MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
K. ZHUBANOV AKTOBE REGIONAL UNIVERSITY

"APPROVED"
Acting Chairman of the Board-Rector of the
K. Zhubanov Aktobe Regional University
Professor _____ R.A. Beknazarov
«___» _____ 2021.

MODULAR EDUCATIONAL PROGRAM

The code and name of the field of education: 6B05 Natural Sciences, mathematics and statistics
The code and name of the training area: 6B053 Physical and Chemical Sciences
The code and name of the educational program: 6B05301-Physics

Education level: Bachelor's degree
Degree awarded: Bachelor of Natural Sciences in the educational program 6B05301–Physics
Total credits: 240 academic credits / 240 ECTS
180 academic credits / 180 ECTS
120 academic credits / 120 ECTS

Year of admission: 2021

The compilers:

Full name	Job title	Contact information
Employers:		
Bulekov K.S.	Director of Aktobe Regional Planetarium	8-701-431-71-39
Aldiyarov K.T.	Director of Aktobe Higher Polytechnic College	8(7132) 562 - 051
Bakitzhanov Sh.Zh.	Director of Aleks ASU LLP	8(7132) 906 907
Responsible compilers from the department:		
Zhubaev A.K.	Associate Professor of the Department of Physics	8-708-802-76-27
Amantayeva A.Sh.	Lecturer of the Department of Physics	8-775-475-28-29
Reviewers: Bulekov K.Sh.	Director of Aktobe Regional Planetarium	8-701-431-71-39

2. Mission, vision, and values of the university

MISSION: Formation of a qualified specialist and a "perfect personality" who has absorbed national values.

VISION: A multidisciplinary classical university providing the western region of Kazakhstan with qualified specialists and becoming the core of applied science

Values:

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

3. The graduate model

- ✓ Has 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 Bachelor's degree program

Scope of application	The field of application of the Bachelor of Education in the educational program 6B05301 Physics: research institutes, laboratories, design and design bureaus and firms; government educational organizations and educational enterprises, as well as non-governmental educational organizations; manufacturing enterprises and associations.
The code and name of the educational program	6B05301- Physics
Regulatory and legal support	1. The Law of the Republic of Kazakhstan "On Education" dated June 27, 2007 No. 319-III (with amendments and additions); 2. Guidelines for the use of the European Credit Transfer and Accumulation System (ESTS) 2015; 3. Professional standards (Approved by: Order of the Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No. 288 dated December 22, 2016; 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; order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" No.266 dated December 27, 2019); 4. "Rules for the organization of the educational process on credit technology of education" (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 12, 2018 No. 563. On amendments to the Order of the Minister of Education and Science of the Republic of Kazakhstan dated April 20, 2011 No. 152); 5. The State Mandatory Standard of Higher Education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 604. New edition of Order No. 182 dated 05/5/2020); 6. National Qualifications Framework (approved by Protocol No. 20-5/I-141 of the Republican Three-Party Commission on Social Partnership and Regulation of Social and Labor Relations dated March 16, 2016; 7. Sectoral qualifications frameworks in various fields of activity, developed in accordance with Article 117 of the Labor Code of the Republic of Kazakhstan (with amendments and additions as of 01.01.2019); 8. Classifier of training areas with higher and postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 13, 2018 No. 569);

	9. "Rules for the organization of dual education" (Order of the Minister of Education and Science of the Republic of Kazakhstan dated January 21, 2016 No. 50 (as amended on 09/11/2018)); 10. Standard rules for the activities of educational organizations implementing educational programs of higher and (or) postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 30, 2018 No. 595. New edition No. 539 dated 12/24/2020); 11. Standard curricula of the cycle of general education disciplines for organizations of higher and (or) postgraduate education (Order of the Minister of Education and Science of the Republic of Kazakhstan dated October 31, 2018 No. 603); 12. The coding system of academic disciplines of higher and postgraduate education. State Standard of the Republic of Kazakhstan 5.05.001-2005; 13. Regulations on the organization and conduct of professional practice and the definition of organizations as bases of practice (Protocol No. 13 dated 08/12/2020); 14. Regulations on the ongoing monitoring of academic performance and intermediate certification (examination session) of students. (Protocol No. 13 dated 08/12/2020); 15. Regulations on the final certification of students. (Protocol No. 13 dated 08/12/2020); 16. IEEE Computer Society, https://www.computer.org – (Computer Society of the IEEE or IEEE-CC); 17. Professional standard "Technical support of electronics" (Appendix No. 41 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 24, 2019 No. 259); 18. Professional standard: "Maintenance and software support of robots" (Appendix No. 49 to the order of the Deputy Chairman of the Board of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" dated December 24, 2019 No. 259) 19. Regulations on the construction of a modular educational program (Protocol No. 13 dated 08/12/2020.
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 is to provide graduates with basic humanitarian, socio-economic knowledge and fundamental training in physics, mathematics and natural sciences, contributing to their familiarization with the cultural and civilizational values of modern society, special professional education that allows graduates to successfully work in their chosen field of activity, possess general and special competencies that promote their social mobility and sustainability in the labor market.

Qualification characteristics of the graduate	
Degree awarded:	Bachelor of Natural Sciences in the educational program 6B05301–Physics
List of specialist positions	✓ specialist in scientific research institutes and laboratories, design and design bureaus and firms; ✓ specialist in state educational organizations and educational enterprises, as well as in non-governmental educational organizations; ✓ specialist in manufacturing enterprises and associations.
Area of professional activity	✓ The field of experimental, theoretical and applied physics, as well as the fields of related natural and technical sciences; ✓ the field of education, including the field of pedagogy, theory and methods of teaching physics in secondary educational institutions; ✓ translation of scientific and technical literature from a foreign language and into a foreign language (for the special branch).
Functions and types of educational activities	**The functions of educational activity** - are to ensure the effective organization and conduct of scientific research on physical phenomena and processes.; – implementation of educational programs and curricula at a level that meets accepted educational standards. **Types of educational activities** ✓ **scientific research;** ✓ **pedagogical;** ✓ **organizational and managerial;** ✓ **design and technology;** ✓ **translation (for the special branch).**
Dual training	This educational program assumes dual training in one discipline.

5. Expected learning outcomes from the educational program

1. To use basic theoretical knowledge in physics, practical skills and abilities to solve organizational and managerial tasks;
2. To substantiate and present the results of work in accordance with the standards adopted by the organization and the ability to choose tools for data processing in the field of physics;
3. To know the basic concepts, laws and models of general theoretical physics, the ability to see the applied aspect in solving a scientific problem, competently present and interpret the result;
4. To formulate the main results of fundamental and applied research in the field of physics and mathematics as a theory in relation to the phenomenon or law under study.;
5. To work with modern software, devices and installations, apply acquired research skills; motivate creativity and successful implementation of new ideas in the professional field in the field of physic;
6. To use acquired knowledge of physical and mathematical disciplines for the successful mastery of knowledge in the main subjects of training;
7. To organize educational and research work and work on academic writing, methodically competently perform a physical experiment;
8. To apply mathematical knowledge and methods for solving practice-oriented tasks, analyzing numerical data presented in the form of graphs, diagrams, analyzing statistical information, using mathematical methods in analyzing and synthesizing observable physical processes, facts and phenomena.
9. To master independently new knowledge and skills in the field of law, academic integrity, national and spiritual values, management and business;.

