



CURRICULUM of educational program for 2020-2021 academic year
Educational programs 6B07109 - "Engineering Physics and Materials Science", 6B07207 - "Engineering Physics and Materials Science"
Groups of educational programs B061 - "Materials Science and Technology", B069 - "Production of materials (glass, paper, plastic, wood)"
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	Diagnostic Test
	PHY00120	Physics	B	6	180	1/1/1	135	Diagnostic Test
	CB1101	Fundamentals of Chemistry	B	5	150	1/0/2/3	105	Diagnostic Test
	AAP106	Physical education I	G	4	120	0/0/4		no
	HUM113	Modern History of Kazakhstan	G	5	150	1/0/2	105	no
				Total:	37	22		
Term 2 (Spring 2020)								
1	LNG 105	English	G	6	180	0/0/3	135	no
	LNG101	Kazakh (Russian) Language	G	5	150	0/0/3	105	no
	MAT00122	Mathematics	B	6	180	1/0/2	135	MAT00121
	PHY00121	Physics I: Mechanics, Molecular Physics and Thermodynamics	B	6	180	1/1/1	135	PHY00120
	CHE192	General Chemistry	B	6	150	1/1/1	105	CB1101
	GEN101	Engineering and computer graphics	B	5	150	1/0/2	105	no
	AAP118	Physical education II	G	4	120	0/0/4		AAP106
				Total:	37	20		
Term 3 (Autumn 2021)								
2	MAT00122	Mathematics	B	6	150	1/0/2	105	MAT00121
	CSE677	Information and Communication Technology (eng)	G	5	150	2/1/0	105	no
	PHY471	Physics II: Electricity and Magnetism	B	5	150	1/1/1	105	PHY00121
	PHY477	Quantum Mechanics	B	5	150	2/0/1	105	no
	PHY470	Physics of matter. (Introduction to the specialty)	B	5	150	1/1/1	105	no
	PHY2001	ELECTIVE	B	5	150	1/0/2	105	no
					Total:	31	18	
Term 4 (Spring 2022)								
2	HUM132	Philosophy	G	5	150	1/0/2	105	no
	HUM126	Socio-political knowledge	G	8	240	4/0/0	180	no
	PHY529	Physical materials science	B	5	150	2/1/0	105	no
	MAT103	Mathematics III	B	5	150	1/0/2	105	MAT102
	PHY475	Physics III: Optics, Quantum physics, Atomic physics.	B	5	150	1/1/1	105	PHY471
	PHY478	Statistical Physics and Thermodynamics	B	5	150	2/0/1	105	no
					Total:	34	23	
Term 5 (Autumn 2022)								
3	CHE452	Ecology and sustainable development	G	2	60	1/0/0	45	no
	CHE451	Life safety	G	2	60	1/0/0	45	no
	PHY481	Condensed Matter Physics	B	5	150	1/1/1	105	PHY477
	PHY482	Functional materials	M	5	150	1/0/2	105	no
	PHY483	Computational physics	M	5	150	1/0/2	105	no
	PHY484	Modern methods of materials research	M	5	150	1/1/1	105	no
	PHY495	Physics of strength and plasticity	B	5	150	1/1/1	105	no
				Total:	29	17		
Term 6 (Spring 2023)								
3	MNG487	Fundamentals of Entrepreneurship, Leadership and Anti-Corruption Culture	G	3	90	1/0/1	60	no
	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
	PHY496	Corrosion and Anti-Corrosion Treatment	B	5	150	2/0/1	105	no
	PHY501	Defects in The Crystal Structure of Materials	B	5	150	1/1/1	105	no
					Total:	28	17	
Term 7 (Autumn 2022)								
4	PHY4001	ELECTIVE	M	5	150	1/0/2*	105	no
	PHY4002	ELECTIVE	B	5	150	1/0/2*	105	no
	PHY4003	ELECTIVE	B	5	150	1/0/2*	105	no
	PHY4004	ELECTIVE	M	5	150	1/0/2*	105	no
	PHY4005	ELECTIVE	M	5	150	1/0/2*	105	no
	PHY4006	ELECTIVE	B	5	150	1/0/2*	105	no
					Total:	30	18	
Term 8 (Spring 2023)								
4	PHY4007	ELECTIVE	M	5	150	1/0/2*	105	no
	ECA103	Final Attestation	FA	12				
				Total:	17			

