

Satbayev University A. Burkitbayev Institute of Industrial Automation and Digitalization The Department "Robotics and Engineering Tools of Automation"

Working curriculum CURRICULUM PROGRAM

"Robotics and Mechatronics"

Bachelor of Engineering and Technology in the field of Robotics and Mechatronics

on the basis of the vitiated Specialty Classifier: 6D071600 - Instrumentation

1st edition in accordance with the State Educational Standard of Higher Education 2018

Almaty 2020

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The program is drawn up and signed by the parties:

from Satbayev University:

- 1. Head of the Department of Robotics and Engineering Tools of Automation (R&ETA), Ph.D. K. Ozhikenov
- 2. Director of the Institute of Industrial Automation and Digitalization, PhD
- Chairman of the Educational and Methodological Group of the Department of "R&ETA", Ph.D, Associate Professor

Zh. Ualiyev

B. Omarbekov

From the employer:

Director of LLP "MedRemZavodHolding" A. K. Dzhumagulov Deputy Director for IIT of LLP "Saiman Corporation" K. I. Baibekov

Approved at the meeting of the Educational and Methodological Council of the Satbayev University, (Protocol #3 of 19.12.2018)

Qualification:

Level 6 of the National Qualifications Framework: 6B07 Engineering (bachelor's degree): 6B071 Robotics and Mechatronics

Professional competencies: providing a wide range of theoretical and practical knowledge in the professional field; the ability to develop methodological and regulatory documents, technical documentation, as well as the implementation of measures to implement the developed projects and programs; the ability to make decisions based on the results of calculations for projects and the results of the technical-economic and functional-cost analysis of the effectiveness of the designed mechatronic systems; master the organization of work on operation, installation and adjustment of modern machines and equipment.

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1 Brief description of the program

The professional activities of the graduates of the program are directed to the field of robotics and mechatronics.

Educational program «Robotics and mechatronics» is aimed at training professional bachelors in the field of design and construction of robots, robotic and mechatronic systems for industrial and non-industrial purposes.

The direction of the specialty and specialization program covers engineering and engineering business.

Purposes of EP "Robotics and mechatronics" are:

- meeting the needs of students for intellectual, creative and professional development by obtaining knowledge and skills in the field of robotic and mechatronic systems;

- preparing graduates for continuous self-improvement and self-development, mastering new knowledge, skills and abilities in innovative areas;

- meeting the needs of the Republic of Kazakhstan qualified personnel on the basis of the diversity and dynamism of the catalog of elective disciplines of the curriculum, with a predominance of practical skills competencies able to carry out professional functions in one or more activities based on the learning outcomes, taking into account the specifics of these activities, market requirements for organizational management, the professional competences.

The objects of professional activity of graduates who have completed the undergraduate program are robotic and mechatronic systems, including information and sensory, Executive and control units, their mathematical, algorithmic and software methods and tools for design, modeling, experimental studies, debugging and exploitation, research and production testing of robotic and mechatronic systems having different applications.

Educational program "Robotics and mechatronics" contains a complete list of academic disciplines, grouped in cycles: compulsory disciplines (CD), basic (BD) and majors (MD) as mandatory components, and components for selection, indicating the complexity of each subject in academic credits and hours established by the State obligatory standards of higher and postgraduate education, approved by order of MES RK №604 dated October 31, 2018.

The disciplines of the mandatory component of the CD cycle are aimed at forming the worldview, civic and moral positions of a future specialist who is competitive on the basis of knowledge of information and communication technologies, building communication programs in the state, Russian and foreign languages, focusing on a healthy lifestyle, self-improvement and professional success. The BD cycle includes studying academic subjects and passing professional practice. The MD cycle includes academic disciplines and types of professional practices. The programs of disciplines and modules of the BD and MD cycles are interdisciplinary and multidisciplinary in nature, providing training at the junction of a number of areas of knowledge.

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Final certification is carried out in the form of writing and defending a thesis (project) or preparing and passing a comprehensive exam.

As a result of the training bachelor of EP "Robotics and mechatronics" should receive all the necessary knowledge and skills for ensuring quality implementation of functional responsibilities in their chosen specialty, and to acquire socio-humanitarian, economic, administrative, scientific and technical competencies that serve as the Foundation for providing graduate mobility on the professional labor market and readiness to continue their education in higher or further education.

The requirements for the level of training of students are determined based on the Dublin descriptors of the first level of higher education (bachelor's degree) and reflect the development of competence, expressed as outcomes of learning. Learning outcomes are formed both at the level of the entire educational program of higher education, and at the level of individual modules or academic disciplines.

The requirements for the level of training of students based on the Dublin descriptors are given in the section "Descriptors of the level and scope of knowledge, abilities, skills and competencies".

2 Requirements for applicants

Admission of persons entering the UNIVERSITY is carried out in accordance with the Rules for admission to study in educational organizations that implement educational programs of higher education (Approved by the resolution of the Government of the Republic of Kazakhstan).

For training on EP "Robotics and mechatronics" graduates of organizations of General secondary education who have passed University or complex testing and graduates of organizations of secondary special education after passing complex testing are enrolled. When submitting documents for the competition, the graduates of secondary vocational schools (colleges) can only specify a related specialty, in accordance with the approved list of the correspondence table of the Classifier of specialties of higher and postgraduate education of RK and the Classifier of professions of technical and vocational, post-secondary education of MES RK.

The formation of the student body is carried out through budget financing, placement of a state educational order for training specialists (educational grants), as well as tuition fees at the expense of citizens own funds and other sources.

J • • • • •	,,					
Code	Type of competence	Description of the compe	tence	Result of the compet	tence	Responsible
		GEN	ERAL			
	(Implies full	training with possible addition	onal de	pending on the level of kn	owledge))
G1	Communicative	- Fluent monolingual or	al,	Full 4-year training w	Kazakh and	
	ness	written and communicat	ion	minimum of 240 acad	lemic	Russian
		skills	kills credits (including 120 contact			
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Rules for credit transfer for accelerated (reduced) education on the basis of 12year secondary, technical and higher education





		 ability not to fluently communicate with a second language Ability to use communication in varion situations there are basics of acade writing in the native language 	ond ative us mic nage el of	classroom academic cr with a possible transf credits in the second lar where students have advanced level. The lar level is determined by p diagnostic test	redits) fer of nguage, e an nguage assing a	Department , English language
Depa	Mathematical	- Basic mathematical think	ing at	Complete 4-year training	g with a	Department
rtme	literacy	the communication level	l –	minimum of 240 acad	lemic	of
nt		ability to solve situation	al	credits (120 of them c	ontact	mathematics
G2		problems based on the	•	classroom academic cr	edits).	
		mathematical apparatus	of	With a positive pass of	of the	
		algebra and the principles	s of	diagnostic test, the lev	vel of	
		mathematical analysis		Mathematics 1, with a n	egative-	
		- diagnostic test for	1	the level of Algebra and	nd the	
<u> </u>	Desis literation in	mathematical literacy in alg	gebra	beginning of analy	S1S	
63	Basic literacy in	- basic understanding of	the orld	complete 4-year training	g with a	Of the Department
	disciplines	with an understanding of	the	credits (120 of them of	ontact	in areas of
	uiscipinies	essence of the basic laws	of	classroom academic cr	edits)	natural
		science	01	With a positive pass of	of the	Sciences
		- understanding basic		diagnostic test, the lev	vel of	~
		hypotheses, laws, metho	ds,	Physics 1, General che	mistry,	
		drawing conclusions an	ıd	with a negative-the leve	l of the	
		evaluating errors		Beginning of physics an	d Basic	
				basics of chemistr	у	
		SPEC	CIFIC			
(impli	es reduced training	due to retargeting credits dep	bending	g on the level of knowledg	e on com	petencies for
C 1	graduates of 12-yea	Eluant hilingual and we	1es, 1nc	Eull and it transfor by la	economic	areas)
51		- Fluent billingual oral, wr		(Kozokh and Pussie	inguage	Department of Kazakh
	ness	- ability of non-fluent	18	(Kazakii aliu Kussia	all <i>)</i>	of Kazakii and
		communication with a th	ird			Russian
		language	in a			language
		- writing skills of various s	tyles			88-
		and genres	5			
		- skills of deep understand	ling			
		and interpretation of one's	own			
		work of a certain level of	of			
		complexity (essay)				
		- basic aesthetic and theore	etical			
		literacy as a condition for	full			
		perception, interpretation original taxt	n the			
\$2	Mathematical	- Special mathematical thir	nkina	Transfer of credits	in	Department
52	literacy	using induction and deduc	tion	Mathematics (Calcul	us) I	of
	interacy	generalization and		Municipalities (Calcul		Mathematics
		concretization, analysis a	and			
		synthesis, classification a	and			
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		systematization, abstraction and analogy - ability to formulate, justify and prove propositions - application of General mathematical concepts, formulas and extended spatial perception to mathematical problems - full understanding of the basics of mathematical analysis		
\$3	Special literacy in natural science disciplines (Physics, Chemistry, Biology and Geography)	 Broad scientific perception of the world, which provides a deep understanding of natural phenomena critical perception for understanding the scientific phenomena of the surrounding world cognitive abilities to formulate a scientific understanding of the existence of matter, its interaction and manifestations in nature 	Transfer of credits in Physics I, General chemistry, General biology, Introduction to Geology, Introduction to geodesy; educational practice, etc.	Department s in the areas of natural Sciences
S4	English	 readiness for further self-study in English in various fields of knowledge readiness to gain experience in project and research work using English 	Transfer of English language credits above the academic level to the professional level (up to 15 credits)	English language Department
S5	Computer skills	- Basic programming skills in one modern language - use of software and applications for teaching in various disciplines -availability of a worldwide standard certificate of language level	ПерезачетCredit transfer in the discipline Introduction to information and communication technologies, Information and communication technologies	Software engineering Department
S6	Social and humanitarian competencies and behavior	 -understanding and awareness of the responsibility of each citizen for the development of the country and the world - Ability to discuss ethical and moral aspects in society, culture and science 	ПерезачетCredit transfer in the Modern history of Kazakhstan (except for the state exam)	Department of social disciplines
DDOI	FESSIONAL (impl	-Critical understanding and ability to polemics for debating on modern scientific hypotheses and theories	ПерезачетResetting credits in philosophy and other Humanities	knowledge
on	competencies for g	raduates of colleges, secondary scho economic area	bols, universities, including humani s)	tarian and