6. Academic calendar

Academic calendar for 2021-2025 (4 years)

н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1								Р1							Р2	С	С	С	К	К								Р1							Р2	С	С	УП	Л/С	Л/С	Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13
2								Р1							Р2	С	С	С	К	К								Р1							Р2	С	С	ПП	ПП	ПП/Л/С	Л/С	Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	1	2	3	3	5	6	7	8	9	10	11	12
3								Р1							Р2	С	С	С	К	К								Р1							Р2	С	С	ПП	ПП	ПП/Л/С	ПП/Л/С	ПП/Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
4					Р1					Р2	С	С	К				Р1				Р2	С	К	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ДП	ДП	К	ГЭ	ГЭ	ЗД	ЗД	ЗД	ЗД											

Academic calendar for 2021-2024 (3 years)

н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1	2	3	3	5	6	7	8	9	10	11	12	13	14	15
1								Р1							Р2	С	С	С	К	К								Р1							Р2	С	С	УП	Л/С	Л/С	Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	1	2	3	4	5	6	7	8	9	10	11	12
2								Р1							Р2	С	С	С	К	К								Р1							Р2	С	С	ПП	ПП	ПП/Л/С	ПП/Л/С	ПП/Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
3					Р1					Р2	С	С	К				Р1				Р2	С	К	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ПП	ДП	ДП	К	ГЭ	ГЭ	ЗД	ЗД	ЗД	ЗД											

Academic calendar for 2021-2023 (2 years)

н	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	1	2	3	3	5	6	7	8	9	10	11	12	13	14
1								Р1							Р2	С	С	ПП	ПП	К	К								Р1							Р2	С	С	С	Л/С	Л/С	Л/С	Л/С	Л/С	Л/С	К	К	К	К	К	К	К	К
н	1	2	3	4	5	6	7	8	9	10	11	12	13	1	2	3	4	5	6	7	8	9	10	11	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
2					Р1					Р2	С	С	К				Р1			Р2	С	ПП	ПП	К		Р1		Р2	С	ПП	ПП	ПП	ПП	ДП	К	К	ГЭ	ГЭ	ЗД	ЗД	ЗД	ЗД											

Условные обозначения:

Р – рейтинг	ГЭ – государственный экзамен	УП – учебная практика
С – экзаменационная сессия	ЗД – защита дипломной работы	К - каникул
ЛС – летний семестр	П – педагогическая практика	**Всего недели:** Теоретическая учеба в семестре – 15 нед
Праздничные дни: 30 август – День Конституции	ПП – производственная практика	Теоретическая учеба в триместре-10 нед, квар.-8 нед.(4-курс)
16 декабря – День Независимости Казахст	21,22,23 марта – Наурыз	экзаменационная сессия– 2-3 нед.
1,2 января –Новый год	1 мая – Казахстанский День Международного Единства	зимние каникулы – 1-2 нед.
7 января – Рождество	9 мая – День Победы	летние каникулы – 2-7 нед.
8 марта – Международный женский день	6 июля - День Столицы	летний семестр – 5 нед.

7. Modular curriculum

7.1.1 Modular curriculum for 2021-2025 (full-time, 4-year study period)

Trajectory 1: Physics and technology of new materials

Trajectory 2: Applied Physics

Cycle / Component	Code of the discipline	Name of the discipline	Semester	Academic credit	ECTS credit number	Form of Assessment	Budgeted student workload hours							Breakdown of the educational programme by year of study and semester							
							Total number of hours	Total contact hours	Contact classes			Independent study		1 course		2 course		3 course		4 course	
									Lectures	Laboratory Work	practical/seminar classes	IWST	IWS	1st Semester	2nd Semester	3rd Semester	4th Semester	5th Semester	6th Semester	7th Semester	8th Semester
Module 1 – Language Module, 20 academic credits																					
GED CC	IYa 1101	Foreign language	1, 2	10	10	exam	300	90			90	50	160	5	5						
GED CC	K(R)Ya 1102	Kazakh (Russian) Language	1	3	3	exam	300	90			90	50	160	5	5						
Module 2. General Education Module, 22 academic credits																					
GED CC	SIK 1103	Modern History of Kazakhstan	2	5	5	SE	150	45	30		15	25	80		5						
GED CC	IKT 1104	Information and Communication Technologies (in English)	1	5	5	exam	150	45	15	15	15	25	80	5							
GED CC	MSPZ 1105	Module of Socio-Political Knowledge	1, 2	8	8	exam	240	80	40		40	40	120	4	4						
GED CC	FK(1) 1106	Physical Education	1, 2	4	4	DC	120				120			2	2						
Module 3 – Higher Mathematics and General Physics-1 — 18 ECTS credits																					

BD EC	MA 1201	Mathematical Analysis	1	4	4	exam	120	40	20		20	20	60	4							
BD EC	AG 1202	Algebra and Geometry	2	3	3	exam	90	30	15		15	15	45		3						
BD EC	UR 1203	National Spiritual Values	1	5	5	exam	150	45	30		15	25	80	5							
BD EC	Mech 1204	Mechanics	2	5	5	exam	150	45	15	10	20	25	80		5						
BD	UP 1205	Educational Internship	2	1	1	report	30								1						
Module 4.1 – Philosophy and Economics, 17 academic credits																					
GED CC	FIL 2107	Philosophy	4	5	5	exam	150	45	30		15	25	80				5				
GED EC	OPB 2108	Fundamentals of Entrepreneurship and Business	3	5	5	exam	150	45	30		15	25	80			5					
BD	PP 2206	Industrial Internship	4	3	3	report	90	45	15		30	25	80		3						
GED CC	FK(2) 2109	Physical Education	3, 4	4	4	DC	120				120					2	2				
Module 4.2 – Worldview and Academic Integrity, 17 academic credits																					
GED CC	FIL 2107	Philosophy	4	5	5	exam	150	45	30	30		15	25	80				5			
GED EC	Ach 2108	Academic Integrity	3	5	5	exam	150	45	30		20	20	60		4						
BD	PP 2206	Industrial Internship	4	3	3	report	90				30	25	80		5						
GED CC	FK(2) 2109	Physical Education	3, 4	4	4	DC	120				120			2	2						
Module 5.1 – General Physics-2, 19 academic credits																					
BD UC	MF 2207	Molecular Physics	3	5	5	exam	150	45	15	10	20	25	80			5					
BD UC	EM 2208	Electricity and Magnetism	3	4	4	exam	120	40	20	5	15	20	60			4					

