

## CONTENT OF THE EDUCATIONAL PROGRAM

№	Code and name of modules	Total credits by module	№	Name of subject and code	Credits by subjects	Cycle/component
1	ORW – 1 Organization of research work	9	1	ORW 701 Academic writing	4	UC CC
			2	ORW 702 Methods of scientific research	5	UC CC
	PM – 2 Professional modul	16	1	PM 701 Energy saving and renewable energy	6	UC CM
			2	PM 702/1 Commercialization of research	5	OC CM
				PM 702/2 Methods of teaching philological disciplines in higher education		OC CM
			3	PM 703/1 Application of the finite element method to the study of mechanical processes	5	OC CM
				PM 703/2 Modern astrophysics and cosmology		OC CM
5	PT – 3 Professional training	10	1	PT 801 Pedagogical practice	10	UC CC
			2	PT7(8)02 Research practice	10	UC CM
		123	3	PT7(8,9) 031 Doctoral student research work, including internship and doctoral dissertation DSRW	123	DSRW
			4	Methods of scientific research		
			5	Intensive course		
6	FC Final certification	12	6	FE 901 Writing and defense a doctoral dissertation	12	FC
TOTAL:		180			180	

## 2.1. DESCRIPTION MODULES AND DISCIPLINES

<b>ORW – 1</b> Organization of research work <i>Module description:</i> In the organization of research work, at the academic level, learns the ability to distinguish scientific information texts, conduct scientific research, including various scientific research methods related to the field of subject research.							
№	Name of subject and code	Cycle/component	Credits	Subject discription	Teaching methods	LO by EP	Assessment methods
1	<b>ORW 701</b> Academic writing	UC CC	4	The purpose of the discipline is to develop the skills of writing various scientific articles, reports, experimental articles on physics, mastering their general characteristics and structure. Doctoral students develop the ability to think critically, write, build a scientific discourse, read, analyze and evaluate scientific works. They get acquainted with the style and structure of scientific articles in high-level international journals.	– бірлескен жұмыстар – жеке және бірлескен ғылыми-зерттеу жұмыстары, – пікірталастар, – әртүрлі ақпарат көздерімен жұмыс жасау (кітап, интернет, құжаттар, т.б.)	LO 1 LO 2 LO 3	Rating system and written exam
2	<b>ORW 702</b> Methods of scientific research	UC	5	The purpose of the subject is the formation of concepts about research and research skills, search, analysis of information necessary for the effectiveness of research work. Doctoral students develop a plan and stages of research, apply quantitative and qualitative methods. Observe research ethics.			Rating system and written exam
<b>PM – 2</b> Professional modul <i>Module description:</i> Aims to learn modern research methods in the field of physics and develop skills of effective application in solving actual problems.							

1	PM 701 Energy saving and renewable energy		5	The purpose of the subject is the formation of knowledge about the problems of energy conservation in Kazakhstan and abroad, the search and creation of new alternative and renewable energy sources. As a result, doctoral students will acquire knowledge and practical skills in calculating the economic, industrial, technical and environmental aspects of the efficient use of energy resources, the physical foundations and principles of operation of power plants, improve methods of searching and creating new energy sources.	<ul style="list-style-type: none"> <li>- collaboration</li> <li>- individual and joint research works,</li> <li>- discussions,</li> <li>- work with various sources of information (books, Internet, documents, etc.)</li> </ul>	LO2, LO4, LO6	Rating control and written exam
	<b>PM 702/1</b> Commercialization of research	OC		The purpose of the discipline is to form knowledge of the methodological foundations for assessing the economic efficiency of projects, scientific implementation and development of business plans based on the results of scientific research. Doctoral students develop innovative strategies of CASE STUDY to create an implementation infrastructure, study the content stages of commercialization, features of project planning, principles and forms of organization of the system covering the full cycle of scientific production and commercialization of scientific products.	<ul style="list-style-type: none"> <li>- collaboration</li> <li>- individual and joint research works,</li> <li>- discussions,</li> <li>- work with various sources of information (books, Internet, documents, etc.)</li> </ul>	LO2, LO3, LO4, LO5	Rating control and written exam
4	<b>PM 702/2</b> Fundamentals of modern biophysics			The purpose of the subject is the formation of knowledge on the basics of biophysics, biophysics of complex systems, molecular and cellular biophysics. Doctoral students have the skills of mathematical and computer modeling of complex biological processes and physical methods of studying biological systems at	<ul style="list-style-type: none"> <li>- collaboration</li> <li>- individual and joint research works,</li> <li>- discussions,</li> <li>- work with various sources of information</li> </ul>	LO2, LO3, LO4, LO5	Rating control and written exam