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	1			
P1	Professional	- critical perception and deep	Transfer of credits in basic	Graduate
	competencies	understanding of professional	professional disciplines,	Department
		competencies at level 5 or 6	including introduction to the	
		- Ability to discuss and polemize	specialty, structure and	
		on professional issues within the	construction of systems and	
		framework of the mastered	machines by industry,	
		program	maintenance of machines by	
			industry educational and training	
			and production practice	
P2	General	- basic General engineering	Credit transfer for general	Graduating
	Engineering	skills and knowledge, ability to	engineering disciplines	Department
	competencies	solve General engineering	(Engineering graphics,	
		problems and problems	descriptive geometry,	
		- to be able to use application	fundamentals of mechanics,	
		software packages for	fundamentals of hydrodynamics,	
		processing experimental data,	fundamentals of electrical	
		solving systems of algebraic and	engineering, fundamentals of	
		differential equations	microelectronics, fundamentals	
			of thermodynamics,	
			fundamentals of geology, etc.)	
P3	Computer	- basic skills of using computer	Credit transfer for the following	Graduating
	engineering	programs and soft systems to	computer graphics disciplines,	Department
	competencies	solve common engineering tasks	CAD fundamentals, CAE	
			fundamentals, etc.	
P4	Engineering and	- skills and abilities to use	Transfer of credits for academic	Graduating
	working	technical means and	disciplines of the experimental	Department
	competencies	experimental devices to solve	direction: turning and	
		common engineering problems	locksmithing, repair work,	
			welding, laboratory or analytical	
			chemistry, laboratory physics,	
2.4	~ · · ·		mineralogy, etc.	<u> </u>
P5	Socio-economic	- Critical understanding and	Transfer of credits in socio-	Graduate
	competence	cognitive ability to reason on	humanitarian and technical-	Department
		current social and economic	economic disciplines to the	
		1ssues	credit of the elective cycle	
		- Basic understanding of the		
		economic assessment of objects		
		of study and the profitability of		
	1	projects in the industry		

The University may refuse to reschedule credits if a low diagnostic level is confirmed or if the final grades were lower than A and B in the completed disciplines.

3 Requirements for completing training and obtaining a diploma

Description compulsory standard requirements for graduation and assignment of the academic degree bachelor: on the volume of the educational program of bachelor degree is 240 credits, regardless of the form of education, applied educational technologies, the implementation of bachelor programs using a network form of realization of the program of bachelor in the individual curriculum, including accelerated learning.

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Special requirements for University graduation in this program: Students who have passed the final certification, and who have confirmed the assimilation of the professional curriculum in the EP "Robotics and mechatronics", the decision of the SAC confers the academic degree "Bachelor of engineering and technology" in the educational programRobotics and mechatronics and a state-issued diploma with an Appendix is issued.

Issuance of a state-issued diploma with an Appendix is carried out on the basis of an order of the head of the University on graduation.

The diploma Supplement is filled out on the basis of a certificate of completion of the student's (student's) individual curriculum in accordance with the received grades in all disciplines in the amount provided for by the state mandatory standard of education and the working curriculum, completed course papers (projects), types of practices and the results of final certification.

In the diploma Supplement, the latest grades for each academic discipline are recorded according to the point-rating letter system of knowledge assessments, indicating its volume in credits and in the ECTS scale.

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	Ful	l-time study	Sti	ıdy du	ration : 4 y	ears		Acad	emic o	degree: bachelor of eng	gineeri	ing and	l technolog	y	-		
rear or study	Code	Name of discipline	Cycle	Credits	ec/lab/pr/SSA	Reload code	pre-requisites	Co	ode	Name of discipline	Cycle	Credits	ec/lab/pr/SSA	Reload code	pre-requisites		
		1st semest	er (autur	nn 2020	 D)					2nd seme	ster (sp	oring 20	21)				
	LNG 1051	Beginner (A1)						LNG	1052	Elementary English (A1)					LNG 1051		
	LNG 1052	Elementary English (A1)						LNG	1053	General English 1 (A2)					LNG 1052		
	LNG 1053	General English 1 (A2)		6	0/0/2/2	64	Diagno	LNG	1054	General English 2 (A2)	C	c	0/0/2/2	64	LNG 1053		
	LNG 1054	General English 2 (A2)	G	б	0/0/3/3	54	stic. Test	LNG	1055	Academic English (B1)	G	б	0/0/3/3	54	LNG 1054		
	LNG 1055	Academic English (B1)							LNG1	L056	Business English (B2)					LNG 1055	
	LNG1056	Business English (B2)						LNG	1057	Professional English (B2+)					LNG105		
	LNG1012	Kazakh (Russian) language (A1)						LNG1	1073	Academic Kazakh (Russian) language (B1)					LNG101		
	LNG1012.1	Academic kazakh (russian) language (B1)	G	4	0/0/2/2	S1	Diagno stic. Test	LNG1	1074	Business Kazakh (Advanced Russian) language (B2)	G	6	0/0/3/3	S1	LNG101		
	LNG1012.2	Business kazakh (russian) language (B2)								1101		ELECTIVE					LNG107
	MAT110	Algebra and beginning of mathematical analysis	В	6	1/0/2/3	S2	Diagno stic. Test	MAT	101	Mathematics I	В	6	1/0/2/3	not	not		
	MAT101	Mathematics I						MAT	102	Mathematics II					MAT101		
	PHY400	Beginnings of physics			1		Diagno	PHY1	.11	Physics I					not		
	PHY111	Physics I	В	6	1/1/1/3	S3	stic. Test	PHY1	.12	Physics II	В	6	1/1/1/3	not	PHY111		

4 Working curriculum of the educational program

EDUCATIONAL PROGRAM for 2020-2021 academic year enrolment Group of educational programs B63 - Electrical engineering and automation, Educational program 6B07113 - Robotics and Mechatronics