BD EC	PR 2209	Physical Practicum	4	5	5	exam	150	45	15		30	25	80				5				
BD EC	TM 2210	Theoretical Mechanics	4	5	5	exam	150	45	15		30	25	80				5				
Module 5.2 – Problem-Solving Methods in General Physics, 19 academic credits																					
BD UC	MF 2207	Molecular Physics	3	5	5	exam	150	45	15	10	20	25	80			5					
BD UC	EM 2208	Electricity and Magnetism	3	4	4	exam	120	40	20	5	15	20	60			4					
BD EC	MRGZE 2209	Methods for Solving Boundary-Value Problems in Electrostatics	3	5	5	exam	150	45			45	25	80			5					
BD EC	KM 2210	Classical Mechanics	4	5	5	exam	150	45	30		15	25	80				5				
Module 6.1 – Mathematics and Programming, 24 academic credits																					
BD EC	DIU 2211	Differential and Integral Equations	3	4	4	exam	120	40	20		20	20	60			4					
BD EC	MMF 2212	Methods of Mathematical Physics	4	5	5	exam	150	45	15		30	25	80				5				
BD EC	Pro 2213	Programming	3	5	5	exam	150	45	15	10	20	25	80			5					
BD UC	Elec 2214	Electrical Engineering	4	4	4	exam	120	40	20	5	15	20	60				4				
BD EC	Opt 2215	Optics				exam	180	60	30	10	20	30				6					
Module 6.2 – Mathematical Physics and Programming, 24 academic credits																					
BD EC	DUChPPP 2211	First-Order Partial Differential Equations	3	4	4	exam	120	40	20		20	20	60			4					
BD EC	MFT 2212	Equations of Mathematical Physics	4	5	5	exam	150	45	15		30	25	80				5				
BD EC	MRZP 2213	Problem-Solving Methods in Programming	3	5	5	exam	150	45	15	10	20	25	80			5					
BD UC	Elec 2214	Electrical Engineering	4	4	4	exam	120	40	20	5	15	20	60				4				
BD EC	KO 2215	Geometrical Optics	4	6	6	exam	180	60	30	10	20	30	90				6				

Module 7.1 – Quantum Physics, 30 academic credits																					
BD UC	AF 3216	Atomic Physics	5	5	5	exam	150	45	15	10	20	25	80					5			
PD UC	AP 3301	Academic Writing	**5**	**5**	**5**	exam	150	45			45	25	80					**5**			
BD EC	YaF 3217	Nuclear Physics	6	5	5	exam	150	45	15	10	20	25	80						5		
PD EC	ED 3302	Electrodynamics	5	5	5	exam	150	45	30		15	25	80					5			
BD UC	KM 3218	Quantum Mechanics	6	5	5	exam	150	45	30		15	25							5		
PD	PP 3303	Industrial Internship	6	5	5	report	150												5		
Module 7.2 – Subatomic Physics, 30 academic credits																					
BD UC	AF 3216	Atomic Physics	5	5	5	exam	150	45	15	10	20	25	80					5			
PD UC	AP 3301	Academic Writing	5	5	5	exam	150	45			45	25	80					5			
BD EC	FAYaECh 3217	Physics of Atomic Nucleus and Elementary Particles	6	5	5	exam	150	45	15	10	20	25	80						5		
PD EC	TSF 3302	Thermodynamics and Statistical Physics	5	5	5	exam	150	45	30		15	25	80					5			
BD UC	KM 3218	Quantum Mechanics	6	5	5	exam	150	45	30		15	25	80					5			
PD	PP 3303	Industrial Internship	6	5	5	report	150											5			
Module 8.1 – Electronics and Astronomy, 30 academic credits																					
BD EC	ES 3219	Electronics and Circuit Design	**5**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80					**5**			
PD EC	AZ 3304	Astrophysical Research	**6**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80						**5**		
BD EC	FSK 3220	Condensed Matter Physics	**5**	**5**	**5**	exam	150	45	**30**		**15**	**25**	80					**5**			
PD UC	Ast 3305	Astronomy (Dual Education Track)	**5**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80					**5**			

BD EC	FPD 3221	Physics of Semiconductors and Dielectrics	**6**	**5**	**5**	exam	150	45	**15**		**30**	**25**	80						**5**		
PD UC	NT 3306	Nanotechnology	**6**	**5**	**5**	exam	150	45	**15**			**25**	80						**5**		
Module 8.2 – Microelectronics and Physical Research Methods, 30 academic credits																					
BD EC	ME 3219	Microelectronics	**5**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80					**5**			
PD EC	MAN 3304	Analysis Methods of Nanoparticles and Nanomaterials	**6**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80						**5**		
PD UC	FTT 3220	Solid State Physics	**5**	**5**	**5**	exam	150	45	**30**		**15**	**25**	80					**5**			
BD	Ast 3305	Astronomy (Dual Education Track)	**5**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80					**5**			
BD	OPNN 3221	Optics of Semiconductor Nanostructures and Nanotechnology	**6**	**5**	**5**	exam	150	45	**15**		**30**	**25**	80						**5**		
BD	NT 3306	Nanotechnology	**6**	**5**	**5**	exam	150	45	**15**	**10**	**20**	**25**	80						**5**		
Module 9.1 – Technical Physics, 28 academic credits																					
BD EC	FM 4222	Physical Materials Science	**7**	3	3	exam	90	30	15	**0**	**15**	**15**	**45**							**3**	
PD EC	YaGR 4307	Nuclear Gamma Resonance	**7**	5	5	exam	150	45	15	**10**	**20**	**25**	**80**							**5**	
PD UC	IIT 4308	Information and Measurement Technology	**7**	5	5	exam	150	45	15	**10**	**20**	**25**	**80**							**5**	
BD	PP 4223	Industrial Internship	**8**	10	10	report	300														**10**
BD	PP 4224	Pre-Graduation Internship	**8**	5	5	report	150														**5**
Module 9.2 – Measurement Techniques and Physical Research Methods, 28 academic credits																					
BD EC		Space Physics and Open Systems	**7**	**3**	**3**	exam	**90**	30	15	**0**	**15**	**15**	**45**							**3**	
PD EC		Methods of Physical Research	**7**	**5**	**5**	exam	**150**	45	15	**10**	**20**	**25**	**80**							**5**	
PD UC		Information and Measurement Technology	**7**	**5**	**5**	exam	**150**	45	15	**10**	**20**	**25**	**80**							**5**	

BD		Industrial Internship	**8**	**10**	**10**	report	**300**														**10**
BD		Pre-Graduation Internship	**8**	**5**	**5**	report	**150**														**5**
Module 10.1 – Applied Physics Methods, 20 academic credits																					
PD UC	SMIIT 4309	Spectroscopic Methods in Solid State Research	7	5	5	exam	150	45	15	10	20	25	80							5	
PD EC	FP 4310	Polymer Physics	7	5	5	exam	150	45	15	10	20	25	80							5	
PD UC	RFZPK 4311	Solving Physical Problems Using Computers	7	5	5	exam	150	45	30		15	25	80							5	
PD EC	RM 4312	Robotics and Mechatronics	7	5	5	exam	150	45	15	10	20	25	80							5	
Module 10.2 – Applied Physics and Radiophysics, 20 academic credits																					
PD UC	SMITT 4309	Spectroscopic Methods in Solid State Research	7	5	5	exam	150	45	15	10	20	25	80							**5**	
PD EC	IF-4310	History of Physics	7	5	5	exam	150	45	15	10	20	25	80							**5**	
PD UC	RFZPK 4311	Solving Physical Problems Using Computers	7	5	5	exam	150	45	30		15	25	80							**5**	
PD EC	RF-4312	Radiophysics	7	5	5	exam	150	45	15	10	20	25	80							**5**	
BD	IA 4225	Final Certification	8	12	12	SE	360														
		GED CC		51	51	0	1530	395	115	15	505	215	680	21	21	2	7	0	0	0	0
		GED EC		5	5	0	150	45	30	0	15	25	80	0	0	5	0	0	0	0	0
	TOTAL	GED		56	56	0	1680	440	145	15	520	240	760	21	21	7	7	0	0	0	0
		BD UC		40	40	0	1200	375	180	40	155	200	625	9	8	9	4	5	5	0	0
		BD EC		53	53	0	1590	490	200	40	250	265	835	0	0	14	16	10	10	3	0
		BD Practice		19	19	0	570	0	0	0	0	0	0	0	1	0	3	0	0	0	15
	TOTAL	BD		112	112	0	3360	865	380	80	405	465	1460	9	9	23	23	15	15	3	15
		PD UC		10	10	0	300	90	45	10	35	50	160	0	0	0	0	1	5	1	0

