



**CURRICULUM**  
of Educational Program on enrollment for 2023-2024 academic year

Educational program 6B07109 - "Engineering Physics and Materials Science"  
Group of educational programs B061 - "Materials Science and Technology"

Discipline code	Name of disciplines	Cycle	Total amount in credits	Total hours	classroom volume of lek/lab/p	SIS (including TSIS) in hours	Form of control	Allocation of face-to-face training based on courses and semesters							
								I course		II course		III course		IV course	
								1 semester	2 semester	3 semester	4 semester	5 semester	6 semester	7 semester	8 semester
<b>CYCLE OF GENERAL EDUCATION DISCIPLINES (GED)</b>															
<b>M-1. Module of language training</b>															
LNG 108	English language	GED, RC	10	300	0/0/6	210	E	5	5						
LNG 104	Kazakh (Russian) language	GED, RC	10	300	0/0/6	210	E	5	5						
<b>M-2. Module of physical training</b>															
KFK 101-104	Physical Culture	GED, RC	8	240	0/0/8	120	Difercit	2	2	2	2				
<b>M-3. Module of information technology</b>															
CSE 677	Information and communication technologies (in English)	GED, RC	5	150	2/1/0	105	E				5				
<b>M-4. Module of socio-cultural development</b>															
HUM 137	History of Kazakhstan	GED, RC	5	150	1/0/2	105	SE		5						
HUM 132	Philosophy	GED, RC	5	150	1/0/2	105	E				5				
HUM 120	Socio-political knowledge module (sociology, politology)	GED, RC	3	90	1/0/1	60	E				3				
HUM 134	Socio-political knowledge module (culturology, psychology)		5	150	2/0/1	150	E			5					
<b>M-5. Module of anti-corruption culture, ecology and life safety base</b>															
HUM 136	Fundamentals of anti-corruption culture	GED, CCH	5	150	2/0/1	150	E								
MNG 489	Fundamentals of economics and entrepreneurship														
HPP128	Scientific research methods														
CHE 656	Ecology and life safety														
<b>CYCLE OF BASIC DISCIPLINES (BD)</b>															
<b>M-6. Module of physical and mathematical training</b>															
MAT 101	Mathematics I	BD, UC	5	150	1/0/2	105	E	5							
PHY 468	Physics	BD, UC	5	150	1/1/1	105	E	5							
MAT 102	Mathematics II	BD, UC	5	150	1/0/2	105	E		5						
<b>M-7. Basic general technical training module</b>															
CHE127	Physical chemistry	BD, UC	5	150	1/1/1*	105	E			5					
<b>M - 8. Materials Science Module</b>															
PHY533	Fundamentals of materials science	BD, UC	4	120	2/1/0*	75	E	4							
PHY501	Defects in the Crystal Structure of Materials	BD, UC	5	150	1/1/1*	105	E	5							
PHY581	Non-ferrous metals and alloys	BD, UC	5	150	2/1/0*	105	E		5						
PHY537	Physics of metals. Physical properties of materials	BD, UC	5	150	2/1/0*	105	E				5				
PHY559	Methods for studying the structure of material properties	PD, UC	5	150	2/1/0*	105	E				5				
PHY561	Mechanical properties of materials	BD, UC	6	180	2/1/1*	120	E			6					
PHY588	Polymeric materials and composites based on them	BD, CCH	5	150	2/0/1/	105	E			5					
PHY589	Microstructure of Organic Materials				1/1/1/										
PHY582	Alloy steels and alloys. Cast iron	BD, UC	5	150	2/1/0*	105	E				5				
PHY590	Corrosion and protection of metal structures	BD, CCH	5	150	2/0/1/	105	E			5					
PHY591	Perspective glasses and glass materials				1/1/1/										
PHY538	Metallography	BD, UC	5	150	2/1/0*	105	E				5				
PHY583	Carbon materials	BD, UC	5	150	1/0/2*	105	E				5				
PHY592	Structural materials	BD, CCH	5	150	2/0/1/	105	E				5				
PHY593	Paints and varnishes materials				1/1/1/										
PHY495	Physics of Strength and Plasticity				1/1/1/										
PHY584	Chemical-thermal treatment of metals and alloys	PD, UC	5	150	1/1/1*	105	E						5		
PHY541	Functional materials	PD, UC	5	150	2/1/0*	105	E						5		
PHY542	Non Metallic Materials and Technologies	PD, UC	6	180	2/1/1*	120	E						6		
PHY526	Methods for studying powder and composite materials	PD, CCH	5	150	1/1/1/	105	E						5		
PHY527	Methods for producing powder materials				1/1/1/										