	ROB107	Introduction to the	в	6	2/0/1/3	not	not
	HUM113	Modern history of Kazakhstan	G	6	1/0/2/3	S6	not
	KFK101	Physical training I	G	4	0/0/2/2	not	not
		Total:		38	38		
		3rd semeste	er (autu	mn 202	1)		
	LNG 1053	General English 1 (A2)					LNG 1052
	LNG 1054	General English 2 (A2)					LNG 1053
	LNG 1055	Academic English (B1)	G	6	0/0/3/3	not	LNG 1054
	LNG1056	Business English (B2)					LNG 1055
	LNG 1057	Professional English (B2+)					LNG10 56
2	MAT102	Mathematics II	в	6	1/0/2/3	not	MAT1 01
-	MAT103	Mathematics III	5	Ū	1/0/2/3	not	MAT1 02
	CSE174	Information and communication technology (eng)	G	6	2/1/0/3	S5	not
	ROB198	Basics of Electromechanics	В	6	2/1/0/3	P1-3	PHY11 1
	PHY112	Physics II	В	6	1/1/1/3	not	PHY11 1
	2201	ELECTIVE					not
	HUM126	Social & Political Knowledge	G	8	4/0/0/4	S6	not
		Total:		38	38		
		5th semeste	er (autu	mn 202	2)		
	MAT126	5th semeste Ordinary differential	er (autui	mn 202	2)	P1-3	MAT1
	MAT126 MAT127	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab	er (autur B	mn 202	2) 1/0/2/3	P1-3 P1-3	MAT1 03 MAT1 26
	MAT126 MAT127 ROB173	5th semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators	er (autur B B	6 6	2) 1/0/2/3 2/1/0/3	P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8
	MAT126 MAT127 ROB173 3203	5th semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE	B B B B	6 6 6	2) 1/0/2/3 2/1/0/3	P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8
3	MAT126 MAT127 ROB173 3203 ROB110	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design	B B B B	6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3	P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB40 156
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies	r (autur B B B B B S	6 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation	r (autuu B B B B S S	6 6 6 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03 MAT1 03
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total:	r (autur B B B B S S	6 6 6 6 6 6 6 6 6 36	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03 MAT1 03
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total:	r (autu B B B B S S ter (aut	mn 202 6 6 6 6 6 6 36 umn 20	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23)	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03 MAT1 03
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158 ROB158 ROB144	Sth semester Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemes	r (autu B B B B S S ter (aut	6 6 6 6 6 6 36 4 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03 MAT1 03 ROB19 °
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158 ROB158 A0B144 4303	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemes Mashine learning and neural networks	r (autur B B B B S S ter (aut S S	6 6 6 6 6 6 36 9 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 ROB 156 MAT1 03 MAT1 03 ROB19 8
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158 ROB158 ROB144 4303 4304	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemes Mashine learning and neural networks ELECTIVE	r (autu B B B B S S ter (aut S S S	6 6 6 6 6 6 36 6 0 0 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 T56 MAT1 03 MAT1 03 ROB19 8
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB187 ROB158 ROB158 ROB144 4303 4304 4305	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemes Mashine learning and neural networks ELECTIVE	r (autu B B B B S S S ter (aut S S S S	6 6 6 6 6 6 36 4 6 6 6 6 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 156 MAT1 03 MAT1 03 ROB19 8
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB187 ROB158 ROB158 ROB144 4303 4304 4305	Sth semester Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemes Mashine learning and neural networks ELECTIVE ELECTIVE ELECTIVE ELECTIVE	r (autu B B B B S S S S S S S	6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 T56 MAT1 03 MAT1 03 ROB19 8 2 ROB19 8
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158 ROB158 ROB144 4303 4304 4305 4306	Sth semester Ordinary differential equations. Matlab Partial differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemess Mashine learning and neural networks ELECTIVE ELECTIVE ELECTIVE ELECTIVE	r (autu B B B B S S S S S S S S S S	6 6 6 6 6 6 6 36 9 6 6 6 6 6 6 6 6	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3 	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 T56 MAT1 03 MAT1 03 ROB19 8 8
3	MAT126 MAT127 ROB173 3203 ROB110 ROB187 ROB158 ROB158 ROB158 4304 4305 4306 ECA001	Sth semeste Ordinary differential equations. Matlab Partial differential equations. Matlab Mechanic manipulators ELECTIVE Integral and microprocessor circuit design Fundamentals of information and measuring technologies Basics of automation Total: 7th threemess Mashine learning and neural networks ELECTIVE ELECTIVE ELECTIVE Graduate thesis (project) preparation	r (autu B B B B S S S S S S S S S FA	mn 202 6 6 6 6 6 6 6 6 6 6 6 6 6 6 4	2) 1/0/2/3 2/1/0/3 2/1/0/3 2/1/0/3 36 23) 2/1/0/3 	P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3 P1-3	MAT1 03 MAT1 26 ROB40 8 T56 MAT1 03 MAT1 03 ROB19 8 8

GEN101	Engineering and computer graphics	в	6	1/0/2/3	not	not
ROB197	Calculation methods and programming	В	6	1/1/1/3	not	not
KFK102	Physical training II	G	4	0/0/2/2	not	KFK101
	Total:		40	40		
	4th seme	ester (sp	oring 20	22)		
LNG 1054	General English 2 (A2)					LNG 1053
LNG 1055	Academic English (B1)					LNG 1054
LNG1056	Business English (B2)	G	6	0/0/3/3	not	LNG 1055
LNG 1057	Professional English (B2+)					LNG1056
2102	Elective (B2+)					LNG1056
MAT103	Mathematics III		6	1/0/2/2	not	MAT102
MAT126	Ordinary differential equations. Matlab	В	0	1/0/2/3	not	MAT103
HUM124	Philosophy	G	6	1/0/2/3	S6	not
ROB156	Fundamentals of electronics	В	6	1/1/1/3	P1-3	not
ROB408	Mechanics of robots	В	6	2/0/1/3	P1-3	PHY111
2202	ELECTIVE	В	6			
	Total:		36	36		
	6th seme	ester (sp	oring 20	23)		
MAT127	Partial differential equations. Matlab	в	6	1/0/2/3		MAT126
3204	ELECTIVE	5	Ű			
ROB127	Design of electronic circuits	S	6	2/1/0/3	P1-3	ROB156
ROB109	Microcontroller control systems	s	6	2/1/0/3	P1-3	ROB110
ROB169	Modeling of dynamic systems	s	6	2/1/0/3	P1-3	ROB158
3301	ELECTIVE	s	6			
3302	ELECTIVE	S	6			
	Total:		36	36		
	8th threen	nester (spring 2	2024)	1	
4307	ELECTIVE	S	6			
4308	ELECTIVE	S	6			
4309	ELECTIVE	S	6			
4310	ELECTIVE	S	6		-	r
ECA001	Graduate thesis (project) preparation	FA	4			
ECA103	The defence of graduation work (project)	FA	6			
Total			34	3/		

	Additional academic programes (AAP)													
year	Code	Name of discipline	Credits	Semester										
1	AAP122,132	Physical training III, IV	0	3-4										
1	AAP101	Educational practice	2	2										
2	AAP109	Field Practice I	2	4										
3	AAP103	Field Practice II	4	6										
2-3	AAP500	Military Training	0	3-6										

Total number of credits												
	Credits											
Cycle of disciplines	ompu I-sarv	electiv e	total									
Cycle of general disciplines (G)	56	12	68									
Cycle of basic disciplines (B)	90	24	114									
Cycle of special disciplines (S)	36	60	96									
Total for theoretical training:	182	96	278									
Additional education	12	2	14									
Final attestation (FA)	14	0	14									

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Total:	26	2	28
The classroom volume in	224	100	224
theoretical training credits	234	100	554

ELECTIVE SUBJECTS of the EDUCATIONAL PROGRAM for enrollment for 2020-2021 academic year

ELECTIVE DISCIPLINES for 2020-2021 academic year entrolment Group of educational programs B63 - Electrical engineering and automation, Educational program 6B07113 - Robotics and Mechatronics Group of educational programs B64 - Mechanics and metalworking, Educational program 6B07111 - Robotics and Mechatronics