																		0		5	
		PD EC		45	45	0	1350	405	135	70	200	225	720	0	0	0	0	5	5	15	0
		PD Practice		5	5	0	150	0	0	0	0	0	0	0	0	0	0	0	5	0	0
	TOTAL	PD		60	60	0	1800	495	180	80	235	275	880	0	0	0	0	15	15	30	0
		State Final Attestation (SFA)		12	12		360	0	0	0	0	0	0	0	0	0	0	0		12	
TOTAL:				240	240	7200	1800	705	175	1160	980	3100	30	30	30	30	30	30	30	33	27

7.1.2 Modular curriculum for 2021-2024 (full-time, 3-year study period)
Trajectory 1: Physics and technology of new materials
Trajectory 2: Applied Physics

Cycle / Component	Code of the discipline	Name of the discipline	Semester	Academic credit	ECTS credit number	Form of Assessment	Budgeted student workload hours							Breakdown of the educational programme by year of study and semester					
							Total number of hours	Total contact hours	Contact classes			Independent study		1 course		2 course		3 course	
									Lectures	Laboratory Work	Practical/Seminar Classes	IWST	IWS	1st Semester	2nd Semester	3rd Semester	4th Semester	5th Semester	6th Semester
Module 1 – Higher Mathematics and General Physics-1, 17 academic credits																			
BD UC	MA 1201	Mathematical Analysis	1	4	4	exam	120	40	20		20	60	4						
BD UC	AG 1202	Algebra and Geometry	2	3	3	exam	90	30	15		15	45		3					
BD UC	Mech 1203	Mechanics	2	4	4	exam	120	40	20	5	20	60		4					

BD		Educational Internship	2	2	2	report	60							2					
BD		Industrial Internship	2	3	4	report	120							4					
Module 2.1 General Physics-2, 19 academic credits																			
GED CC	SIK 1103	Molecular Physics	1	5	5	exam	150	45	15	10	20	25	80	5					
GED CC	IKT 1104	Electricity and Magnetism	1	4	4	exam	120	40	20	5	15	20	60	4					
GED CC	MSPZ 1105	**Problem-Solving Practicum**	1	5	5	exam	150	45			45	25	80	5					
GED CC	FK(1) 1106	Theoretical Mechanics	2	5	5	exam	150	45	30		15	25	80		5				
BD EC	SRGZh 1204	Properties of Real Gases and Liquids	1	5	5	exam	150	45	15	10	20	25	80	5					
BD UC	EM 1205	Electricity and Magnetism	1	4	4	exam	120	40	20	5	15	20	60	4					
BD EC	MRGZE 1206	Methods for Solving Boundary Problems in Electrostatics	1	5	5	exam	150	45			45	25	80	5					
BD EC	KM 1207	Classical Mechanics	2	5	5	exam	150	45	30		15	25	80		5				
Module 3.1 – Mathematics and Programming, 24 academic credits																			
BD EC	DIU 1208	Differential and Integral Equations	1	4	5	exam	120	40	20		20	20	60	4					
BD EC	MMF 1209	Methods of Mathematical Physics	2	5	5	exam	150	45	15		30	25	80			5			
BD EC	Pro 1210	Programming	1	5	3	exam	150	45	15	10	20	25	80	5					
BD EC	Elec 1211	Electrical Engineering	2	4	4	exam	120	40	20	5	15	20	60			4			
BD EC	Opt 1212	Optics	2	6	6	exam	180	60	30	10	20	30	90			6			

Module 3.2 – Mathematical Physics and Programming, 24 academic credits																		
BD EC	DUChPPP 1208	First-Order Partial Differential Equations	1	4	4	exam	120	40	20		20	20	60	4				
BD EC	MFT 1209	Equations of Mathematical Physics	2	5	5	exam	150	45	15		30	25	80		5			
BD EC	MRZP 1210	Methods for Solving Programming Problems	1	5	5	exam	150	45	15	10	20	25	80	5				
BD EC	SMFI 1211	Stochastic Methods in Physical Problems	2	4	4	exam	120	40	20	5	15	20	60		4			
BD EC	KO 1212	Corpuscular Optics	2	6	6	exam	180	60	30	10	20	30	90		6			
Module 4.1 – Quantum Physics-2, 30 academic credits																		
BD UC	AF 2213	Atomic Physics	3	5	5	exam	150	45	15	10	20	25	80			5		
PD UC	AP 2301	Academic Writing	3	5	5	exam	150	45	15		30	25	80			5		
BD EC	YaF 2214	Nuclear Physics	4	5	5	exam	150	45	15	10	20	25	80				5	
PD EC	ED 2302	Electrodynamics	3	5	5	exam	150	45	30		15	25	80			5		
BD UC	KM2215	Quantum Mechanics	4	5	5	exam	150	45	30		15	25	80				5	
		Industrial Internship	4	5	5	report	150										5	
Module 4.2 – Problem-Solving Methods in General Physics, 30 academic credits																		
BD UC	AF 2213	Atomic Physics	3	5	5	exam	150	45	10	10	20	25	80			5		
PD UC	AP 2301	Academic Writing	3	5	5	exam	150	45		5	30	25	60			5		
BD EC	FAYaECh 2214	Physics of Atomic Nucleus and Elementary Particles	4	5	5	exam	150	45	10		20	25	80				5	
PD EC	TSF 2302	Thermodynamics and Statistical Physics	3	5	5	exam	150	45			15	25	80			5		

PD UC	KM 2215	Quantum Physics	4	5	5	exam	150	45			15	25	80				5		
PD		Industrial Internship	4	5	5	report	150										5		
Module 5.1 – Electronics and Solid-State Physics, 30 academic credits																			
BD EC	ES 2216	Electronics and Circuit Design	3	5	5	exam	150	45	15	10	20	25	80			5			
PD UC	MN 2302	Micro- and Nanoelectronics	4	5	5	exam	150	45	15	10	20	25	80			5			
BD EC	FKS 2217	Condensed Matter Physics	3	5	5	exam	150	45	30		15	25	80				5		
PD EC	FPYa 2304	Surface Physics	3	5	5	exam	150	45	15	10	20	25	80			5			
BD EC	FP 2218	Semiconductor Physics	4	5	5	exam	150	45	15		30	25	80				5		
PD EC	NT 2305	Nanotechnology	4	5	5	exam	150	45	15	10	20	25	80				5		
BD EC	ME 2216	MicroelectronicsEquations	3	5	5	exam	150	45	15	10	20	25	80			5			
PD UC	MAN 2303	Methods for Analyzing Nanoparticles and Nanomaterials	4	5	5	exam	150	45	15	10	20	25	80			5			
BD EC	FIT 2217	Solid-State Physics	3	5	5	exam	150	45	30		15	25	80				5		
PD EC	PK 2304	Polymer Composites	3	5	5	exam	150	45	15	10	20	25	80			5			
BD EC	OPNN 2218	Optics of Semiconductor Nanostructures and Nanotechnology	4	5	5	exam	150	45	15		30	25	80				5		
PD EC	MSSr 2305	Continuum Mechanics	4	5	5	exam	150	45	15	10	20	25	80				5		
BD EC	FM 3219	Physical Materials Science	5	3	3	exam	90	30	15	5	10	15	45						
PD EC	YsGR 3306	Nuclear Gamma Resonance	**5**	**5**	**5**	exam	**150**	**45**	**15**	**10**	**20**	**25**	**80**						
PD UC	IIT 3307	Information and Measurement Technology	5	5	5	exam	150	45	15	10	20	25	80						
BD	ED 3302	Industrial Internship	6	10	10	report	300												

