

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE
NATIONAL TECHNICAL UNIVERSITY "KHARKIV POLYTECHNIC INSTITUTE"



APPROVED BY

Rector of NTU "KPI"

[Signature]

"02" 06 2023

CURRICULUM

educational and professional program

Applied mechanics

in the field of

second (master`s) level
(higher education level)

knowledge

13 Mechanical engineering
(Knowledge field code and title)

Year of SOU

by specialty

- 131

Applied mechanics

Qualification

master's degree in applied mechanics

Period of study

1 year 4 months

on the

basis of bachelor's degree

Form of study

full-time

I. Schedule of Education Process

Course	September				October				November					December					January					February					March					April					May					June				July				August			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52			
1																																																							
2	P	P	P	P	P	P	P	P	Q	Q	Q	Q	Q	Q	D	D																																							

Legend: Theoretical study E Exam Session P Practice Q Preparation of qualification work T Test week V Vacation D Defending of qualification work

II. Consolidated budget time (in weeks)

Course	Theoretical study	Exam Session	Practice	Attestation	Preparation of qualification project (work)	Vacation	Total
1	32	8				12	52
2			8	2	6		16
total	32	8	8	2	6	12	68

III. Practice

Type of practice	Duration (in weeks)	Semester
Prediploma	8	3

IV. Attestation

Measures	Number of ECTS credits	Semester
Preparation of qualification work	11,0	3
Defending of qualification work	4,0	3
Proficiency examination		

V. EDUCATION PROCESS PLAN

Code in accordance with the EPP	Name of academic discipline	Semester distribution			Number of ECTS credits	Number of hours						Distribution of classroom hours per a week and ECTS credits per a semester						Department			
		Exams	Tests	Individual tasks		Total amount	Classroom			Independent work	1 course		2 course		Classroom hours	ECTS credits	Classroom hours		ECTS credits	Classroom hours	ECTS credits
							Total	including			Semesters		Semester								
		Lectures	Laboratory works	Practical studies		1		2	3	Number of weeks in the semester											
							20			20	16										
		1	2	3		4	5	6	7	8	9	10	11	12	13	14	15		16	17	18
1	Obligatory educational components				28,0	840,0	320,0	176,0	32,0	112,0	520,0	12,0	17,0	8,0	11,0						
1.1	General training				9,0	270,0	96,0	32,0		64,0	174,0	6,0	9,0								
GT 1	Intellectual Property		1	R	3,0	90,0	32,0	16,0		16,0	58,0	2,0	3,0					202			
GT 2	Innovative Entrepreneurship and Management of Startup Projects		1	R	3,0	90,0	32,0	16,0		16,0	58,0	2,0	3,0					202			
GT 3	Foreign Language for Professional Purposes		1	R	3,0	90,0	32,0			32,0	58,0	2,0	3,0					275			
1.2	Professional training				19,0	570,0	224,0	144,0	32,0	48,0	346,0	6,0	8,0	8,0	11,0						
PT 1	Modern technologies in applied mechanics	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					140			
PT 2	Work processes of modern productions	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					140			
PT 3	Modeling and design of processes, products, equipment	2		RG	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			140			
PT 4	Certification and metrological quality assurance	2		R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			140			
PT 5	Basics of the scientific research	2		R	3,0	90,0	32,0	16,0		16,0	58,0			2,0	3,0			140			
2	Practical training				15,0	450,0					450,0						15,0				
PP 1	Pre-graduation practice*		3		15,0	450,0					450,0						15,0	140			
3	Attestation*	3			15,0	450,0					450,0						15,0	140			
4	Optional educational component				32,0	960,0	400,0	176,0	64,0	64,0	560,0	13,0	16,0	12,0	16,0						
4.1	Profile training				24,0	720,0	304,0	176,0	64,0	64,0	416,0	10,0	12,0	9,0	12,0						
4.1.1	Profiled discipline package 01 "Integrated engineering technologies"				24,0	720,0	304,0	176,0	64,0	64,0	416,0	10,0	12,0	9,0	12,0						
OP 1.1	High technologies in mechanical engineering	1		KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					147			
OP 1.2	System analysis, structural and parametric optimization		1	R	6,0	180,0	80,0	48,0	32,0		100,0	5,0	6,0					147			
OP 1.3	Additive technologies of materialization of industrial products	2		KR	6,0	180,0	64,0	32,0		32,0	116,0			4,0	6,0			147			
OP 1.4	Laser and combined technologies		2	R	6,0	180,0	80,0	48,0	16,0	16,0	100,0			5,0	6,0			147			
4.1.2	Profiled discipline package 02 "Tool production"				24,0	720,0	304,0	176,0	112,0	16,0	416,0	10,0	12,0	9,0	12,0						
OP 2.1	Theory of 3D modeling	1		KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					147			
OP 2.2	Theory of designing tools and CAD systems		1	R	6,0	180,0	80,0	48,0	32,0		100,0	5,0	6,0					147			
OP 2.3	Special technologies of tool production	2		KR	6,0	180,0	64,0	32,0	32,0		116,0			4,0	6,0			147			
OP 2.4	Design of tool shops and divisions		2	R	6,0	180,0	80,0	48,0	32,0		100,0			5,0	6,0			147			
4.1.3	Profiled discipline package 03 "Technology of automated production"				24,0	720,0	304,0	192,0	64,0	48,0	416,0	10,0	12,0	9,0	12,0						
OP 3.1	CALS technologies in mechanical engineering	1		R	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					146			

