



APPROVED
Chairman of the board
Rector of KazNRTU named K.I. Satpayev
M.M. Begentaev
06.06.2021 r.

CURRICULUM of educational program for 2019-2020 academic year
Educational programs 6B07109 - "Engineering physics and materials science", 6B07207 - "Engineering physics and materials science"

Mode of study: Full-time

Duration: 4 years

Academic degree: Bachelor of engineering and technology

Grade level	Code	Name of disciplines	Cycle	Total volume in credits	Total hours	Classroom volume lec/lab/pr/ISW	ISW (including ISWT) in hours	Prerequisite
Term 1 (Autumn 2019)								
1	LNG 105	English	G	6	180	0/0/3	135	Diagnostic Test
	LNG101	Kazakh (Russian) Language	G	5	150	0/0/3	105	Diagnostic Test
	MAT00121	Mathematics	B	6	180	1/0/2	135	
	PHY413	Physics I: Mechanics, Molecular Physics and Thermodynamics	B	5	150	1/1/1	105	Diagnostic Test
	HUM113	Modern History of Kazakhstan	B	5	150	1/0/2	105	no
	CSE192	General Chemistry	B	6	180	1/1/1	135	no
	AAP106	Physical Culture I	G	4	120	0/0/4		no
Total:				37	22			
Term 2 (Spring 2020)								
2	LNG 1053	General English 1 (A2)	G	6	180	0/0/3	135	LNG 1052
	MAT00123	Mathematics	B	6	180	1/0/2	135	MAT00122
	CSE174	Information and Communication Technology (eng)	G	5	150	1/0/2	105	no
	PHY415	Physics III: Optics, Atomic physics.	B	6	180	2/0/1	135	PHY414
	PHY127	Mechanics of Materials	B	5	150	1/1/1	105	no
	PHY149	Quantum Mechanics	M	5	150	1/0/2	105	PHY414
	Total:				34	18		
Term 3 (Autumn 2020)								
3	MAT191	Partial Equations MatLab	B	5	150	1/0/2	105	MAT126
	HUM126	Social & Political Knowledge	G	8	240	4/0/0	180	no
	PHY481	Condensed Matter Physics	B	5	150	1/1/1	105	PHY149
	PHY482	Functional Materials	M	5	150	1/0/2	105	no
	PHY483	Computational Physics	M	5	150	1/0/2	105	no
	PHY484	Modern Materials Research Methods	M	5	150	1/1/1	105	no
	Total:				33	19		
Term 4 (Spring 2021)								
4	PHY505	Methods for obtaining and researching nanostructured materials	B	5	150	1/0/2	105	no
	PHY523	Micro and nanosystem design	M	5	150	1/1/1	105	no
	PHY510	Physics and Optics of Photovoltaic Materials	B	5	150	1/1/1	105	no
	PHY512	Nuclear technology	B	5	150	1/0/2	105	no
	PHY525	Methods for measuring parameters of electronic equipment	M	5	150	1/0/2	105	no
	PHY519	Vacuum technology and technology	M	5	150	1/1/1	105	no
	Total:				30	18		