	Full-time study Study du		Study duration : 4 years	ALat	Jennic degr	ee: bachelor	Ji engineering	
Year of	Elective	Code of	Name of disciplines		Cycle	Credits	lec/lab/pr/SSA	Prerequisites
study	code	aiscipline		(SPRING 2020)	•			I
		LNG103	The Culture of Business Communication (C1)	n (SPRING 2020)			T	r
1	1101	LNG103	Rhetoric (C1)		G	4	0/0/2/2	LNG1012.2
		LINGIUZ	Bcero:			4		ł
			3rd semest	er (AUTUMN 2020))	•		
		ROB199	Biomorphic and anthropomorphic robotics	•				
	2201	ROB106	Bionics and biomimetics		В	6	2/0/1/3	
		ROB149	Physical basis for obtaining information					
			Bcero:			6		
		- r	4th semest	ter (SPRING 2021))		1	T
		LNG109	IELTS Preparation					
		LNG110	Intercultural Communication					
2		LNG117	Technical Writing			-	a /a /a /a	
	2102	LNG118	Public speaking		G	6	0/0/3/3	LNG 1056
		LNG119	Productivity skills					
		LNG120	GRE preparation					
		LING121 POR186	Academic Writing				1/0/2/2	ł
	2202	ROB100	Human biology		в	6	2/0/1/3	
	2202	ROB188	Introduction to Electronic Measuring Systems		U	0	2/1/0/3	
		RODICO	Bcero:			12	2/1/0/5	
			5th semeste	er (AUTUMN 2021	L)			
		ROB 159	Automated drives				1/1/1/3	
	3203	ROB105	Biomechanics Basics		В	6	2/0/1/3	
		ROB130	Conversion technology				2/1/0/3	
			Bcero:		6			
		•	6th semes	ter (SPRING 2022)				•
	3204	ROB409	Mechanics of controlled mashines				2/0/1/3	
3		ROB128	Fundamentals of Medical Optics		В	6	2/0/1/3	
_		ROB189	Instrumentation				2/1/0/3	
	2204	ROB101	Autonomous mobile robots			c	2/0/1/3	
	3301	ROB100	Biomedical electronics		Р	6	2/1/0/3	
		ROBIIO POBI20	Power sources				2/1/0/3	ł
	3302	ROB133	Sensors in medicine		P	6	2/1/0/3	
	5502	ROB140	Conversion of measuring signals		'	0	2/0/1/3	
	-	NOBIZS	Bcero:			18	2/0/1/3	
			7th semest	er (AUTUMN 2022	2)	10		<u> </u>
		ROB 171	Robot drives				2/1/0/3	
	4303	ROB167	Human body physics		Р	6	2/1/0/3	
		ROB112	Information theory of measurements				2/0/1/3	
		ROB 157	Automation				2/1/0/3	
	4304	ROB177	Heart Engineering		Р	6	2/1/0/3	
		ROB163	Optical methods of control and analysis				2/0/1/3	
		ROB190	Вибрация механических систем				2/0/1/3	-
	4305	ROB122	Techniques for processing and analyzing biomed	dical signals	Р	6	2/0/1/3	
4		000453	and data				2/4/0/2	+
		ROB152	Signal processing				2/1/0/3	
	1206	ROB181	Embedded systems in robotics		D	c	2/1/0/3	
	4300	ROB170	Accuracy of measuring instruments		r	0	2/1/0/3	<u> </u>
		KOB145	Bcero:			24	2/1/0/5	
			8th semest	ter (SPRING 2023))			<u>I</u>
		000124	Программное обеспечение мехатронных и				2/1/2/2	
	4207	KOB134	робототехнических систем		D	C	2/1/0/3	
	4307	ROB122	Программное обеспечение биотехнических и	1	٢	o	2/1/0/2	
		100132	медицинских систем				2/ 1/0/ 3	<u> </u>
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			Bcero:		24		
		ROB147	Control and monitoring in measuring systems			2/1/0/3	
	4310	ROB146	Control in biotechnical systems	Р	6	2/1/0/3	
		ROB148	Robot control			2/1/0/3	
		ROB136	CAD of the information and measuring equipment	7		2/1/0/3	
	4309	ROB135	CAD of biotechnical and medical systems	Р	6	2/1/0/3	
		ROB137	CAD robotic systems			2/1/0/3	
		ROB111	Intelligent measuring tools			2/1/0/3	
	4308	ROB182	Artificial life support systems	Р	6	2/1/0/3	
		ROB115	Artificial intelligence and expert systems			2/1/0/3	
		ROB133	Программное обеспечение измерительных процессов			2/1/0/3	

Number of credits on elective subjects for the entire period of study										
Cycles of disciplines	Credits									
The cycle of general disciplines (G)	12									
The cycle of basic disciplines (B)	24									
The cycle of profiling disciplines (P)	60									
TOTAL:	96									

5 Descriptors of the level and scope of knowledge, abilities, skills and competencies

A-knowledge and understanding:

A1 - knowledgeof methods of mathematical modeling, theoretical and experimental research for solving engineering problems;

A2 - knowledge of modern software products for controlling robots and their elements;

A3 - knowledge of physical processes and phenomena underlying the principles of operation of robots, equipment and mechatronic systems;

A4 - knowledge of standards, methodological and regulatory materials accompanying the operation, installation and adjustment of modern elements of digitally controlled robots.

B - applying knowledge and understanding

B1 - development and promotion of various solutions to professional problems using theoretical and practical knowledge;

B2 - apply knowledge and skills in the field of research and development aimed at the development of production and use of modern equipment;

B3 - apply the latest technologies to solve and manage engineering problems in various fields of science and technology;

B4 - development and optimization of field experimental studies of modern equipment with digital control, taking into account the criteria for their reliability;

B5 - control of compliance of technical documentation of projects being developed with standards and technological conditions.

C - the formation of judgments

C1 - independent and proactive thinking, critical, analytical, diagnostic skills;

C2 - ability to define and formulate goals, sete tasks, choose research methods in the field of robotics based on the selection and study of literary, patent and other sources of information;

C2 - independence of mathematical models for analysis and optimization of research objects, development and algorithm for solving engineering problems;

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C4 - self-sufficiency selecting optimal methods and designs and programs of experimental research and testing.

D-personal abilities

D1-substantive collection of a and interpretation and information for making judgments based on social, ethical and scientific considerations;

D2 - organization of modern metrological support for technological processes of mechatronic systems production, development of new methods of quality control of manufactured products, technological processes and their certification;

D3-striving to develop intellectual, moral, communicative, organizational and managerial skills;

D4 - striving for high motivation for professional activity, creative application of engineering innovations, self-education and self-realization.

6 Competencies at the end of studing

	Generalcultural competences (GC)									
GC 1	The ability to communicate in oral and written forms in the state, Russian									
	and foreign languages for solving problems of interpersonal and									
	intercultural interaction									
GC 2	Understanding and practical use of the norms of a healthy lifestyle,									
	including issues of prevention, the ability to use physical culture to optimize									
	performance									
GC 3	The ability to analyze the main stages and patterns of the historical									
	development of society for the formation of civic position									
GC 4	Ability to use the foundations of philosophical knowledge to form a									
	worldview									
GC 5	The ability to critically use the methods of modern science in practice									
GC 6	Awareness of the need and the acquisition of the ability to independently									
	study and improve their qualifications throughout their working life									
GC 7	Knowledge and understanding of professional ethical standards, mastery of									
	professional communication techniques									
GC 8	Ability to work in a team, tolerantly perceiving social, ethnic, confessional									
	and cultural differences									
GC 9	Ability to use the basics of economic knowledge in various fields of activity									
	General professional competencies (GPC)									
GPC 1	Knowledge of design methods for robotic and mechatronic systems, their									
	individual subsystems and modules									
GPC 2	Possession of modern software products for solving problems of system									
	design, design of mechanical and mechatronic modules, control and									
	information processing									