BD	KM 3218	Pre-Graduation Internship	6	5	5	report	150												
BD EC	FKOS 3219	Space Physics and Open Systems	5	3	3	exam	90	30	15	5	10	15	45						
PD EC	MFI 3306	Physical Research Methods	5	5	5	exam	150	45	15	10	20	25	80						
PD UC	IIT 3307	Information and Measurement Technology	5	5	5	exam	150	45	15	10	20	25	80						
BD		Industrial Internship	6	10	10	report	300												
BD		Pre-Graduation Internship	6	5	5	report	150												
PD EC	SMITT 3308	Spectroscopic Methods in Solid-State Research	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
PD EC	FP 3309	Physics of Polymers	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
PD UC	BF 3310	Biophysics	**5**	**5**	**5**	exam	150	45	30		15	25	80						
PD EC	RM 3311	Robotics and Mechatronics	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
PD EC	Ast 3308	Astronomy	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
PD EC	IF 3309	History of Physics	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
PD UC	BF 3310	Biophysics	**5**	**5**	**5**	exam	150	45	30		15	25	80						
PD EC	RF 3311	Radiophysics	**5**	**5**	**5**	exam	150	45	15	10	20	25	80						
BD		Final Certification	**6**	**12**	**12**	**SE**	**360**												
		BD UC		**25**	**25**		**750**	**240**	**120**	**20**	**100**	**125**	**385**	**8**	**7**	**5**	**5**		
		BD EC		**62**	**62**		**1860**	**575**	**235**	**60**	**280**	**310**	**975**	**19**	**20**	**10**	**10**	**3**	
		BD Practice		**21**	**21**		**630**								**6**				
	TOTAL	**BD**		**108**	**108**		**3240**	**815**	**355**	**80**	**380**	**435**	**1360**	**27**	**33**	**15**	**15**	**3**	**15**

		PD UC		**15**	**15**		**450**	**135**	**60**	**10**	**65**	**75**	**240**			**5**			
		PD EC		**40**	**40**		**1200**	**360**	**135**	**70**	**155**	**200**	**640**			**10**	**10**	**20**	
		PD practice		**5**	**5**		**150**										**5**		
	TOTAL	PD		**60**	**60**		**1800**	**495**	**195**	**80**	**220**	**275**	**880**			**15**	**15**	**30**	
		FC		**12**	**12**		**360**												**12**
TOTAL:				**180**	**180**		**5400**	**1310**	**550**	**160**	**600**	**710**	**2240**	**27**	**33**	**30**	**30**	**33**	**27**

7.1.3 Modular curriculum for 2021-2023 (full-time, 2-year study period)
Trajectory 1: Physics and technology of new materials
Trajectory 2: Applied Physics

Cycle / Component	Code of the discipline	Name of the discipline	Semester	Academic credit	ECTS credit number	Form of Assessment	Budgeted student workload hours							Breakdown of the educational programme by year of study and semester			
							Total number of hours	Total contact hours	Contact classes			Independent study		1 course		2 course	
									Lectures	Laboratory work	Practical/sem.classes	IWST	IWS	1st Semester	2nd Semester	3rd Semester	4th Semester
Module 1 – Higher Mathematics and General Physics-1, 17 academic credits																	
BD UC	MA 1201	Mathematical Analysis	1	4	4	exam	120	40	20		20	60	4				

BD UC	AG 1202	Algebra and Geometry	2	3	3	exam	90	30	15		15	45		3			
BD UC	Mech 1203	Mechanics	2	4	4	exam	120	40	20	5	15	60		4			
BD		Educational Internship	2	2	2	report	60							2			
BD		Industrial Internship	2	4	4	report	120							4			
Module 2.1 General Physics-2, 19 academic credits																	
BD EC	MF 1204	Molecular Physics	1	5	5	exam	150	45	15	10	20	25	80	5			
BD UC	FM 1205	Electricity and Magnetism	1	4	4	exam	120	40	20	5	15	20	60	4			
BD EC	PRZ 1206	Problem-Solving Practicum	1	5	5	exam	150	45			45	25	80	5			
BD EC	TM 1207	Theoretical Mechanics	2	5	5	exam	150	45	30		15	25	80		5		
Module 2.2 – Methods for Solving General Physics Problems — 19 academic credits																	
BD EC	SRGZh 1204	Properties of Real Gases and Liquids	1	5	5	exam	150	45	15	10	20	25	80	5			
BD UC	EM 1205	Electricity and Magnetism	1	4	4	exam	120	40	20	5	15	20	60	4			
BD EC	MRGZE 1206	Methods for Solving Boundary Problems in Electrostatics	1	5	5	exam	150	45			45	25	80	5			
BD EC	KM 1207	Classical Mechanics	2	5	5	exam	150	45	30	10	15	25	80		5		
Module 3.1 – Mathematics and Programming, 24 academic credits																	
BD EC	DIU 1208	Differential and Integral Equations	1	4	4	exam	120	40	20		20	20	60	4			5
BD EC	MMF 1209	Methods of Mathematical Physics	2	5	5	exam	150	45	15		30	25	80		5		
BD EC	Pro 1210	Programming	1	5	5	exam	150	45	15	10	20	25	80	5			
BD EC	Elec 1211	Electrical Engineering	2	4	4	exam	120	40	20	5	15	20	60		4		

	Opt 1212	Optics	2	6	6	exam	180	60	30	10	20	30	90		6		
Module 3.2 – Mathematical Physics and Programming, 24 academic credits																	
BD EC	DUChPPP 1208	First-Order Partial Differential Equations	1	4	4	exam	120	40	20		20	20	60	4			
BD EC	MFT 1209	Equations of Mathematical Physics	2	5	5	exam	150	45	15		30	25	80		5		
BD EC	MRZP 1210	Methods for Solving Programming Problems	1	5	5	exam	150	45	15	10	20	25	80	5			
BD EC	Elec 1211	Stochastic Methods in Physical Problems	2	4	4	exam	120	40	20	5	15	20	60		4		
BD EC	Opt 1212	Corpuscular Optics	2	6	6	exam	180	60	30	10	20	30	90		6		
Module 4.1 – Quantum Physics-2, 30 academic credits																	
BD UC	AF 2213	Atomic Physics	3	5	5	exam	150	45	15	10	20	25	80			5	
PD UC	AP 2301	Academic Writing	3	5	5	exam	150	45	15		30	25	80			5	
BD EC	YaF 2214	Nuclear Physics	4	5	5	exam	150	45	15	10	20	25	80				5
PD EC	ED 2302	Electrodynamics	3	5	5	exam	150	45	30		15	25	80			5	
BD UC	KM 2215	Quantum Mechanics	4	5	5	exam	150	45	30		15	25	80				5
PD		Industrial Internship	4	4	4	report	120	45				25	80				4
Module 4.2 – Subatomic Physics, 30 academic credits																	
BD UC	AF 2213	Atomic Physics	3	5	5	exam	150	45	15	10	20	25	80			5	
PD UC	AP 2301	Academic Writing	3	5	5	exam	150	45	15		30	25	80			5	
BD EC	FAYaECH 2214	Physics of Atomic Nucleus and Elementary Particles	4	5	5	exam	150	45	15	10	20	25	80				5
PD EC	TSF 2302	Thermodynamics and Statistical Physics	3	5	5	exam	150	45	30		15	25	80			5	
BD UC	KM 2215	Quantum Mechanics	4	5	5	exam	150	45	30		15	25	80				5