Code	Name of disciplines	Cycle	Total volume in credits	Total hours	Classroom volume lec/lab/pr/ISW	ISW (including ISWT) in hours	Prerequisite	
Term 2 (Spring 2020)								
LNG 105	English	G	6	180	0/0/3	135		
LNG101	Kazakh (Russian) Language	G	5	150	0/0/3	105	LNG10121	
MAT00122	Mathematics	B	6	180	1/0/2	135	MAT00121	
PHY414	Physics II: Electricity and Magnetism	B	6	180	1/1/1	135	PHY413	
PHY421	Physics of Matter (Introduction to the Specialty)	B	6	180	1/1/1	135	no	
PHY435	Methods of Theoretical Physics	B	5	150	1/0/2	105	no	
AAP118	Physical Culture II	G	4	120	0/0/4		AAP106	
Total:				38	22			
Term 3 (Autumn 2020)								
Term 4 (Spring 2021)								
LNG 1054	General English 2 (A2)	G	6	180	0/0/3	135	LNG 1053	
MAT00124	Mathematics	B	6	180	1/0/2	135	MAT00123	
HUM124	Philosophy	G	6	180	1/0/2	135	no	
PHY131	Crystal Physics	M	6	160	1/1/1	135	no	
PHY122	Physical Materials	B	6	180	1/1/1	135	no	
PHY163	Statistical Physics and Thermodynamics	M	6	180	2/0/1	135	no	
Total:				36	18			
Term 5 (Autumn 2021)								
Term 6 (Spring 2022)								
PHY485	Basics of heat treatment and surface hardening	M	5	150	1/1/1	105	no	
PHY486	Non-metallic materials and technologies	M	5	150	1/1/1	105	no	
PHY487	Semiconductor physics	M	5	150	1/1/1	105	no	
PHY495	Physics of strength and plasticity	B	5	150	1/1/1	105	no	
PHY496	Corrosion and anti-corrosion treatment	B	5	150	2/0/1	105	no	
PHY501	Defects of the crystal structure of materials	B	5	150	1/1/1	105	no	
Total:				30	18			
Term 7 (Autumn 2022)								
Term 8 (Spring 2023)								
PHY431	Advanced materials	M	5	150	1/1/1	105	no	
PHY480	Technologies for obtaining nanomaterials and nanosystems				1/1/1			
ECA103	Final Attestation	FA	12					
Total:				17	3			

Year of	Code	Name	Cycle	Credits	Term
Compulsory graded training P/NP					
1	AAP101	Educational Practice	B	2	2
2	AAP141	Industrial Practice I	B	5	4
3	AAP178	Industrial Practice II	M	8	6

Amount of Credits for The Entire Period of Study				
Disciplines Cycles	compu	Credits		
		loory	additi	Total
Cycle of General Disciplines (G)	62			62
Cycle of Basic Disciplines (B)	87	30		117
Cycle of Major Disciplines (M)	41	35		76
Total Theoretical Training:	190	65		255
Final Attestation (FA)	12	0		12
Total:	12	0		12
Classroom Volume in Theoretical Training Credits	202	0		267

Decision of the Academic Council of KazNRTU named K.I.Satpayev, Protocol № 3 from "25" 06 2021 y.

Decision of the Academic Council of the School of MM, Protocol № 10 from "10" 06 2021 y.

Vice Rector for Academic Affairs
Director of the MM Institute
Head of MNnEP department
Representative of Specialty council



Zhautikov B.A.
Rysbekov K.B.
Kakimov U.K.
Serikkanov A.S.

MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN
KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named K.I. SATPAYEV



Educational programs 6B07109 - "Engineering physics and materials science", 6B07107 - "Engineering physics and materials science"

Mode of study: Full-time Duration: 4 years Academic degree: Bachelor of Engineering and Technology