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GPC 3	Knowledge of mathematical models of robots, robotic and mechatronic
	systems, their individual subsystems and modules, carrying out their
	software tools in order to substantiate the theoretical and design decisions
CDC 4	Understanding the physical processes and phenomena underlying the
UrC 4	principles of operation of devices equipment and systems
CPC 5	Knowledge of standards methodological and regulatory materials
UPC J	accompanying the operation installation and adjustment of modern
	mechatronic systems with digital control
	Professional competence (PC)
PC -1	Collection and analysis of scientific and technical information taking into
10-1	account modern trends in the development and use of the achievements of
	science technology and technology in professional activities
PC -2	Assessment of the economic efficiency of the implementation of projected
10 2	robotic and mechatronic systems, their individual modules and subsystems
PC -3	Application of modern software products and the latest technologies for
100	solving and managing interdisciplinary engineering problems in various
	fields of science and technology
PC -4	Evaluation of the surrounding reality on the basis of worldview positions
	formed by knowledge of the foundations of philosophy, which provide
	scientific understanding and study of the natural and social world by
	methods of scientific and philosophical knowledge
PC -5	Calculation and design of individual blocks and devices of robotic and
	mechatronic systems, control, information-sensor and executive subsystems
	and mechatronic modules in accordance with the terms of reference
PC -6	Planning tests of modules and subsystems of robotic and mechatronic
	systems, participation in the organization and conduct of experiments at
	existing facilities and experimental models, processing the results of
	experimental studies using modern information technologies
PC -7	Monitoring the compliance of technical documentation of developed
	projects with standards and technological conditions
PC -8	Implementation of the results of theoretical developments in the production
	of robotic and mechatronic systems, their subsystems and individual
	modules
PC -9	Organization of work on operation, installation and commissioning of
	modern mechatronic systems
PC -10	Organization of the activities of the production team, making organizational
	and managerial decisions in the context of different opinions and assessing
	the consequences of decisions made

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Matrix of competencies of the educational program "Robotics and Mechatronics"

Disginling		Generalcultural									General professional					Professional									
Index	Name of the discipline										_	0	~	4	5										0
		2	2 2	<u>-</u> 9	4	-5	9	L- 0	80 00	6-0	لَ ت	Ľ	ل ا	ပ္ခ်	ν	T	-2	-3	4-	-5	9-	L- 1	8	6-	-1
Paguired component		ğ	ğ	ğ	ğ	ğ	ğ	ğ	ğ	ğ	7	7	7	Ę	ΞĘ	Š	Š	Q	Š	Š	Š	Q	Š	- Ň	Õ
I NG105 English		~		~		~	~	~	~																
LNG101	Kazakh (Russian) language	· •		√		√	√	√	· √																
MAT110	Algebra and beginning of mathematical analysis									~		✓	~												
MAT101	Mathematics I									✓		✓	✓												
MAT102	Mathematics II									✓		✓	✓												
MAT103	Mathematics III									\checkmark		\checkmark	\checkmark												
HUM113	Modern history of Kazakhstan				✓				✓										✓						
PHY110	Beginnings of physics												~	\checkmark											
PHY111	Physics I												✓	~											
PHY112	Physics II												\checkmark	\checkmark											
HUM126	Social & Political Knowledge										\checkmark			\checkmark	\checkmark	\checkmark				\checkmark					
KFK101,102	Physical training I, II										\checkmark			\checkmark	\checkmark	\checkmark				\checkmark					
ROB107	Introduction to the specialty										✓			\checkmark	✓	\checkmark				\checkmark					
GEN101	Engineering and computer graphics										~	✓													
HUM124	Philosophy				\checkmark				\checkmark										\checkmark						\checkmark
MAT126	Обыкновенные дифференциальные уравнения MatLab									~		~	~							~					
MAT127	Ordinary differential equations. Matlab.									~		~	~							~					
CSE174	Information and communication technology (eng)											~	~					~							
ROB197	Calculation methods and programming									~		~	~												
ROB198	Basics of Electromechanics													\checkmark		\checkmark				✓					
GEN128	Theoretical mechanics															✓					\checkmark				
ROB156	Basics of Electromechanics													~		~		✓		✓					✓
GEN104	Strength of materials																	✓		\checkmark				\checkmark	
ROB131	Standardization and technical measurements														~			~		~					
ROB110	Integral and microprocessor circuit design											~				~		✓		~					
GEN147	The theory of mechanisms and machines										~					~									
ROB187	Basics of information- measuring technology											✓				~	✓			✓				~	
ROB116	Power sources															\checkmark	\checkmark		\checkmark	\checkmark					
ROB158	Basics of automation												~			~		~	~					~	
ROB163	Optic methods of control and analysis													✓		~		✓		✓		✓			
KOB109	Design of electronic circuits										~	~		~	V		~	V		~	V		~		V
ROB127	Microcontroller control systems												√			Ĺ			~		✓		✓	~	
KOB169	Modeling of dynamic systems										~		~			~	~				~		~		
ROB144	Machine learning and neural networks											✓					✓	~	✓				✓	~	
ROB134	Software mechatronics and robotic systems											✓	✓		~	~		~		~	✓		✓		~
	Elective courses																								
ROB199	Biomorphic and anthropomorphic robotics										~		~			~			~	~	~		~		
ROB105	Fundamentals of biomechanics		~											~		~			~						
ROB401	Electric and hybrid vehicle technology																~					~	✓		
ROB101	Autonomous mobile robots										✓		~			✓	✓			✓	✓		✓	✓	
ROB100	Biomedical electronics													\checkmark		\checkmark			\checkmark		\checkmark		~		

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	Sources of outonomous nower																								
ROB143	supply of electric vehicles													~	~		~						~	~	
ROB181	Embedded systems in robotics											✓						\checkmark		\checkmark			\checkmark		
ROB182	Artificial life support systems											✓		✓				\checkmark	\checkmark	\checkmark			\checkmark		
DOD 400	Data collection, sensors and											/				1	/							/	
KOB400	vehicle control systems											ř				v	v							ř	
ROB171	Robot drives										\checkmark		✓							\checkmark				\checkmark	
ROB172	Medical Imaging											✓		~				\checkmark	\checkmark						
ROB402	Electric vehicle charging systems											~						~					~		
ROB166	Designing robots										\checkmark		\checkmark		\checkmark		\checkmark	\checkmark		\checkmark	\checkmark		\checkmark		
ROB 167	Physics of the human body		\checkmark											✓		\checkmark			\checkmark						
ROB404	Electric drive electric cars												\checkmark				\checkmark							\checkmark	
ROB121	Optoelectronic technology													✓				\checkmark				\checkmark			
ROB177	Heart Engineering		\checkmark									✓		✓				\checkmark							
ROB405	Diagnosis of electric vehicles											✓		✓			\checkmark	\checkmark			\checkmark				
ROB139	Sensor systems in robotics											✓		✓	✓			\checkmark					✓	\checkmark	
ROB176	Clinical Engineering		\checkmark											✓				\checkmark							
ROB403	Autonomous control systems												\checkmark				\checkmark				\checkmark		✓		
ROB148	Robot control										\checkmark		\checkmark				\checkmark			\checkmark			✓	\checkmark	
ROB146	Management in biotechnical												~	~			~			~			~	~	
	Conjugation of alternative																								
ROB406	energy sources with electric											\checkmark				\checkmark	\checkmark						\checkmark		ĺ
	vehicles																								ĺ
Sta	te final certification																								
ECA 101	Graduate thesis (project)	1	1	/	/	1	/	/	/	/	1	/	/	/	/	/	/	/	/	/	/	/	/	/	/
ECAIUI	preparation	•	v	ř	v	v	ř	ř	ř	v	v	ř	v	ř	ř	v	v	ř	ř	ř	ř	ř	ř	ř	v
ECA102	The defence of graduation																								
ECA102	work (project)																								
Addit	ional types of training																								
AAP106	Physical education I		\checkmark						✓																
AAP101	Training Practice						\checkmark		\checkmark	\checkmark															
AAP109	Industrial internship I						\checkmark		\checkmark																
AAP103	Industrial internship II						\checkmark		\checkmark																

SATBAYEV UNIVERSITY

7 Minor's continuing education policyMinor

When mastering at least 12 credits in the program's disciplines, including the following mandatory disciplines (if available):

- M1 Integrated and microprocessor circuitry;
- M2 Fundamentals of information and measuring technologies;
- M3 Theory of mechanisms and machines;
- M4 Fundamentals of automation.

an additional specialty Minor is assigned with the issuance of an Appendix to the diploma of the established sample.

8 Appendix to the ects diploma

The diploma Supplementis issued after graduation from the University in accordance with the rules for organizing the educational process on credit technology of education. Persons who have mastered the educational program Robotics and mechatronics, academic degree awarded "Bachelor of engineering and technology".

The diploma Supplement follows the model developed by the European Commission, Council of Europe and UNESCO /CEPES.

The European diploma Supplement allows you to continue your education at foreign universities, as well as confirm your national higher education for foreign

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employers. When traveling abroad for professional recognition, additional legalization of the diploma of education will be required. The European diploma Supplement is completed in English upon individual request and is issued free of charge.