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	29	
OP 3.2	Machine tools		1	KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					146	MIT-M223.e
OP 3.3	Automated programming systems for CNC machines		2	KR	5,0	150,0	64,0	32,0	16,0	16,0	86,0			4,0	5,0			146	MIT-M223.e
OP 3.4	Precision equipment of automated production	2		R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			146	MIT-M223.e
OP 3.5	Automation of assembly production		2	RE	3,0	90,0	32,0	32,0			58,0			2,0	3,0			146	MIT-M223.e
4.1.4	Profiled discipline package 04 "Metal cutting machines and systems"				24,0	720,0	304,0	192,0	48,0	64,0	416,0	10,0	12,0	9,0	12,0				
OP 4.1	Dynamics and computer modeling of metal cutting equipment	1		R	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					146	MIT-M223.e
OP 4.2	Diagnostics and operation of technological equipment		1	KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					146	MIT-M223.e
OP 4.3	Automated programming systems for CNC machines		2	KR	5,0	150,0	64,0	32,0	16,0	16,0	86,0			4,0	5,0			146	MIT-M223.e
OP 4.4	Reliability and environmental friendliness of machine tool systems	2		R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			146	MIT-M223.e
OP 4.5	Mechatronics and components of technological equipment		2	RE	3,0	90,0	32,0	32,0			58,0			2,0	3,0			146	MIT-M223.e
4.1.5	Profiled discipline package 05 "Engineering of logistics systems"				24,0	720,0	304,0	128,0	96,0		416,0	10,0	12,0	4,0	5,0				
OP 5.1	Monitoring and diagnostics of cargo handling equipment	1		RG	6,0	180,0	80,0	48,0	32,0		100,0	5,0	6,0					149	MIT-M223.e
OP 5.2	Technical and technological equipment of logistics systems		1	KR	6,0	180,0	80,0	48,0	32,0		100,0	5,0	6,0					149	MIT-M223.e
OP 5.3	Visualization and 3D modeling in automated transport and storage complexes		2	KR	5,0	150,0	64,0	32,0	32,0		86,0			4,0	5,0			149	MIT-M223.e
OP 5.4	Modeling and optimization of systems	2		RG	4,0	120,0	48,0	32,0	16		72,0			3	4,0			149	MIT-M223.e
OP 5.5	Administration of logistics systems		2	RE	3,0	90,0	32,0	32,0			58,0			2,0	3,0			149	MIT-M223.e
4.1.6	Profiled discipline package 06 "Smart hydro-pneumatic systems"				24,0	720,0	304,0	128,0	64,0	64,0	416,0	10,0	12,0	9,0	12,0				
OP 6.1	Methods of controlling power circuits of hydropneumatic systems		1	R	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					148	MIT-M223.e
OP 6.2	Fluid and gas mechanics	1		RG	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					148	MIT-M223.e
OP 6.3	Design of hydraulic and pneumatic power circuits of hydropneumatic systems	2		KR	6,0	180,0	64,0	32,0	32,0		116,0			4,0	6,0			148	MIT-M223.e
OP 6.4	The application of engineering software complexes to the modeling of physical processes in hydropneumatic systems		2	RG	6,0	180,0	80,0	32	16	32,0	100,0			5,0	6,0			148	MIT-M223.e
4.1.7	Profiled discipline package 07 "Standardization, certification and product quality management"				24,0	720,0	304,0				416,0	10,0	12,0	9,0	12,0				
OP 7.1	Quality management systems	1		KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					147	MIT-M223.e
OP 7.2	Standardization of products and services		1	R	6,0	180,0	80,0	48,0	32,0		100,0	5,0	6,0					147	MIT-M223.e
OP 7.3	Audit of quality systems	2		KR	6,0	180,0	64,0	32,0	32,0		116,0			4,0	6,0			147	MIT-M223.e
OP 7.4	Qualimetry, quality management and product competitiveness		2	R	6,0	180,0	80,0	48,0	32,0		100,0			5,0	6,0			147	MIT-M223.e
4.1.8	Profiled discipline package 08 "Computer modeling and integrated technologies of pressure processing"				24,0	720,0	304,0	224,0	16,0	64,0	416,0	10,0	12,0	9,0	12,0				
OP 8.1	Methods of computational mathematics in pressure processing	1		R	6,0	180,0	80,0	64,0		16,0	100,0	5,0	6,0					141	MIT-M223.e
OP 8.2	Theory of processes in pressure treatment		1	KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					141	MIT-M223.e
OP 8.3	Modern methods of scientific research in pressure treatment		2	KR	5,0	150,0	64,0	48,0		16,0	86,0			4,0	5,0			141	MIT-M223.e
OP 8.4	Additive technologies and production	2		R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			141	MIT-M223.e
OP 8.5	Designing workshops and districts		2	RE	3,0	90,0	32,0	32,0			58,0			2,0	3,0			141	MIT-M223.e
4.1.9	Profiled discipline package 09 "Computerized foundry production, artistic and jewelry casting"				24,0	720,0	304,0	128,0	48,0	48,0	416,0	10,0	12,0	9,0	12,0				