PD		Industrial Internship	4	4	4	report	120	45				25	80				4
Module 5.1 – Electronics and Solid-State Physics, 30 academic credits																	
BD EC	ES 2216	Electronics and Circuit Design	3	5	5	exam	150	45	15	10	20	25	80			5	
PD TK EC	MN 2303	Micro- and Nanoelectronics	4	5	5	exam	150	45	15	10	20	25	80				5
BD EC	FKS 2217	Condensed Matter Physics	3	5	5	exam	150	45	30		15	25	80			5	
PD UC	FPYa 2304	Surface Physics	3	5	5	exam	150	45	15	10	20	25	80			5	
PD EC	NT 2305	Nanotechnology	4	5	5	exam	150	45	15	10	20	25	80				5
Module 5.2– Microelectronics and Physical Research Methods, 30 academic credits																	
BD EC	ME 2216	Microelectronics Equations	3	5	5	exam	150	45	15	10	20	25	80			5	
PD TK	MAN 2303	Methods for Analyzing Nanoparticles and Nanomaterials	4	5	5	exam	150	45	15	10	20	25	80				5
BD EC	FTT 2217	Solid-State Physics	3	5	5	exam	150	45	30		15	25	80			5	
PD EC	PK 2304	Polymer Composites	3	5	5	exam	150	45	15	10	20	25	80			5	
PD EC	MSSr 2305	Continuum Mechanics	4	5	5	exam	150	45	15	10	20	25	80				5
BD		Final Certification	6	6	6	SE	180										
TOTAL				120	120	0	3600	**965**	**415**	**105**	**445**	**520**	**1635**	**27**	**33**	**30**	**30**
		BD UC		**25**	**25**	**0**	**750**	**240**	**120**	**20**	**100**	**125**	**385**	**8**	**7**	**5**	**5**
		BD EC		**54**	**54**	**0**	**1620**	**500**	**205**	**55**	**240**	**270**	**850**	**19**	**20**	**10**	**5**
		BD practice		**6**	**6**	**0**	**180**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**	**0**	**0**
	TOTAL	BD		**85**	**85**	**0**	**2550**	**740**	**325**	**75**	**340**	**395**	**1235**	**27**	**33**	**15**	**10**
		PD UC		**5**	**5**	**0**	**150**	**45**	**15**	**0**	**30**	**25**	**80**	**0**	**0**	**5**	**0**
		PD EC		**20**	**20**	**0**	**600**	**180**	**75**	**30**	**75**	**100**	**320**	**0**	**0**	**10**	**10**
		PD practice		**4**	**4**	**0**	**120**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**4**
	TOTAL	PD		**29**	**29**	**0**	**870**	**22**	**90**	**30**	**10**	**125**	**400**	**0**	**0**	**15**	**14**

								5			5						
FC				**6**	**6**	**0**	**180**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**6**
TOTAL:				**120**	**120**	**0**	**3600**	**965**	**415**	**105**	**445**	**520**	**1635**	**27**	**33**	**30**	**30**

8. Educational program card

Cycle/ component	Discipline code	Name of disciplines	Semester	**Academic credit**	**Number of ECTS credits**	**Learning outcomes**
1. Module -Language module, 20 academic credits						
ООД ОК	IYa 1101	Foreign language	1,2	10	10	LO2
ООД ОК	K (R) Ya 1102	Kazakh (Russian) language	1,2	10	10	LO2
2. Module - General education, 22 academic credits						
ООД ОК	SIK 1103	Modern History of Kazakhstan	2	5	5	LO9
ООД ОК	IKT 1104	Information and Communication Technologies (in English)	1	5	5	LO5
ООД ОК	MSPZ 1105	Module of Social and Political Knowledge	1,2	8	8	LO10
ООД ОК	FK (1) 1106	Physical Education	1,2	4	4	LO9
3. Module - Higher Mathematics and General Physics-1, 18 academic credits						
БД ВК	MA 1201	Mathematical analysis	1	4	4	LO6; LO8
БД ВК	AG 1202	Algebra and geometry	2	3	3	LO6; LO8
БД ВК	UR 1203	Ulttyk rakhaniyat	1	5	5	LO9
БД ВК	Mech 1204	Mechanics	2	5	5	LO1; LO3; LO8
БД		Educational practice	2	1	1	LO1; LO2; LO3; LO7
4.1 Module - Philosophy and Economics, 17 academic credits						
ООД ОК	Fil 2107	Philosophy	4	5	5	LO9

ООД КВ	OPB 2108	Fundamentals of Entrepreneurship and Business	3	5	5	LO9
БД		Industrial Practice	4	3	3	LO1; LO2; LO5; LO7
ООД ОК	FK (2) 2109	Physical Education	3,4	4	4	LO9
4.2 Module - Knowledge of the world and academic integrity, 17 academic credits						
ООД ОК	Fil 2107	Philosophy	4	5	5	LO9
ООД КВ	ACh 2108	Academic Integrity	3	5	5	LO2
БД		Industrial Internship	4	3	3	LO1; LO2; LO5; LO7
ООД ОК	FK (2) 2109	Physical Education	3,4	4	4	LO9
5.1 Module - General Physics -2.19 academic credits						
БД ВК	MF 2205	Molecular Physics	3	5	5	LO1; LO3; LO7
БД ВК	EM 2206	Electricity and magnetism	3	4	4	LO1; LO3; LO7
БД КВ	PR 2207	Physical practice	3	5	5	LO1; LO8
БД КВ	TM 2208	Theoretical mechanics	4	5	5	LO3; LO4; LO8
5.2 Module - Methods of solving problems of general physics, 19 academic credits						
БД ВК	MF 2205	Molecular Physics	3	5	5	LO1; LO3; LO7
БД ВК	EM 2206	Electricity and magnetism	3	4	4	LO1; LO3; LO7
БД КВ	MRGZE 2207	Methods for solving boundary problems of electrostatics	3	5	5	LO1; LO8
БД КВ	KM 2208	Classical mechanics	4	5	5	LO3; LO4; LO8
6.1 Module - Mathematics and Programming, 24 academic credits						
БД КВ	DIU 2209	Differential and integral equations	3	4	4	LO6; LO8
БД КВ	MMF 2210	Methods of mathematical physics	4	5	5	LO6; LO8
БД КВ	Pro 2211	Programming	3	5	5	LO1; LO5
БД ВК	Elec 2214	Electrical engineering	4	4	4	LO1; LO2; LO7
БД КВ	Opt 2213	Optics	4	6	6	LPO1; LO3; PLO7
6.2 Module – Mathematical Physics and Programming, 24 academic credits						
БД КВ	DUChPPP 2209	Partial differential equations of the first order	3	4	4	LO6;LO8
БД КВ	MFT 2210	Equations of mathematical physics	4	5	5	LO6; LO8
БД КВ	MRZP 2211	Methods for solving programming problems	3	5	5	LO1; LO5
БД ВК	Elec 2214	Electrical engineering	4	4	4	LO1; LO2; LO7