The purpose of the application is to provide comprehensive independent data in order to ensure international "transparency" and objective academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). the Application contains a description of the nature, level, context, content and status of training completed and successfully completed by the person named in the original qualification document, which supplements this Annex. The Appendix does not allow making judgments, statements of equivalence, or offers of recognition. Data must be submitted for all eight sections. If such data is not available, the reason must be specified.

This document serves only for academic recognition and is not an official confirmation of a document of education. It is not valid without a higher education diploma.

Bachelor of Engineering and Technology, Level 6 of National Qualifications Framework.

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9 Brief description of the courses

English CODE-LNG1051-1057 CREDIT – 6 (0/0/3) PRECONDITION-diagnostic test/LNG1051-1056

LNG1051

PURPOSE AND OBJECTIVES OF THE COURSE

The English language course "Beginner English" is designed primarily for learning from scratch. This course is also suitable for those who have only a General elementary knowledge of the language. After passing this level, the student will be able to confidently communicate on basic topics in English, learn the basics of grammar and lay a certain Foundation that will allow them to improve their skills at the next stage of studying English.

Post-requisites of the course: Elementary English.

LNG1052

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline "Elementary English" is the Foundation of learning English, which is aimed at developing students ' receptive skills (reading and listening) and productive skills (writing and speech), analyzing basic knowledge, using and remembering the main grammatical rules and mastering the features of pronunciation and elementary vocabulary, as well as encouraging independent learning and critical thinking.

Pre-requisites for the course: Beginner.

Post-requisites for the course: General 1.

LNG1053

PURPOSE AND OBJECTIVES OF THE COURSE

The goalof the General English 1 course is to provide students with the opportunity to acquire sufficient knowledge to become more free in everyday social and academic settings. Students work on improving pronunciation, expanding vocabulary and grammar. At this level, the main task will be to consolidate the skills acquired earlier, learn how to compose and correctly apply complex syntactic constructions in English, as well as achieve a really good pronunciation.

Pre-requisites of the course: Elementary English.

Post-requisites for the course: General 2.

LNG1054 PURPOSE AND OBJECTIVES OF THE COURSE

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The course "General English 2" is intended for students who continue to study "General English 1". The course focuses on the ability to actively use in practice most aspects of the tenses of the English language, conditional sentences, phrases in the passive voice, etc. At this stage, the student will be able to hold a conversation with several interlocutors or Express their point of view. The student significantly expands their vocabulary, which will allow them to Express their thoughts freely in any environment. At the same time, the speech will be supplemented with various synonyms and antonyms of already familiar words, phrasal verbs and stable expressions.

Pre-requisites of the course: General 1.

Post-requisites of the course: Academic English.

LNG1055

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the English language course "Academic English" it is the development of academic language skills. This course is designed to help students become more successful and effective in their learning by developing critical thinking and independent learning skills.

Pre-requisites of the course: General 2.

Post-requisites of the course: Professional English.

LNG1056

PURPOSE AND OBJECTIVES OF THE COURSE

"Business English" is the English language for business communication, business and career. Knowledge of business English will be useful for conducting negotiations and business correspondence, preparing presentations and informal communication with business partners.

The special features of training are that it is necessary not only to master the vocabulary, but also to master new skills: presentation, communication, language, professional.

Pre-requisites of a course: IELTS score of 5.0 and/or Academic English

Post-requisites of the course: Professional English, IELTS score 5.5-6.0

LNG1057

PURPOSE AND OBJECTIVES OF THE COURSE

"Professional English" course is designed for B2+ level students, the purpose of which is to increase the language competence of students in the relevant professional areas. The main goal of the course is to teach students to work with texts, both audio and written, in their specialty. The curriculum is based on the necessary vocabulary (words and terms), often used in English for special purposes. Students will acquire professional English language skills through integrated content-and language-based learning, acquire vocabulary in order to read and understand original sources with a high degree of

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independence, and practice various communication models and vocabulary in specific professional situations.

Pre-requisites of the course: Business English.

Post-requisites of the course: any elective course.

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Kazakh/Russian language CODE – ENG1012 CREDIT – 4 (0/0/2) PRECONDITION-diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

- teach students to listen to statements on well-known topics related to home, study, and leisure time;

- understand texts on personal and professional topics that contain the most common words and expressions;

- be able to conduct a conversation on everyday topics; describe their experiences; Express their opinions; retell and evaluate the content of a read book, seen a movie;

- be able to create simple texts on well-known topics, including those related to professional activities.

BRIEF DESCRIPTION OF THE COURSE

The language material of the course is selected in such a way that the student, assimilating the lexical and grammatical minimum, had the opportunity to get acquainted with typical communicative situations and himself in such situations, was able to correctly assess them and choose the appropriate model (strategy) of speech behavior.

The main emphasis of teaching is transferred from the process of knowledge transfer to learning how to use the language being studied in the course of performing various types of speech activities, such as reading (if you understand what is being read), listening (if you understand what is being read) and producing texts of a certain complexity with a certain degree of grammatical and lexical correctness.

The material for classes is chosen so that students, studying Kazakh/Russian, acquire reading, writing and understanding skills of sounding speech on the basis of simultaneous mastering of the basics of grammar (phonetics, morphology and syntax) and word usage in the course of constant repeated repetition with a gradual complication of tasks.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

By the end of the first semester, the student, subject to active organization of work in the classroom and conscientious completion of homework, acquires skills and abilities corresponding to the European level A2 (Threshold according to the ALTE classification), that is, is on the threshold of the level of independent language proficiency.

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Algebra and introduction to mathematical analysis CODE-MAT110 CREDIT – 6 (1/0/2) PRECONDITION-diagnostic test

PURPOSE AND OBJECTIVES OF THE COURSE

The aim and objectives of the course is to familiarize students with the basic ideas and concepts of algebra and mathematical analysis and to form the basic knowledge necessary to study the course "Mathematics 1". Formation of skills for studying mathematical disciplines and effective use of mathematical methods for solving research and practical problems in the professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Algebra and introduction to analysis" gives the basic concepts of algebra, mathematical analysis, differential and integral calculus.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

know:

- basic concepts of algebra;
- basic concepts of mathematical analysis;
- basic elementary functions;

be able to:

- find solutions to equations and inequalities, systems of equations and inequalities;
- convert algebraic and trigonometric expressions;
- to solve word problems;
- find the derivative of elementary functions;
- explore functions using a derivative;
- find an indefinite integral of elementary functions;
- find a definite integral;
- find the area of a curved trapezoid.

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Mathematics I CODE-MAT101 CREDIT – 6 (2/0/1) PRECONDITION-diagnostic test/MAT100

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to give the future specialist a certain amount of knowledge on the sections of the course "Mathematics -I", necessary for studying related engineering disciplines. Introduce students to the ideas and concepts of mathematical analysis. The main attention should be paid to the formation of basic knowledge and skills with a high degree of understanding of differential and integral calculus.

The objectives of the course are to acquire the knowledge necessary for the effective use of rapidly developing mathematical methods; to acquire the skill of constructing and researching mathematical models; to possess fundamental sections of mathematics necessary for solving research and practical problems in a professional field.

BRIEF DESCRIPTION OF THE COURSE

The course "Mathematics-I" provides an overview of the sections: introduction to analysis, differential and integral calculus

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

The study of this discipline will allow the student to apply the course "Mathematics-I" to solving simple practical problems, find tools sufficient for their research, and obtain numerical results in some standard situations.

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Mathematics II CODE-MAT102 CREDIT – 6 (1/0/2) PRECONDITION-MAT100/MAT101

PURPOSE AND OBJECTIVES OF THE COURSE

Purpose of the course "Mathematics II" is the formation of bachelor's ideas about modern mathematics as a whole as a logically coherent system of theoretical knowledge.

The objectives of the course are to instill students with solid skills of solving mathematical problems with bringing the solution to a practically acceptable result. Develop primary skills of mathematical research of applied issues and the ability to independently understand the mathematical apparatus contained in the literature related to the student's specialty.

BRIEF DESCRIPTION OF THE COURSE

The course "MathematicsII" provides an accessible presentation of the following sections: elements of linear algebra and analytical geometry, differential calculus of functions of many variables, multiple integrals. "Mathematics II" is a logical continuation of the course "Mathematics I".