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	29	
OP 9.1	Resource-saving technologies and melting of alloys with special properties	1		R	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					142	MIT-M223.e
OP 9.2	Automation of foundry production		1	KR	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					142	MIT-M223.e
OP 9.3	Technology of artistic and jewelry casting		2	KR	5,0	150,0	64,0	32,0	16,0	16,0	86,0			4,0	5,0			142	MIT-M223.e
OP 9.4	Additive technologies in foundry production	2		R	4,0	120,0	48,0	32	16		72,0			3,0	4,0			142	MIT-M223.e
OP 9.5	Alloys for artistic and jewelry molding		2	RE	3,0	90,0	32,0	32			58,0			2,0	3,0			142	MIT-M223.e
4.1.10	Profiled discipline package 10 "Digital hydraulics, hydraulic machines and hydropneumatic drives"				24,0	720,0	304,0	208,0	48,0	48,0	416,0	10,0	12,0	9,0	12,0				MIT-M223.e
OP 10.1	Dynamics of hydropneumatic systems	1		CP	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					150	MIT-M223.e
OP 10.2	CAD of hydropneumatic drives		1	RG	6,0	180,0	80,0	48,0	16,0	16,0	100,0	5,0	6,0					150	MIT-M223.e
OP 10.3	Proportional hydraulics		2	RG	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			150	MIT-M223.e
OP 10.4	Design and calculation of volumetric hydraulic machines and hydropneumatic systems	2		KR	5,0	150,0	64,0	48,0		16,0	86,0			4,0	5,0			150	MIT-M223.e
OP 10.5	Operation of hydropneumatic drives of technological equipment		2	R	3,0	90,0	32,0	32,0			58,0			2,0	3,0			150	MIT-M223.e
4.1.11	Profiled discipline package 11 "Welding and related processes and technologies"				24,0	720,0	304,0	176,0	48,0		416,0	10,0	12,0	4,0	5,0				MIT-M223.e
OP 11.1	Experimental methods in welding	1		RE	6,0	180,0	80,0	64,0	16,0		100,0	5,0	6,0					145	MIT-M223.e
OP 11.2	Ability to weld structural materials		1	KR	6,0	180,0	80,0	64,0	16,0		100,0	5,0	6,0					145	MIT-M223.e
OP 11.3	Modernization of welding shops		2	KR	5,0	150,0	64,0	48,0	16,0		86,0			4,0	5,0			145	MIT-M223.e
OP 11.4	Welding of special steels and non-ferrous alloys	2		RE	4,0	120,0	48,0	48			72,0			3	4,0			145	MIT-M223.e
OP 11.5	Surface engineering		2	RE	3,0	90,0	32,0	32			58,0			2,0	3,0			145	MIT-M223.e
4.1.12	Profiled discipline package 12 "Computer modeling of technical systems"				24,0	720,0	304,0	192,0		112,0	416,0	10,0	12,0	9,0	12,0				MIT-M223.e
OP 12.1	Modern methods of mathematical and computer modeling	1		R	6,0	180,0	80,0	48,0		32,0	100,0	5,0	6,0					151	MIT-M223.e
OP 12.2	Computerized design of complex mechanical objects and systems		1	R	6,0	180,0	80,0	48,0		32,0	100,0	5,0	6,0					151	MIT-M223.e
OP 12.3	Computer systems for the justification of project decisions		2	R	5,0	150,0	64,0	32,0		32,0	86,0			4,0	5,0			151	MIT-M223.e
OP 12.4	Research of connected physical and mechanical processes in modern CAD	2		KR	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			151	MIT-M223.e
OP 12.5	Mathematical modeling in modern CAD		2	R	3,0	90,0	32,0	32,0			58,0			2,0	3,0			151	MIT-M223.e
4.2	Optional student disciplines of the profile preparation according to the list (the list is attached)				8,0	240,0	96,0				144,0	3	4	3	4				MIT-M223.e
Total for education period					90,0	2700,0	720,0	352,0	96,0	176,0	1980,0	25,0	33,0	20,0	27,0			30,0	
Hours per week												25,0		20,0					
Number of exams												4		4					
Number of tests												3		3		1			
Number of course projects (works)												1		1					
Numbers of disciplines per semester												7,0		5,0					

