



M - 9. Module of engineering physics																
PHY539	Crystal physics	BD, UC	4	120	2/1/0*	75	E				4					
PHY540	Fundamentals of condensed matter physics	BD, UC	5	150	2/1/0*	105	E				5					
4001	Elective	BD, CCH	6	180	2/1/1*	120	E					6				
PHY543	Physics of semiconductor materials	PD, UC	4	120	2/1/0*	75	E				4					
3005	Elective	ПД, KB	4	120	2/1/0*	75	E				4					
4002	Elective	ПД, KB	6	180	2/1/1*	120	E					6				
M - 10. Nanotechnology module																
3002	Elective	BD, UC	5	150	2/1/0*	105	E				5					
3003	Elective	BD, CCH	5	150	2/1/0*	105	E				5					
3004	Elective	PD, CCH	5	150	2/1/0*	105	E				5					
4004	Elective	PD, CCH	5	150	2/1/0*	105	E					5				
M - 11. R&D module																
4006	Elective	PD, CCH	5	150	2/1/0*	105	E					5				
M - 12. Practice-oriented module																
AAP179	Training Practice	BD, UC	2							2						
AAP143	Production practice I	PD, UC	2								2					
PET506	Production practice II	PD, UC	3									3				
M - 13. Module of final attestation																
ECA103	Final attestation	FA	12									12				
M - 14. Module of additional types of training																
AAP500	Military affairs	ATT	0													
Total based on UNIVERSITY:									31	29	28	32	29	31	33	27
									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		81	31	112
PD	Cycle of profile disciplines		25	35	60
	<b>Total for theoretical training:</b>	<b>51</b>	<b>106</b>	<b>71</b>	<b>228</b>
FA	Final attestation	12			12
	<b>TOTAL:</b>	<b>63</b>	<b>106</b>	<b>71</b>	<b>240</b>

Decision of the Academic Council of Kazntu named after K.Satpayev. Protocol № 13 от "28" 04 2022y.

Decision of the Educational and Methodological Council of Kazntu named after K.Satpayev. Protocol № 7 от "26" 04 2022y.

Decision of the Academic Council of the Institute M&M. Protocol № 5 от "20" 12 2021y.

Vice-Rector for Academic Affairs

Director of M&M Institute

Head of the MN&EP Department

Specialty Council representative from employers

Zhautikov B.A.

Rysbekov K.B.

Kakimov U.K.

Serikkanov A.S.



**ELECTIVE DISCIPLINES of the educational program for recruitment for the 2022-2023 academic year**  
**Educational programs: 6B07109 - "Engineering Physics and Materials Science"**  
**Groups of educational programs: B061 - "Materials Science and Technology"**

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	Term	Cycle	Total value in credits	Total hours	Classroom volume lec/lab/pr/ISW	SIS (including TSIS) in hours
<b>M - 8. Materials Science Module</b>									
2	2001	PHY544	Application by chemical methods and study of the properties of the obtained thin films	3	B	5	150	2/0/1/	105
		PHY495	Physics of Strength and Plasticity					1/1/1/	
	2002	PHY496	Corrosion and anti-corrosion treatment	4	B	5	150	2/0/1/	105
		PHY497	Technologies of materials in electronic equipment					1/1/1/	
3	3001	PHY545	Fundamentals of space materials	5	B	5	150	2/0/1/	105
		PHY501	Defects in the Crystal Structure of Materials					1/1/1/	
4	4003	PHY526	Methods for studying powder and composite materials	7	P	5	150	1/1/1/	105
		PHY527	Methods for producing powder materials					1/1/1/	
	4005	PHY557	Scientific basis for material selection	8	P	5	150	1/1/1/	105
		PHY558	Methods for calculating phase diagrams					1/1/1/	
<b>M - 9. Module of engineering physics</b>									
3	3005	PHY548	Physicochemical principles of coating	6	P	4	120	2/0/1/	75
		PHY549	Vacuum Technology					2/0/1/	
		PHY550	Fundamentals of laser ablation					1/1/1/	
4	4001	PHY551	Nuclear Technologies	7	B	6	180	2/1/1/	120
		PHY552	Dielectric materials					2/1/1/	
		PHY553	Reactor Materials Science					2/1/1/	
		PHY554	Physics of Low-Dimensional Systems					2/1/1/	
	4002	PHY555	Probing methods on materials research	7	P	6	180	2/1/1/	120
PHY556	Solid oxide fuel cells	2/1/1/							
<b>M - 10. Nanotechnology module</b>									
3	3002	PHY502	Methods of structural analysis and Quality control methods	6	B	5	150	1/1/1/	105
		PHY503	Methods of obtaining and research of nanostructured materials					1/0/2/	
		PHY505	Methods of obtaining and research of nanostructured materials					2/0/1/	
	3003	PHY546	Low-temperature synthesis of graphene	6	P	5	150	2/0/1/	105
		PHY511	Computer Modeling in Materials Science (thermocalc)					1/1/1/	
	3004	PHY507	Fundamentals of Technology Processes of Manufacturing Materials	6	P	5	150	1/1/1/	105
PHY547		Nanoelectronics. Graphene electronics	2/0/1/						
4	4004	PHY431	Advanced materials	8	P	5	150	1/1/1/	105
		PHY480	Technologies of obtaining nanomaterials and nanosystems					1/1/1/	
<b>M - 11. R&amp;D module</b>									
4	4006	PHY559	Methods for studying the structure of material properties	8	P	5	150	1/1/1/	105
		PHY560	X-ray diffraction and electron microscopic analysis					1/1/1/	

Disciplines Cycles	Credits
Cycle of Basic Disciplines (B)	31
Cycle of profile disciplines (P)	35
<b>TOTAL:</b>	<b>66</b>

Decision of the Academic Council of the Institute M&M. Protocol № 5 от "20" 12 2021 y.

Head of the MN&EP Department  
 Specialty Council representative from employers

Kakimov U.K.  
 Serikkanov A.S.