				various levels. Analyze and interpret various biological processes from a physical point of view	(books, Internet, documents, etc.)		
	<b>PM 703/1</b> Application of the finite element method to the study of mechanical processes	UC	6	The purpose of the discipline is the formation of basic concepts and techniques for solving differential and integral equations describing various mechanical processes by the finite element method. Doctoral students study methods of finite element stress modeling of the deformed state of structures using rod, plate and bulk finite elements	- collaboration - individual and joint research works, - discussions, - work with various sources of information (books, Internet, documents, etc.)	LO2, LO3, LO4, LO5	Rating control and written exam
	<b>ORW 703/2</b> Modern astrophysics and cosmology	OC	5	The purpose of the subject is to form doctoral students' knowledge about the modern picture and evolution of the Universe, about alternative and modified theories of gravity, about various cosmological models, about the most modern astrophysical and cosmological discoveries and achievements. As a result of mastering the course, doctoral students will acquire practical skills in analytical and numerical calculation of various parameters of the Universe, processing and analysis of observational data.	- collaboration - individual and joint research works, - discussions, - work with various sources of information (books, Internet, documents, etc.)	LO3, LO4, LO6	Rating control and written exam

**PT – 2 Professional training**

Module description: Professional training instills in doctoral students the skills of applying theoretical knowledge in pedagogical and research tactics. The internship determines the direction and improves the quality of research work, including the implementation of the dissertation

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1	PT 801 Pedagogical practice	UC	10	<p>Pedagogical practice in the system of postgraduate education is a component of professional training for scientific and pedagogical activities in a higher educational institution and is a type of practical activity of doctoral students in the implementation of the educational process in higher education, including teaching special disciplines, organizing student educational activities, scientific and methodological work in the subject, obtaining skills and abilities of practical teaching. The pedagogical practice of doctoral students is aimed at studying the foundations of pedagogical and educational-methodical work in higher educational institutions, mastering the pedagogical skills of conducting certain types of training sessions in the disciplines of the department. The pedagogical practice of a doctoral student is based on the development of both theoretical and practice-oriented components of doctoral training, acquired in the process of mastering the academic disciplines of the basic and variable parts of the EP and prepares doctoral students for setting and solving research problems in the course of pedagogical and research activities, as well as for writing a doctoral dissertation.</p>		LO7	
2	PT 801 Pedagogical practice	UC	10	<p>Pedagogical practice in the system of postgraduate education is a component of professional training for scientific and pedagogical activities in a higher educational institution and is a type of practical activity of</p>			

				<p>doctoral students in the implementation of the educational process in higher education, including teaching special disciplines, organizing student educational activities, scientific and methodological work in the subject, obtaining skills and abilities of practical teaching. The pedagogical practice of doctoral students is aimed at studying the foundations of pedagogical and educational-methodical work in higher educational institutions, mastering the pedagogical skills of conducting certain types of training sessions in the disciplines of the department. The pedagogical practice of a doctoral student is based on the development of both theoretical and practice-oriented components of doctoral training, acquired in the process of mastering the academic disciplines of the basic and variable parts of the EP and prepares doctoral students for setting and solving research problems in the course of pedagogical and research activities, as well as for writing a doctoral dissertation.</p>			
3	PT7(8)02 Research practice	UC	10	<p>Research practice is a type of professional practice of doctoral students, which is carried out in order to familiarize themselves with the latest theoretical, methodological and technological achievements of domestic and foreign science, with modern methods of scientific research, processing and interpretation of experimental data, as well as consolidating the practical skills of their application in dissertation research. Research practice is an</p>		LO2-LO5	