Individual tasks	
C	Calculated task
CG	Calculated and graphic task
R	Report
CP	Course project
CW	Course work

Approved by the Academic Council of NTU "KhPI"
Protocol № 5 from 02.06 2023p.

Vice-rector for scientific and pedagogical work


P signature _____ Gennadiy KHRYPUNOV

Director of the Educational and Scientific Institute of Mechanical Engineering and Transport


P signature _____ Vitaly EPIFANOV

Technologies of Mechanical Engineering


P signature _____ Olexander SHELKOVIY

Engineering Technology and Metal Cutting


P signature _____ Olexander PERMYAKOV

hydropneumatic systems"


P signature _____ Anatoly HAIDAMAKA

and Integrated Pressure Processing


P signature _____ Vitaly CHUHLIB

Guarantor of the educational and professional program - Applied Mechanics


P signature _____ Olexander SHELKOVIY

Head of the department "Theory and systems of automated design of mechanisms and machines"


P signature _____ Mykola TKACHUK

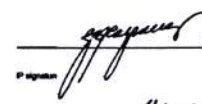
Head of the "Welding" department


P signature _____ Serhii LUZAN

Head of the Department "Hydraulic Machines"


P signature _____ Andrii ROGOVY

Head of the department "Lifting - transport


P signature _____ Valentyn KOVALENKO

Head of the department "Foundry production"


P signature _____ Oleg AKIMOV

List of optional student disciplines of the profile training

Code in accordance with the EPP	Name of academic discipline	Semester distribution			Number of ECTS credits	Number of hours						Distribution of classroom hours per a week and ECTS credits per a semester						Department			
		Exams	Tests	Individual tasks		Total amount	Classroom			Independent work	1 course		2 course		Classroom hours	ECTS credits	Classroom hours		ECTS credits	Classroom hours	ECTS credits
							Total	including			Semesters		Semester								
		Lectures	Laboratory works	Practical studies		20		20	16	1	2	3									
							Number of weeks in the semester														
		1	2	3		4	5	6	7	8	9	10	11	12	13	14	15		16	17	18
4.2	Optional student disciplines of the profile training																				
OPT 1	Diagnostics and control of technological processes	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					147			
OPT 2	Reverse engineering	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					147			
OPT 3	Integrated production systems	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					146			
OPT 4	Control systems for machines and machine complexes	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					146			
OPT 5	WMS. Management systems of warehouse complexes	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					149			
OPT 6	Design of intelligent hydropneumatic systems	1		R	4,0	120,0	48,0	32,0		16,0	72,0	3,0	4,0					148			
OPT 7	Marketing and quality monitoring	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					147			
OPT 8	Machines, automatic lines and complexes in pressure processing	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					141			
OPT 9	Finishing operations in the production of castings	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					142			
OPT 10	Mathematical modeling of the working process of hydraulic machines	1		R	4,0	120,0	48,0	32,0	16,0		72,0	3,0	4,0					150			
OPT 11	Justification and improvement of technologies for restoration of parts	1		R	4,0	120,0	48,0	48,0			72,0	3,0	4,0					145			
OPT 12	Computer modeling of dynamic systems	1		R	4,0	120,0	48,0	32,0		16,0	72,0	3,0	4,0					151			
OPT 13	Post-processes of integrated generative technologies		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			147			
OPT 14	Formation of the structure and properties of modern instrumental materials		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			147			
OPT 15	Special energy-efficient technologies		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			146			
OPT 16	Special means of processing and accounting for cargo in logistics centers		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			149			
OPT 17	Basics of calculation and design of electrohydraulic and electropneumatic converters		2	R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			148			
OPT 18	Certification of products and services		2	R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			147			
OPT 19	Systems of automated design of stamps and equipment in pressure processing		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			141			
OPT 20	Design of foundry workshops and districts		2	R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			142			
OPT 21	Modeling of fluid flow in the flow part of hydraulic machines		2	R	4,0	120,0	48,0	32,0	16,0		72,0			3,0	4,0			150			
OPT 22	Mechanization, automation and robotization of welding processes		2	R	4,0	120,0	48,0	48,0			72,0			3,0	4,0			145			
OPT 23	Computer research of mechanical systems		2	R	4,0	120,0	48,0	32,0		16,0	72,0			3,0	4,0			151			

