



APPROVED
Chairman of the board:
Director of KazNRTU named K.I. Satpayev
I. M.M. Begentaev
2022 r.

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/SW	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
	CBI101	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	CBI101
	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
	PHYS01	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			
	com	puls	addit	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

(Signatures)

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

KAZAKH NATIONAL RESEARCH TECHNICAL UNIVERSITY named K.I. SATPAYEV



Educational programs 6B07109 - "Engineering Physics and Materials Science", 6B07207 - "Engineering Physics and Materials Science"
 Groups of educational programs B061 - "Materials Science and Technology", B062 - "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 elective 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
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
4	PHY4004	PHY516	Reactor Materials Science	M	5	2/0/1	PHY508
		PHY517	Physics and technology of particle accelerators			2/0/1	no
		PHY518	Physical Kinetics			1/1/1	no
		PHY519	Vacuum Engineering and Technology			1/1/1	no
4	PHY4005	PHY520	Physical and Chemical Bases of Coating	M	5	1/1/1	no
		PHY521	Surface Engineering			1/1/1	no
		PHY522	Methods for measuring the properties of electronic materials			1/1/1	no
		PHY523	Micro and Nanosystems Design			1/1/1	no
4	PHY4006	PHY524	Electron microscopy and radiography	M	5	1/1/1	no
		PHY525	Methods for Measuring the Parameters of Electronics			1/1/1	no
		PHY526	Research Methods of Powder and Composite Materials			1/1/1	no
		PHY527	Methods for Obtaining Powder Materials			1/1/1	no
4	PHY4006	PHY502	Methods of Structural Analysis and Quality Control	B	5	1/1/1	no
		PHY503	Methods of Surface Nanostructures Formation			1/0/2	no
		PHY504	Methods for Deep Cleaning Substances			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 "MNnEP"
 Representative of Speciality council

Kakimov U.K.
 Serikkanov A.S.