				<p>integral part of the entire doctoral student training system and provides for the mastery of students in research activities in accordance with the requirements of the State Educational Standard of the Republic of Kazakhstan. The bases of research practice are the graduating departments of the university, research organizations corresponding to the profile of the specialty being trained (or related organizations). Doctoral studies are a logical continuation of multilevel university education, which involves broad fundamental education within the framework of doctoral studies, followed by in-depth specialized training and independent scientific work. This is a test of the ability to conduct an independent scientific search, to assess their capabilities in determining the path of their professional and scientific growth.</p>			
	<p><b>PT7(8)02</b> Research practice</p>			<p>Research practice is a type of professional practice of doctoral students, which is carried out in order to familiarize themselves with the latest theoretical, methodological and technological achievements of domestic and foreign science, with modern methods of scientific research, processing and interpretation of experimental data, as well as consolidating the practical skills of their application in dissertation research. Research practice is an integral part of the entire doctoral student training system and provides for the mastery of students in research activities in accordance with</p>		<p>LO2- LO5</p>	

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3	<b>PT7(8,9) 031</b> Doctoral student research work, including internship and doctoral dissertation DSRW	DSRW	14	16	The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral program and the topic of the doctoral dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of the relevant industries or fields of activity, including abroad.		LO3-LO7	
	Intensive courses		2		In the course of studying the discipline, a doctoral student, using the experience and			



				<p>knowledge accumulated up to this period, depending on his field of study, will be able to develop and draw up a research plan that he considers acceptable, as well as the possibility of choosing a dissertation topic, how to approach the choice of domestic and foreign scientific supervisors.</p> <p>In addition, sufficient information will be given about the types of research contained in the design of the research paper. Thus, the doctoral student will be given the opportunity to systematize the writing of a research paper and get acquainted with other methods of scientific research. Knowledge about the application of quantitative, qualitative, mixed research methods, methods of data collection, research ethics, information necessary for the research process, such as data analysis, will be improved.</p>				
4	<p><b>PT7(8,9) 031</b>          Doctoral student research work, including internship and doctoral dissertation DSRW</p>	DSRW	12	14	<p>The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral program and the topic of the doctoral dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of</p>		LO3-LO7	

				the relevant industries or fields of activity, including abroad.			
	Intensive courses		2	<p>In the course of studying the discipline, a doctoral student, using the experience and knowledge accumulated up to this period, depending on his field of study, will be able to develop and draw up a research plan that he considers acceptable, as well as the possibility of choosing a dissertation topic, how to approach the choice of domestic and foreign scientific supervisors.</p> <p>In addition, sufficient information will be given about the types of research contained in the design of the research paper. Thus, the doctoral student will be given the opportunity to systematize the writing of a research paper and get acquainted with other methods of scientific research. Knowledge about the application of quantitative, qualitative, mixed research methods, methods of data collection, research ethics, information necessary for the research process, such as data analysis, will be improved.</p>			
5	Doctoral student research work, including internship and doctoral dissertation DSRW	DSRW	20	The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral program and the topic of the doctoral		LO3-LO7	

				dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of the relevant industries or fields of activity, including abroad.			
6	Doctoral student research work, including internship and doctoral dissertation DSRW	DSRW	25	The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral program and the topic of the doctoral dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of the relevant industries or fields of activity, including abroad.		LO3-LO7	
7	Doctoral student research work, including internship and doctoral dissertation DSRW	DSRW	30	The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral program and the topic of the doctoral dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of the relevant industries or fields of activity, including abroad.		LO3-LO7	
8	Doctoral student research work, including internship and doctoral dissertation DSRW	DSRW	18	The research work of a doctoral student is carried out by a doctoral student under the guidance of a scientific supervisor. The direction of research work of a doctoral student is determined in accordance with the doctoral		LO3-LO7	

				program and the topic of the doctoral dissertation. Within the framework of DRW, it is envisaged to undergo a scientific internship in scientific organizations and/or organizations of the relevant industries or fields of activity, including abroad.			
<b>9</b>	<b>Final Certification</b>	FE	12	Writing and defense a doctoral dissertation			