CONTENT of CURRICULUM

for the master's training:

by specialty

131

Applied mechanics

Number in order	Discipline title	Total amount				Department code
		ECTS credits	Hours	Semesters		
				Exam	Test	
1	2	3	4	5	6	7
1	Obligatory educational components	28,0	840,0			31%
1.1	General training	9,0	270,0			10%
GT 1	Intellectual Property	3,0	90,0		1	202
GT 2	Innovative Entrepreneurship and Management of Startup Projects	3,0	90,0		1	202
GT 3	Foreign Language for Professional Purposes	3,0	90,0		1	275
1.2	Professional training	19,0	570,0			21%
PT 1	Modern technologies in applied mechanics	4,0	120,0	1		140
PT 2	Work processes of modern productions	4,0	120,0	1		140
PT 3	Modeling and design of processes, products, equipment	4,0	120,0	2		140
PT 4	Certification and metrological quality assurance	4,0	120,0	2		140
PT 5	Basics of the scientific research	3,0	90,0	2		140
2	Practical training	15,0	450,0			17%
PP 1	Pre-graduation practice*	15,0	450,0		3	140
3	Attestation*	15,0	450,0	3		17%
4	Optional educational component	32,0	960,0			36%
4.1	Profile training	24,0	720,0			27%
4.1.1	Profiled discipline package 01 "Integrated engineering technologies"	24,0	720,0			
OP 1.1	High technologies in mechanical engineering	6,0	180,0	1		147
OP 1.2	System analysis, structural and parametric optimization	6,0	180,0		1	147
OP 1.3	Additive technologies of materialization of industrial products	6,0	180,0	2		147
OP 1.4	Laser and combined technologies	6,0	180,0		2	147
4.1.2	Profiled discipline package 02 "Tool production"	24,0	720,0			
OP 2.1	Theory of 3D modeling	6,0	180,0	1		147
OP 2.2	Theory of designing tools and CAD systems	6,0	180,0		1	147
OP 2.3	Special technologies of tool production	6,0	180,0	2		147
OP 2.4	Design of tool shops and divisions	6,0	180,0		2	147
4.1.3	Profiled discipline package 03 "Technology of automated production"	24,0	720,0			
OP 3.1	CALS technologies in mechanical engineering	6,0	180,0	1		146
OP 3.2	Machine tools	6,0	180,0		1	146
OP 3.3	Automated programming systems for CNC machines	5,0	150,0		2	146
OP 3.4	Precision equipment of automated production	4,0	120,0	2		146
OP 3.5	Automation of assembly production	3,0	90,0		2	146
4.1.4	Profiled discipline package 04 "Metal cutting machines and systems"	24,0	720,0			
OP 4.1	Dynamics and computer modeling of metal cutting equipment	6,0	180,0	1		146
OP 4.2	Diagnostics and operation of technological equipment	6,0	180,0		1	146
OP 4.3	Automated programming systems for CNC machines	5,0	150,0		2	146
OP 4.4	Reliability and environmental friendliness of machine tool systems	4,0	120,0	2		146
OP 4.5	Mechatronics and components of technological equipment	3,0	90,0		2	146
4.1.5	Profiled discipline package 05 "Engineering of logistics systems"	24,0	720,0			
OP 5.1	Monitoring and diagnostics of cargo handling equipment	6,0	180,0	1		149
OP 5.2	Technical and technological equipment of logistics systems	6,0	180,0		1	149
OP 5.3	Visualization and 3D modeling in automated transport and storage complexes	5,0	150,0		2	149
OP 5.4	Modeling and optimization of systems	4,0	120,0	2		149
OP 5.5	Administration of logistics systems	3,0	90,0		2	149
4.1.6	Profiled discipline package 06 "Smart hydro-pneumatic systems"	24,0	720,0			
OP 6.1	Methods of controlling power circuits of hydropneumatic systems	6,0	180,0		1	148
OP 6.2	Fluid and gas mechanics	6,0	180,0	1		148
OP 6.3	Design of hydraulic and pneumatic power circuits of hydropneumatic systems	6,0	180,0	2		148
OP 6.4	The application of engineering software complexes to the modeling of physical processes in hydropneumatic systems	6,0	180,0		2	148
4.1.7	Profiled discipline package 07 "Standardization, certification and product quality management"	24,0	720,0			
OP 7.1	Quality management systems	6,0	180,0	1		147
OP 7.2	Standardization of products and services	6,0	180,0		1	147
OP 7.3	Audit of quality systems	6,0	180,0	2		147
OP 7.4	Qualimetry, quality management and product competitiveness	6,0	180,0		2	147
4.1.8	Profiled discipline package 08 "Computer modeling and integrated technologies of pressure processing"	24,0	720,0			
OP 8.1	Methods of computational mathematics in pressure processing	6,0	180,0	1		141
OP 8.2	Theory of processes in pressure treatment	6,0	180,0		1	141
OP 8.3	Modern methods of scientific research in pressure treatment	5,0	150,0		2	141
OP 8.4	Additive technologies and production	4,0	120,0	2		141
OP 8.5	Designing workshops and districts	3,0	90,0		2	141
4.1.9	Profiled discipline package 09 "Computerized foundry production, artistic and jewelry casting"	24,0	720,0			
OP 9.1	Resource-saving technologies and melting of alloys with special properties	6,0	180,0	1		142
OP 9.2	Automation of foundry production	6,0	180,0		1	142
OP 9.3	Technology of artistic and jewelry casting	5,0	150,0		2	142
OP 9.4	Additive technologies in foundry production	4,0	120,0	2		142
OP 9.5	Alloys for artistic and jewelry molding	3,0	90,0		2	142
OP 9.6						
OP 9.7						
OP 9.8						
OP 9.9						
OP 9.10						
4.1.10	Profiled discipline package 10 "Digital hydraulics, hydraulic machines and hydropneumatic drives"	24,0	720,0			
OP 10.1	Dynamics of hydropneumatic systems	6,0	180,0	1		150