БД КВ	KO 2213	Corpuscular optics	4	6	6	LO1; PLO3; LO8
7.1 Module - Quantum Physics, 30 academic credits						
БД ВК	AF 3214	Atomic physics	5	5	5	LO1; LO3; LO7
ПД ВК	AP 3301	Academic writing	5	5	5	LO2
БД КВ	YaF 3215	Nuclear physics	6	5	5	LO1; LO3; LO8
ПД КВ	ED 3302	Electrodynamics	5	5	5	LO3; LO4; LO8
БД ВК	KM 3216	Quantum mechanics	6	5	5	LO3; LO4; LO8
ПД	PP	Production practice	6	5	5	LO1; LO2; LO5; LO7
7.2 Module - Subatomic Physics, 30 academic credits						
БД ВК	AF 3214	Atomic physics	5	5	5	LO1; LO3; LO7
ПД ВК	AP 3301	Academic writing	5	5	5	LO2
БД КВ	FAYaECh 3215	Physics of the atomic nucleus and elementary particles	6	5	5	LO1; LO3; LO8
ПД КВ	TSF 3302	Thermodynamics and statistical physics	5	5	5	LO3; LO4; LO8
БД ВК	KM 3216	Quantum mechanics	6	5	5	LO3; LO4; LO8
ПД		Production practice	6	5	5	LO1; LO2; LO5; LO7
8.1. Module – Electronics and Astronomy, 30 academic credits						
БД КВ	ES 3219	Electronics and circuit engineering	5	5	5	LO2; LO5
ПД КВ	AZ 3304	Astrophysical research	6	5	5	LO4; LO7
БД КВ	FKS 3220	Condensed matter Physics	5	5	5	LO2; LO3
ПД ВК	Ast 3305	Astronomy (dual training)	5	5	5	LO4; LO7
БД КВ	FPD 3221	Physics of semiconductors and dielectrics	6	5	5	LO6; LO3
ПД ВК	NT 3306	Nanotechnology	6	5	5	LO1; LO3; LO4
8.2 Module - Microelectronics and physical research methods, 30 academic credits						
БД КВ	ME 3217	Microelectronics	5	5	5	LO2; LO5
ПД КВ	MAN 3303	Methods of analysis of nanoparticles and nanomaterials	6	5	5	LO1; LO3; LO4
БД КВ	FTT 3218	Solid State Physics	5	5	5	LO2; LO3
ПД ВК	Ast 3305	Astronomy (dual training)	5	5	5	LO1; LO3; LO4
БД КВ	OPNN 3219	Optics of semiconductor nanostructures and nanotechnology	6	5	5	LO1; LO3; LO4
ПД ВК	NT 3306	Nanotechnology	6	5	5	LO1; LO3; LO4

9.1 Module - Technical Physics, 28 academic credits						
БД КВ	FM 4220	Physical Materials Science	7	3	3	LO1; LO3; LO4
ПД КВ	YaGR 4306	Nuclear gamma resonance	7	5	5	LO2; LO7
ПД ВК	IIT 4307	Information and measurement technology	7	5	5	LO2; LO7
БД	PP	Production practice	8	10	10	LO1; LO2; LO5; LO7
БД		Pre-graduate practice	8	5	5	LO3; LO4; LO5; LO7
9.2 Module – Measuring equipment and methods of physical research, 28 academic credits						
БД КВ	FKOS 4220	Physics of space and open systems	7	3	3	LO1; LO3
ПД КВ	MFI 4306	Methods of physical research	7	5	5	LO2; LO7
ПД ВК	IIT 4307	Information and measurement technology	7	5	5	LO2; LO7
БД	PP	Production practice	8	10	10	LO1; LO2; LO5; LO7
БД		Pre-graduate practice	8	5	5	LO3; LO4; LO5; LO7
10.1 Module - Methods of Applied Physics, 20 academic credits						
ПД ВК	SMITT 4309	Spectroscopic methods in the study of solids	7	5	5	LO2; LO7
ПД КВ	FP 4309	Physics of polymers	7	5	5	LO2; LO7
ПД ВК	RFZPK 4310	Solving physical problems using a computer	7	5	5	LO1; LO5
ПД КВ	RM 4311	Robotics and mechatronics	7	5	5	LO2; LO5
10.2 Module - Applied Physics and Radiophysics, 20 academic credits						
ПД ВК	SMITT 4309	Spectroscopic methods in the study of solids	7	5	5	LO2; LO7
ПД КВ	IF 4309	History of physics	7	5	5	LO4
ПД ВК	RFZPK 4310	Solving physical problems using a computer	7	5	5	LO1; LO5
ПД КВ	RF 4311	Radiophysics	7	5	5	LO2; LO7

8.2 The matrix of the ratio of discipline and learning outcomes – 6B05301 – Physics

№	Learning outcomes / Naming of disciplines	LO 1	LO 2	LO 3	LO 4	LO 5	LO 6	LO 7	LO 8	LO 9	LO 10
1.	Foreign language		+								
2.	Kazakh (Russian) language		+								
3.	Modern history of Kazakhstan									+	
4.	Information and communication technologies (in English)					+					
5.	Module of social and political knowledge										+
6.	Physical education									+	
7.	Mathematical analysis						+		+		
8.	Algebra and geometry						+		+		
9.	Ulttyk rahaniyat									+	
10.	Mechanics	+		+				+			
11.	Educational practice	+	+	+				+			
12.	Philosophy									+	
13.	Fundamentals of entrepreneurship and business									+	
14.	Industrial practice	+	+			+		+			
15.	Academic integrity		+								
16.	Molecular Physics	+		+				+			
17.	Electricity and magnetism	+		+				+			
18.	Physical practice	+							+		
19.	Theoretical mechanics			+	+				+		
20.	Methods for solving boundary problems of electrostatics	+							+		
21.	Classical mechanics			+	+				+		
22.	Differential and integral equations						+		+		
23.	Methods of mathematical physics						+		+		
24.	Programming	+				+					
25.	Electrical engineering	+	+					+			
26.	Optics	+		+				+			
27.	Partial differential equations of the first order						+		+		

28.	Equations of mathematical physics						+		+		
29.	Methods for solving programming problems	+				+					
30.	Corpuscular optics	+		+					+		
31.	Atomic physics	+		+				+			
32.	Academic writing		+						+		
33.	Nuclear physics	+		+					+		
34.	Electrodynamics			+	+				+		
35.	Quantum mechanics			+	+				+		
36.	Physics of the atomic nucleus and elementary particles	+		+					+		
37.	Thermodynamics and statistical physics			+	+				+		
38.	Electronics and circuit engineering		+			+					
39.	Astrophysical research				+			+			
40.	Condensed matter Physics		+	+							
41.	Astronomy (dual training)				+			+			
42.	Physics of semiconductors and dielectrics			+			+				
43.	Nanotechnology	+		+	+						
44.	Microelectronics		+			+					
45.	Methods of analysis of nanoparticles and nanomaterials	+		+	+						
46.	Solid State Physics		+	+							
47.	Optics of semiconductor nanostructures and nanotechnology	+		+	+						
48.	Physical Materials Science	+		+	+						
49.	Nuclear gamma resonance		+					+			
50.	Information and measurement technology		+					+			