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

The study of this discipline will allow you to apply in practice the theoretical knowledge and skills obtained with a high degree of understanding in the course sections, use them at the appropriate level; translate into mathematical language the simplest problems posed in terms of other subject areas; acquire new mathematical knowledge using educational and information technologies; solve applied problems in the field of professional activity

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Mathematics III CODE-MAT103 CREDIT – 6 (1/0/2) PRECONDITION-MAT101/MAT102

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course "Mathematics-III" is to form basic knowledge and skills with a high degree of understanding in the sections of the course that help to analyze and solve theoretical and practical problems.

The objectives of the course are to instill students with the ability to independently study educational literature, conduct probability-theoretic and statistical analysis of applied problems; develop logical thinking and improve the overall level of mathematical culture.

BRIEF DESCRIPTION OF THE COURSE

The course "Mathematics-III" includes sections: series theory, elements of probability theory and mathematicaloй statistics and is a logical continuation of the discipline "Mathematics II".

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

know:

- the theory of numerical series;
- theory of functional series;
- Fourier series;
- -elements of probability theory and mathematical statistics; be able to:
- to solve problems for all sections of the theory of series; find the probability of events;
- find numerical characteristics of random variables;
- use statistical methods for processing experimental data;

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Physics I, II CODE-PHY111, PHY112, CREDIT – 6 (1/1/1) PRECONDITION-diagnostic test/, PHY110-111

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of teaching the course Physics I and Physics II is to form ideas about the modern physical picture of the world and a scientific worldview.

BRIEF DESCRIPTION OF THE COURSE

The disciplines Physics I and Physics II are the basis of theoretical training and engineering activities of graduates of the higher technical school and represent the core of physical knowledge necessary for an engineer operating in the world of physical laws. The course «Physics 1» includes sections: physical foundations of mechanics, structure of matter and thermodynamics, electrostatics and electrodynamics. The discipline «Physics II» is a logical continuation of the study of the discipline «Physics 1», and forms a holistic view of the course of General physics as one of the basic components of General theoretical training of bachelors of engineering and technical profile. The discipline «Physics II» includes sections: magnetism, opticsITTIKA, nanostructures, fundamentals of quantum physics, atomic and nuclear physics.

KNOWLEDGE, SKILLS and ABILITIES AT the end of the COURSE – the ability to use knowledge of fundamental laws, theories of classical and modern physics, as well as the use of methods of physical research as the basis of a professional activity system.

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Social & Political Knowledge CODE – HUM126 CREDIT – 8 (0/0/4) PRECONDITION – non

PURPOSE AND OBJECTIVES OF THE COURSE

This course involves the study of four scientific disciplines - psychology, political science, sociology and cultural studies, each of which has its subject, terminology and research methods. Interactions between these scientific disciplines are carried out based on the principles of information complementarity; integrability; methodological integrity of research approaches of these disciplines; generality of result-oriented teaching methodology; unified system representation of the typology of learning outcomes as formed abilities.

The theoretical sources of this course are the concepts of Western, Russian, and Kazakh scientists in the field of sociology, political science, and cultural studies.

KNOWLEDGE, SKILLS and ABILITIES AT the end of the COURSE

Upon completion of the study of the disciplines of the module, students will be able to: -explain and interpret subject knowledge (concepts, ideas, theories) in all areas of science that form the disciplines of the module (sociology, political science, cultural studies, psychology);

-explain the socio-ethical values of society as a product of integration processes in the systems of basic knowledge of the disciplines of the socio-political module; communication based on the content of theories and ideas of scientific areas of the studied disciplines;

- reasonably and reasonably provide information about the various stages of development of the Kazakh society, political programs, culture, language, social and interpersonal relations;

- analyze the features of social, political, cultural, psychological institutions in the context of their role in the modernization of Kazakhstani society;

-analyze various situations in different areas of communication from the standpoint of correlation with the value system, social, business, cultural, legal and ethical norms of Kazakhstani society;

-distinguish strategies for different types of research on society and justify the choice of methodology for analyzing specific problems;

- evaluate the specific situation of relations in society from the standpoint of a particular science of the social and humanitarian type, project the prospects for its development, taking into account possible risks;

- develop programs for resolving conflict situations in society, including professional society;

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- carry out research project activities in various areas of communication, generate socially valuable knowledge, present it;

- correctly express and reasonably defend their own opinion on issues that have social knowledge value.

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Physical training I, II CODE – KFK 101, 102 CREDIT – 4 (0/0/2) PRECONDITION – non

PURPOSE AND OBJECTIVES OF THE COURSE

The course is intended for 1.2 year students of all specialties

As part of the course, the student will master the practical use of the skills of performing the main elements of athletics, sports games, gymnastics and a set of standards for General physical training, including professional and applied physical training or one of the sports, methods of conducting independent physical exercises.

The main knowledge and skills in the field of physical culture and sports will be presented, as well as methods of building and rationing the load during independent classes; methods of compiling complexes of hygienic gymnastics and General development exercises;

The final stage of the course is a multivariate test and / or the implementation of the established standards for General physical, sports and professional applied training.

After completing the course, the student must understand the role of physical culture and a healthy lifestyle; know the basics of physical culture and a healthy lifestyle; possess a system of practical skills and abilities that ensure the preservation and promotion of health, development and improvement of psychomotor abilities and qualities.

KNOWLEDGE, SKILLS and ABILITIES AT the end of the COURSE

Upon completion of the module, students will be able to:

The student must be able to:

- dose the load during recreational and independent physical exercises;

- evaluate the volume and intensity of physical activity, taking into account age and health status;

- use the methods and means of PPFP;

- to use a set of exercises on OFP, SFP and include sports and outdoor games, national games.

At the end of the course, the student should know:

- the purpose and objectives of physical training;

- content of training sessions;

- rules for building and rationing the load during independent classes; - rules and methods of drawing up complexes of hygienic gymnastics and General developmental exercises;

- orientation of professional and applied physical training;

- sets of exercises on OFP, SFP and the content of games used in practical classes.

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Introduction to the specialty CODE-ROB107 CREDIT – 6 (2/0/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course «Introduction to the specialty» is to familiarize first-year students with sociology as a scientific discipline and its branch directions.

Objectives to achieve the objectives of the course: familiarization with the qualification characteristics of the graduate; introduction to objects, types and tasks of professional activity of graduates; introduction to the qualification requirements to the engineer; introduction to the history of instrumentation; introduction to the development of instrumentation for domestic and foreign enterprises.

BRIEF DESCRIPTION OF THE COURSE

Choosing a profession is the most important stage in any person's life. Material wellbeing and moral satisfaction with the results of their work depend on the correct, and most importantly, conscious, choice. The discipline «Introduction to a speciality» is based on the knowledge and skills of secondary (school), primary vocational or secondary vocational education and is a precursor for the disciplines of the professional cycle and educational practices.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Student must know-the necessary career guidance regarding values in the activity of a mechanical engineer, a deep understanding of the «technology - design» relationship»; must be able to independently plan and achieve the expected results of mastering the main educational program of bachelor's training; apply the knowledge gained in the study of professional disciplines and in the course of training practices; use high motivation to perform professional activities; use professional terminology and basic concepts.

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Modern history of Kazakhstan CODE-HUM113 CREDIT – 6 (1/0/2) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to familiarize students of technical specialties with the main theoretical and practical achievements of domestic historical science on the problems of the history of modern Kazakhstan, a comprehensive and systematic study of the main stages of formation and development of Kazakh society.

Course objective:

- analyze the peculiarities and contradictions of the history of Kazakhstan in the Soviet period;

- to reveal the historical content of the foundations of regularities of political, socioeconomic, cultural processes at the stages of the formation of an independent state;

- contribute to the formation of students civic position;

- to educate students in the spirit of patriotism and tolerance, belonging to their own people, fatherland;

BRIEF DESCRIPTION OF THE COURSE

The course Modern history of Kazakhstan is an independent discipline and covers the period from the beginning of the twentieth century to the present day. Modern history of Kazakhstan studies the national liberation movement of the Kazakh intelligentsia at the beginning of the XX century, the period of creation of the Kazakh ASSR, as well as the process of formation of a multinational society.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- knowledge of events, facts and phenomena Of modern history of Kazakhstan;

- knowledge of the history of ethnic groups inhabiting Kazakhstan;
- knowledge of the main stages of formation of the Kazakh statehood;
- ability to analyze complex historical events and predict their further development;
- ability to work with all types of historical sources;
- ability to write essays and scientific articles on the history of the Fatherland;
- ability to operate with historical concepts;
- ability to lead a discussion;
- skills of independent analysis of historical facts, events and phenomena;
- public speech skills.