1	2	3	4	5	6	7
OP 10.2	CAD of hydropneumatic drives	6,0	180,0		1	150
OP 10.3	Proportional hydraulics	4,0	120,0		2	150
OP 10.4	Design and calculation of volumetric hydraulic machines and hydropneumatic systems	5,0	150,0	2		150
OP 10.5	Operation of hydropneumatic drives of technological equipment	3,0	90,0		2	150
4.1.11	Profiled discipline package 11 "Welding and related processes and technologies"	24,0	720,0			
OP 11.1	Experimental methods in welding	6,0	180,0	1		145
OP 11.2	Ability to weld structural materials	6,0	180,0		1	145
OP 11.3	Modernization of welding shops	5,0	150,0		2	145
OP 11.4	Welding of special steels and non-ferrous alloys	4,0	120,0	2		145
OP 11.5	Surface engineering	3,0	90,0		2	145
4.1.12	Profiled discipline package 12 "Computer modeling of technical systems"	24,0	720,0			
OP 12.1	Modern methods of mathematical and computer modeling	6,0	180,0	1		151
OP 12.2	Computerized design of complex mechanical objects and systems	6,0	180,0		1	151
OP 12.3	Computer systems for the justification of project decisions	5,0	150,0		2	151
OP 12.4	Research of connected physical and mechanical processes in modern CAD	4,0	120,0	2		151
OP 12.5	Mathematical modeling in modern CAD	3,0	90,0		2	151
4.2	Optional student disciplines of the profile preparation according to the list (the list is attached)	8,0	240,0			9%
	Total for education period	90,0	2700,0			