Grade level	Curriculum clective code	Discipline code	Name of disciplines	Cycle	Total value in credits	Classroom volume lec/lab/pr/ISW	Prerequisite
Term 2							
1	PHY1106	LNG103	Culture of Business communication (C1)	G	4	0/0/2/2	LNG1012.2
		LNG102	Rhetoric (C1)				
Total:					4		
Term 3							
2	PHY2106.3	LNG110	Intercultural communication	G	6	0/0/3/3	LNG1057
		LNG109	IELTS preparation				
		LNG121	Academic writing				
Total:					6		
Term 4							
2	PHY2108.2	LNG110	Intercultural communication	G	6	0/0/3/3	LNG1057
		LNG109	IELTS Preparation				
		LNG121	Academic Writing				
	PHY2108.2	HUM103	Political Science			1/0/2/3	no
		HUM111	Fundamentals of Law				
		HUM108	Psychology of Business communication				
		HUM110	Leadership Psychology				
		HUM112	Self-Knowledge				
		HUM109	Human Development Psychology				
		HUM116	Sociology and Engineering				
		HUM102	Conflictology				
		Total:					
Term 6							
3	PHY3001	PHY485	Fundamentals of Heat Treatment and Surface Hardening	M	5	1/1/1	no
		PHY506	Alternative Technologies			1/1/1	no
	PHY3002	PHY496	Corrosion and Anti-Corrosion Treatment	B	5	2/0/1	no
		PHY453	Acoustic methods and devices in materials research			1/0/2	no
	PHY3003	PHY486	Non-Metallic Materials and Technologies	M	5	1/1/1	no
		PHY507	Fundamentals of Technological Processes of Materials Production			1/1/1	no
	PHY3004	PHY487	Physics of Semiconductor Devices	M	5	1/1/1	no
		PHY497	Electronic Materials Technology			1/1/1	no
		PHY498	Engineering Physics II			0/0/3	
	PHY3005	PHY493	Technical Physics II	B	5	0/0/3	
		PHY500	Basics of Space Technology			2/0/1	no
		PHY501	Defects in The Crystal Structure of Materials			1/1/1	no
	PHY3006	PHY495	Physics of strength and plasticity	B	5	1/1/1	no
		PHY452	Methods of magnetic resonance spectroscopy and tomography			1/0/2	no
Total:					30		
Term 7							
4	PHY4001	PHY508	Nuclear and Elementary Particle Physics	B	5	2/0/1	PHY471
		PHY509	Physical Fundamentals of Microelectronics			2/1/0	no
		PHY489	Metal Physics			2/1/0	no
		PHY510	Physics and Optics of Photovoltaic Materials			1/1/1	no
		PHY511	Computer Simulation in Materials Science (Thermocalc)			1/1/1	no
PHY4002	PHY512	Nuclear Technology	B	5	2/0/1	PHY508	
	PHY513	Applied Electronics			1/1/1	PHY471	
	PHY514	Physics of Dielectric Materials			2/0/1	no	
	PHY515	Technological Processes of Photovoltaic Materials Production			1/1/1	no	
PHY4003	PHY516	Reactor Materials Science	M	5	2/0/1	no	
	PHY517	Physics and Technology of Charged Particle Accelerators			2/0/1	PHY508	
	PHY518	Physical Kinetics			2/0/1	no	
	PHY519	Vacuum Engineering and Technology			1/1/1	no	
PHY4004	PHY520	Physical and Chemical Bases of Coating	M	5	1/1/1	no	
	PHY521	Surface Engineering			1/1/1	no	
	PHY522	Probe Techniques of Materials Research			1/1/1	no	
	PHY523	Methods for Measuring The Properties of Electronic Materials			1/1/1	no	
PHY4005	PHY524	Construction of Micro and Nanosystems	M	5	1/1/1	no	
	PHY525	Electron Microscopy and Radiography			1/1/1	no	
	PHY526	Methods for Measuring the Parameters of Electronics			1/1/1	no	
PHY4006	PHY527	Research Methods of Powder and Composite Materials	B	5	1/1/1	no	
	PHY528	Methods for Obtaining Powder Materials			1/1/1	no	
	PHY502	Methods of Structural Analysis and Quality Control			1/1/1	no	
	ROB155	Nondestructive Testing Methods			2/1/0	no	
PHY4007	PHY503	Methods of Surface Nanostructures Formation	B	5	1/0/2	no	
	PHY504	Methods for Deep Cleaning Substances			2/0/1	no	
	PHY505	Methods of Obtaining and Research of Nanostructured Materials			2/0/1	no	
Total:					30		
Term 8							
4	PHY4007	PHY431	Advanced materials	M	5	1/1/1	no
		PHY480	Technologies for obtaining nanomaterials and nanosystems			1/1/1	no
Total:					5		

Amount of credits in elective disciplines for the entire period of study	
Disciplines Cycles	Credits
Cycle of General Disciplines (G)	16
Cycle of Basic Disciplines (B)	30
Cycle of Major Disciplines (M)	35
TOTAL:	81

Decision of the Academic Council of the School of MM. Protocol № 10 from "10" 06 2021 y.

Head of the Department "MNNEP"
Representative of Specialty council

Kakimov U.K.
Serikkanov A.S.