PHY557	Scientific basis for material selection	PD, CCH	5	150	1/1/1/	105	E													5		
PHY558	Methods for calculating phase diagrams				1/1/1/																	
<b>M - 9. Module of engineering physics</b>																						
PHY539	Crystal physics	BD, UC	4	120	2/1/0*	75	E												4			
PHY534	Fundamentals of electricity and magnetism	BD, UC	5	150	2/1/0*	105	E													5		
PHY552	Dielectric materials	BD, CCH	6	180	2/1/1/	120	E													6		
PHY553	Reactor Materials Science				2/1/1/																	
PHY554	Physics of Low-Dimensional Systems				2/1/1/																	
PHY543	Semiconductor materials	PD, UC	4	120	2/1/0*	75	E													4		
PHY548	Physicochemical principles of coating	PD, CCH	4	120	2/0/1/	75	E													4		
PHY549	Vacuum Technology				2/0/1/																	
PHY550	Fundamentals of laser ablation				1/1/1/																	
PHY555	Probing methods on materials research	PD, CCH	6	180	2/1/1/	120	E													6		
PHY556	Solid oxide fuel cells				2/1/1/																	
<b>M - 10. Nanotechnology module</b>																						
PHY586	Introduction to nanomaterials	BD, UC	5	150	1/1/1*	105	E													5		
PHY502	Methods of structural analysis and Quality control methods	BD, UC	5	150	1/1/1/	105	E													5		
PHY503	Methods of obtaining and research of nanostructured materials				1/0/2/																	
PHY505	Methods of obtaining and research of nanostructured materials				2/0/1/																	
PHY546	Low-temperature synthesis of graphene	BD, CCH	5	150	2/0/1/	105	E													5		
PHY511	Computer Modeling in Materials Science (thermocalc)				1/1/1/																	
PHY507	Fundamentals of Technology Processes of Manufacturing Materials	PD, CCH	5	150	1/1/1/	105	E													5		
PHY547	Nanoelectronics. Graphene electronics	PD, CCH	5	150	2/0/1/	105	E													5		
PHY431	Advanced materials				1/1/1/																	
PHY480	Technologies of obtaining nanomaterials and nanosystems				1/1/1/																	
PHY587	Nanomaterials and nanotechnologies in construction	PD, UC	5	150	2/0/1*	105	E															
<b>M - 11. R&amp;D module</b>																						
PHY559	Methods for studying the structure of material properties	PD, CCH	5	150	1/1/1/	105	E													5		
PHY560	X-ray diffraction and electron microscopic analysis				1/1/1/																	
<b>M - 12. Practice-oriented module</b>																						
AAP179	Training Practice	BD, UC	2																	2		
AAP143	Production practice I	PD, UC	2																	2		
PET506	Production practice II	PD, UC	3																	3		
<b>M - 13. Module of final attestation</b>																						
ECA108	Final attestation	FA	8																		8	
<b>M - 14. Module of additional types of training</b>																						
AAP500	Military affairs	ATT	0																			
<b>Total based on UNIVERSITY:</b>																						
										31	29	28	32	29	31	33	27					
										60	60	60	60	60	60	60	60					

Number of credits for the entire period of study					
Cycle code	Cycles of disciplines	Credits			Total
		required component (RC)	university component (UC)	component of choice (CCH)	
GED	Cycle of general education disciplines	51		5	56
BD	Cycle of basic disciplines		76	31	176
PD	Cycle of profile disciplines		34	35	
<b>Total for theoretical training:</b>		<b>51</b>	<b>110</b>	<b>71</b>	<b>232</b>
FA	Final attestation	8			8
<b>TOTAL:</b>					<b>240</b>

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 5 "24" 11 2022 y.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 3 "17" 11 2022 y.

Decision of the Academic Council of the Institute M&M. Protocol № 2 "17" 10 2022 y.

Vice-Rector for Academic Affairs

Zhautikov B.A.

Director of M&M Institute

Rysbekov K.B.

Head of the MN&EP Department

Kudaibergenov K.K.

Specialty Council representative from

Serikkanov A.S.