51.	Pre-graduate practice			+	+	+		+			
52.	Physics of space and open systems	+		+							
53.	Methods of physical research		+					+			
54.	Spectroscopic methods in the study of solids		+					+			
55.	Physics of polymers		+					+			
56.	Solving physical problems using a computer	+				+					
57.	Robotics and mechatronics		+			+					
58.	History of physics				+						
59.	Radiophysics		+					+			
	Total	**21**	**18**	**23**	**13**	**9**	**7**	**17**	**17**	**5**	**1**

9.1.1 Summary table showing the amount of credits disbursed in the context of educational program modules (full-time education, 4 years of study)

Course of study	Semester	Number of modules to be mastered	Number of subjects studied		Number of credits KZ						Total hours	ECTS	Quantity	
			OK	BK/KB	Theoretical training	Educational practice, industrial practice	Pre-graduate practice	Physical education	Final certification	Total			exam	differentiated credit
1	1	3	5	2/0	28	-	-	2		30	900	30	6	1
	2	3	5	2/0	27	1	-	2		30	900	30	6	2
2	3	3	1	2/4	28	-	-	2		30	900	30	6	1
	4	3	2	1/3	25	3	-	2		30	900	30	5	2
3	5	2	-	3/3	30	-	-	-		30	900	30	6	-
	6	2	-	2/3	25	5	-	-		30	900	30	5	1
4	7	2	-	3/4	33	-	-	-		33	990	33	7	-
	8	2	-	-	-	10	5	-	12	27	810	27	-	2
Total:		10	13	15/17	199	19	5	8	12	240	7200	240	41	9

9.1.2 Summary table showing the amount of credits disbursed in the context of educational program modules (full-time education, 3 years of study)

Course of study	Semester	Number of modules to be mastered	Number of subjects studied		Number of credits KZ						Total hours	ECTS	Quantity	
			OK	BK/KB	Theoretical training	Educational practice, industrial practice	Pre-graduate practice	Physical education	Final certification	Total			exam	differentiated credit
1	1	3	5	2/0	28	-	-	2		30	900	30	6	1
	2	3	4	2/0	27	1	-	2		30	900	30	6	2
2	3	4	-	2/4	30	-	-	-		30	900	30	6	-
	4	4	-	4/1	25	5	-	-		30	900	30	5	1
3	5	2	-	2/5	33	-	-	-		33	990	33	7	-

	6	2	-	-	-	10	5	-	12	27	720	27	-	2
Total:		8	9	12/12	146	16	2	4	12	180	5400	180	30	6

9.1.3 Summary table showing the amount of credits disbursed in the context of educational program modules (full-time education, 2 years of study)

Course of study	Semester	Number of modules to be mastered	Number of subjects studied		Number of credits KZ						Total hours	ECTS	Quantity	
			OK	BK/KB	Theoretical training	Educational practice, industrial practice	Pre-graduate practice	Physical education	Final certification	Total			exam	differentiated credit
1	1	2	-	4/2	28	2	-	-		30	900	30	6	1
	2	3	-	4/2	30	-	-	-		30	900	30	6	-
2	3	2	-	2/5	34	-	-	-		34	1020	34	7	-
	4	1	-	0/2	7	-	2	5	12	26	780	26	2	2
Total:		5	-	10/11	99	2	2	5	12	90	3600	90	21	3

10. RESOURCE PROVISION OF THE EDUCATIONAL PROGRAM

The resource provision is based on the requirements for the conditions of implementation of bachelor's degree programs in the field of training 6B05301 – physics.:

- staffing;
- educational, methodological and informational support;
- material and technical support.

10.1. Staffing

The implementation of the basic bachelor's degree program is provided by the scientific and pedagogical staff of K. Zhubanov Aktobe Regional University, who have a higher basic education corresponding to the profile of the discipline taught, and who are systematically engaged in scientific and methodological activities.

The share of full-time teachers in the Department of Physics, including in the cycles of basic and core disciplines of the state mandatory standard is 80%.

10.2. Educational, methodological and informational support

Educational, methodological and informational support includes: the standard and working curriculum of the discipline, the UMKD, syllabus, control and measuring materials, active handouts, didactic materials, normative documents regulating the types of educational activities.

The educational program in the specialty 6B05301 – physics is provided with educational and methodological documentation and materials for all academic disciplines of the curriculum, including the standard and working curriculum of the discipline, UMKD, syllabus, control and measuring materials, active handouts, didactic materials, etc.

Every student has access to the Internet, including the university's electronic library, the Russian Library of Economics, KazNEB, Clarivate Analytics, 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, 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.

10.3. Logistics and technical support

When implementing the general education program in the specialty 6B05301 – physics, the material and technical base is used to ensure that all types of classes 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 with in-line classrooms, equipped classrooms and laboratories, computer classes for conducting classes in the specialty 6B05301 – physics.

The Department of Physics has the following educational laboratories: mechanics, molecular physics, electricity and magnetism, optics, physics of the atom and atomic nucleus, astronomy, theory of electrical circuits, robotics and methods of teaching physics.

The department also has scientific laboratories on radiation physics of materials, nanotechnology, polymer and composite materials.

All laboratories are equipped with modern digital equipment that allows conducting practical and laboratory classes according to the latest achievements of science and technology.

11. Characteristics of the environment of K. Zhubanov Aktobe Regional University, 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 issues of academic discipline, culture of behavior, appearance of students, education of patriotism, citizenship, sense of responsibility, decency, honesty, loyalty to professional duty, law-abiding, respectful attitude to each other and others. Educational work is carried out in the following areas:

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

- fostering an ecological culture;
- labor education.

As a basic normative document for the organization of the educational process at the university, the "Concept of educational work" and intra-university normative documents have been developed, such as the Regulation "On Self-government", the Regulation "On the organization of educational work at the K.Zhubanov ARU, the Regulation "On the Council for the Prevention of Offenses", the Regulation "On the Council of Curators", Regulations "On curatorial work", Regulations "On the school of legal knowledge", Regulations "On the sports club", Regulations "On the debate club", etc.

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 and the department for socio-cultural work. In addition, the university has a student administration, a student dormitory Council, the Headquarters of student labor groups, a Board of Curators, a sports club, and a Board for 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 students and undergraduates, at the K.Zhubanov ARU has Debate clubs "Rhetor", "Zaman Bizdiki", school of legal knowledge, student theater "Zhubanov zhastary", Club of young poets "Taraza", "English-club", "Education club", "Universialprogrammer-club", KVN club, student law clinic "Femida", charity Umitin Uzilmesin Club, Zhubanov Zhyluy volunteer club, ARSU STAR and Big Fam dance clubs, Mansap School of Public Service, sports sections, etc.

Educational work is carried out in a complex of information and propaganda, individual psychological, legal, socio-economic, moral and ethical, cultural and leisure, mass sports and other events.

AGREED:

Aktobe, Director of Aktobe Higher Polytechnic College K.T. Aldiyarov.

Aktobe, Director of Aleks ASU LLP Bakitzhanov Sh.Zh.

Aktobe, Director of Aktobe Regional Planetarium Bulekov K.Sh.

Reviewed at the meeting of the Academic Council of the University Protocol N. __ of "___" _____ 2021.