30 teachers, including 2 Doctors of Sciences, 13 candidates of Sciences, 4 PhD doctors and 9 masters. The share of full-time teachers out of their total number, including in the cycles of basic and core subjects of the state mandatory standard of education is 79%, the share of teachers with academic degrees and titles out of the number of full-time teachers is 63%.

Educational, methodological and informational support

The educational, methodological and informational support of the educational program "8D05401 - Mathematics" includes: a standard and operational curriculum of the discipline, UMKD, syllabus, control and measuring materials, active handouts, didactic materials on all academic disciplines of the curriculum, normative documents regulating the types of educational activities.

Each doctoral student has access to the Internet, including the university's electronic library, the Russian Library of Economics, KazNET, the Web of Knowledge (Thomson Reuters) and the Web of Science, Scopus, Springer, and the resources of the university's scientific library. The library's collection is equipped with printed and electronic publications, educational and scientific literature in all disciplines of the specialty. In addition, doctoral students have contractual access to the AF RNTB foundation, including access to the RSL dissertation fund. The educational, methodological and informational support of the educational process meets the requirements of higher education.

Logistical support

When implementing the EP "8D05401 Mathematics", the material and technical base is used to ensure that all types of classes are provided for in the work curriculum and comply with current sanitary and fire safety rules and regulations.

The material and technical base is provided by the presence of an educational building (at 263 Br. Zhubanovykh St.) with in-line classrooms, equipped classrooms and laboratories, computer classes for conducting classes on the EP "8D05401 Mathematics"

For the implementation of the EP "8D05401 Mathematics", the Faculty of Physics and Mathematics has the necessary classroom fund, methodological and specialized classrooms (Daulet Umbetzhanov Scientific and Innovative Auditorium, multilingual education room, mathematics theory and teaching methods room, Algebra room, Geometry room), computer classes and special laboratories (Laboratory of Streaming Data Analytics and Machine Learning, Computer Modeling and Numerical Methods, Computer

10. Characteristics of the environment of the ARU named after K. Zhubanov, ensuring the development of general cultural and socio-personal competencies of graduates

The University has all the necessary conditions and opportunities to ensure the formation and development of general cultural and socio-personal competencies of graduates.

An integral part of the educational process is educational work, the purpose of which is the formation of a professional, harmoniously developed and morally stable personality. Special attention in educational work is focused on fostering patriotism, citizenship, a sense of responsibility, decency, honesty, loyalty to professional duty, law-abiding, respect for each other and others.

Educational work is carried out in the following areas:

- fostering civic and spiritual and moral culture;
- fostering aesthetic culture;
- physical education and healthy lifestyle formation;

- fostering an ecological culture;
- labor education.

The "Concept of Education" has been developed as a basic normative document for the organization of the educational process at the university. работы в АРУ им.К.Жубанова», Положение «О совете по профилактике правонарушений», Положение «О школе правовых знаний», Положение «О спортивном клубе», Положение «О дебатном клубе» и др.

To organize educational work at the university, the Department for educational work and youth policy has been established, which includes the department for work with students and youth organizations, the department for socio-cultural work. In addition, the university has a student parliament, a student dormitory council, a sports club, a Council for the Prevention of Offenses, etc.

There is a sufficient material and technical base at the university for organizing cultural activities and forming a healthy lifestyle.:

- Youth Palace;
- The Palace of Students;
- Two sports complexes;
- Sports facilities;
- 3 separate gyms;
- A stadium with a running track and a grass soccer field;
- Tennis court;
- Shooting range;
- Student multidisciplinary polyclinic.

For the harmonious development of personality, contributing to the strengthening of moral, civil, patriotic and general cultural competencies of doctoral students, the K. Zhubanov ARU operates Debate clubs "Rhetor", "For

AGREED:

Director of the Institute of Mathematics and Applied Technologies Kenzhegulov B.Z.
at Atyrau University named after H. Dosmukhamedov

Head of the Mathematical Physics and Modeling Department
Institute of Mathematics and Mathematical Modeling of the University of the Ministry of Education and Science of the Republic of Kazakhstan
Asanova A.T.

Reviewed at the meeting of the Academic Council of the University. Protocol no. __ from "___" _____ 2022 y.