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

Amount of Credits for The Entire Period of Study			
Disciplines Cycles	Credits	Credits	
		com-puls	Total
Cycle of General Disciplines (G)	60		60
Cycle of Basic Disciplines (B)	92	35	127
Cycle of Major Disciplines (M)	38	20	58
Total Theoretical Training:	190	55	245
Final Attestation (FA)	12	0	12
Total:	12	0	12
Classroom Volume In Theoretical Training Credits	202		257

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 MnM 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. SATPAEV

APPROVED
Director of the Mining and Metallurgical Institute
Kakimov U.K.
2021

Educational programs 6B07109 - "Engineering Physics and Materials Science", 6B07207 - "Engineering Physics and Materials Science"
Groups of educational programs B061 - "Materials Science and Technology", B069 - "Production of materials (glass, paper, plastic, wood)"
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	PHY1001	LNG107	Culture of Business Communication (C1)	G	6	0/0/3/3	LNG107
		LNG107	Rhetoric (C1)				
Total:					6		
Term 3							
2	PHY2001	PHY436	Material mechanics	B	5	1/0/2/3	no
		PHY435	Methods of theoretical physics				
Total:					5		
Term 4							
2	PHY2002	PHY488	Crystal physics	B	5	1/1/1	no
		PHY489	Physics of metals			2/1/0	no
Total:					5		
Term 5							
3	PHY3001	PHY498	Engineering Physics I	B	5	0/0/3	no
		PHY493	Technical Physics I			0/0/3	no
		PHY494	Space Physics			2/0/1	no
		PHY495	Physics of strength and plasticity			1/1/1	no
Total:					5		
Term 6							
3	PHY3002	PHY496	Corrosion and Anti-Corrosion Treatment	B	5	2/0/1	no
		PHY497	Electronic Materials Technology			1/1/1	no
3	PHY3003	PHY492	Engineering Physics II	B	5	0/0/3	PHY498
		PHY499	Technical Physics II			0/0/3	PHY493
		PHY500	Basics of Space Technology			2/0/1	no
		PHY501	Defects in The Crystal Structure of Materials			1/1/1	no
Total:					10		
Term 7							
4	PHY4001	PHY506	Alternative technologies	M	5	1/1/1	no
		PHY507	Basics of technological processes for the production of materials			1/1/1	no
4	PHY4002	PHY508	Nuclear and Elementary Particle Physics	B	5	2/0/1	PHY471
		PHY509	Physical Fundamentals of Microelectronics			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
4	PHY4003	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
		PHY516	Reactor Materials Science			2/0/1	PHY508
4	PHY4004	PHY517	Physics and technology of particle accelerators	M	5	2/0/1	no
		PHY518	Physical Kinetics			1/1/1	no
		PHY519	Vacuum Engineering and Technology			1/1/1	no
		PHY520	Physical and Chemical Bases of Coating			1/1/1	no
4	PHY4005	PHY521	Surface Engineering	M	5	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
		PHY524	Micro and Nanosystems Design			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
		PHY527	Research Methods of Powder and Composite Materials			1/1/1	no
4	PHY4006	PHY528	Methods for Obtaining Powder Materials	B	5	1/1/1	no
		PHY502	Methods of Structural Analysis and Quality Control			1/0/2	no
		PHY503	Methods of Surface Nanostructures Formation			2/0/1	no
4	PHY4006	PHY504	Methods for Deep Cleaning Substances	B	5	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)	6
Cycle of Basic Disciplines (B)	40
Cycle of Major Disciplines (M)	20
TOTAL:	66

Decision of the Academic Council of the School of MM. Protocol № 10 from 10.06.2021 y.

Head of the Department "MNEP"
Representative of Specialty council

Kakimov U.K.
Serikkanov A.S.