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Calculation methods and programming CODE-ROB197 CREDIT – 6 (1/1/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course is to familiarize students with numerical methods for solving mechanical engineering problems, teach the basic principles of mathematical modeling of mechanical engineering problems, familiarize them with methods for constructing and investigating difference schemes used for numerical solutions of ordinary differential equations and partial differential equations, and numerical computer programming.

BRIEF DESCRIPTION OF THE COURSE

The course "methods of computation and programming" is a branch of science that originated at the intersection of computational mathematics, mechanics and mechanical engineering. The subject of this section of science is numerical modeling of various movements and flows, as well as computer programming of the obtained problems.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

I should know:

- methods of storing numbers in computer memory and actions on them, evaluation of the accuracy of calculations;

- methods of solving basic mathematical problems – integration, differentiation, solving algebraic and transcendental equations and interpolation of functions using computers. must be able to:

- use basic numerical methods for solving mathematical problems;

into choose the optimal numerical method for the solution of the tasks;

- give mathematical characteristics of the accuracy of the initial information and evaluate the accuracy of the resulting numerical solution;

-develop algorithms and programs for solving computational problems, taking into account the necessary accuracy of the resulting result;

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Designing in robotics CODE-ROB102 CREDIT – 6 (2/1/0) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline «Designing in robotics» is the preparation of students for industrial activities in the field of designing robotics using modern computer-aided design systems.

Objectives to achieve the objectives of the course:

-to familiarize students with the purpose and possibility of modern computer-aided design tools aimed at solving scientific, design and technological problems in the field of robotics design;

-study the requirements of standards for technical documentation;

-learn the basics of computer design using the autocad graphics package;

-develop students skills to apply graphic and computer systems of device design;

-develop the ability to independently acquire and deepen the knowledge gained while studying the course.

BRIEF DESCRIPTION OF THE COURSE

The discipline studies the basics of design using the autocad graphics package. Mastering the autocad graphics system allows you to perform graphic work of any level of complexity and make accompanying design documentation when designing devices and equipment.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

must know-prospects and trends in the development of information technologies in the design of devices and equipment; the main requirements of the unified system of design and technological documentation and rules for the design of technical documentation; must be able to apply modern software tools for the development and revision of design and technological documentation of devices

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Informationand communication technologies (in English) yaz) CODE-CSE174 CREDIT – 6 (2/1/0) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

Training in the use of modern information technologies in the field of professional activity. The course objectives include:

- To reveal the basic concepts of computer system architecture;

- To reveal the basic concepts of information and communication technologies and subject-specific terminology;

- Learn how to work with software interfaces of operating systems;

- Teach you how to work with data in different views, both tabular structured and unstructured;

- Teach you how to apply basic information security principles;

- Expand the concepts of data formats and multimedia content. Teach you how to work with standard multimedia data processing applications. Use modern approaches to the presentation of the material;

- Discover the concepts of modern social, cloud, and email platforms, and how to work with them;

- To teach to use methods of algorithmization and programming for solving problems of automation of business processes

BRIEF DESCRIPTION OF THE COURSE

The course contains a training program aimed at leveling the basic knowledge of students in the field of information and communication technologies. It contains a full range of topics, according to the standard curriculum of SSE, with the predominance of teaching practical skills in working with data, algorithmization and programming. The course is designed to teach students not only basic concepts of architecture and modern infrastructure of information and communication technologies, but also to teach them how to use these tools to solve problems of an applied nature. Teach you to optimize processes, apply adequate models and methods of solving practical problems using modern methods and tools of information technology, automate routine processes, be productive and efficient.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Students will know:

Device to the computer;

- Architecture of computer systems;
- Information and communication technology infrastructure;

- Interfaces of modern operating systems;

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- Modern tools for working with data of various types and purposes;

- Types of threats to information security, principles, tools and methods of data protection;

- python programming language.

Students will be able to:

- Work with the interfaces of modern operating systems;

- Work with modern application software for working with data of various types and purposes;

- Use modern social, cloud, and email platforms to organize business processes;

- Programming in an algorithmic programming language;

- Analyze, model, design, implement, test and evaluate information and communication technology systems.

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Fundamentals of electromechanics CODE-ROB198 CREDIT – 6 (2/1/0) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

ЦТhe purpose of the course is to familiarize students with the basic theories of a number of Electromechanical elements and devices used in instrumentation engineering.

The objectives of the course are to form a theoretical base on modern Electromechanical energy converters, which will allow you to successfully solve theoretical and practical problems in professional activities related to the design, testing and operation of electrical machines.

BRIEF DESCRIPTION OF THE COURSE

The study of the discipline consists in studying the basics of the theory of Electromechanical converters of electrical energy; physical processes, design and execution of Electromechanical converters, the basics of the theory, design and execution of electrical machines; working properties, characteristics and performance of Electromechanical converters.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE The student will

to know: the principle of operation of modern types of Electromechanical converters, to know the features of their design, equations, substitution schemes and characteristics; to have a General idea of the design, testing and modeling of Electromechanical converters. be able to: use the acquired knowledge in solving practical problems related to the design, testing and operation of Electromechanical converters. Possess: skills of elementary calculations and tests of Electromechanical converters.

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Theoretical mechanics CODE-GEN128 CREDIT – 6 (2/0/1) PRECONDITION-PHY112

PURPOSE AND OBJECTIVES OF THE COURSE

Study of the basics of mechanics (definitions, theorems, laws), practical methods of their application; preparation for the study of other General engineering and special disciplines; development of students ' logical thinking, skills of independent thinking, necessary in further work when solving certain problems of natural science and technology.

BRIEF DESCRIPTION OF THE COURSE

Statics. A system of converging forces. Theory of moments. Basic theorem of statics. An arbitrary flat system of forces. Friction. An arbitrary spatial system of forces. The center of gravity of the body. Kinematics of the point. The simplest movements of a solid body. Plane-parallel motion of a solid body. Complicated motion of a point. Complex motion of a solid body. Dynamics of a material point. General theorems of dynamics of a point. Introduction to system dynamics. Moment of inertia. General theorems of dynamics of the system. Analytical dynamics. Impact theory.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

The student at the end of studying the discipline must:

- to have a scientific idea of the strength, generality and correctness of the methods of theoretical mechanics, as based on strict logical reasoning and laws on the one hand, and finding their confirmation in practice, on the other;

- be able to use basic knowledge;

- have the ability to apply the acquired knowledge in practice;
- master the methods of solving problems related to the movement of material bodies;

- master the basic models of theoretical mechanics and know the limits of their application;

- be prepared to accurately and thoroughly substantiate the reasoning without cluttering it with unnecessary details;

- demonstrate the ability to work independently and as a team;

- possess research skills:
- to be Pro-active.

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Philosophy CODE-HUM124 CREDIT – 6 (1/0/2) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The goal of the course is to develop cognitive, operational, communicative, and selfeducational competencies for problem solving:

- to promote the development of an adequate philosophical orientations in the contemporary world;

- to form creative and critical thinking among students;

- to distinguish the ratio of spiritual and material values, their role in the life of a person, society and civilization;

- contribute to defining your attitude to life and finding harmony with the world around you.

BRIEF DESCRIPTION OF THE COURSE

«Philosophy» is the formation of an integral worldview that has developed in the context of socio-historical and cultural development of mankind. Familiarization with the main paradigms of the methodology of teaching philosophy and education in the classical and post-classical traditions of philosophy. Philosophy is designed to develop stable life orientations, finding the meaning of one's existence as a special form of spiritual production. Promotes the formation of a moral image of a person with the ability of critical and creative thinking. The theoretical sources of this course are the concepts of Western, Russian, and Kazakh scientists on the history and theory of philosophy.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- knowledge of the main terms, main concepts and problems of philosophy;

- knowledge of the main philosophical ways of solving worldview issues in the context of culture;

- ability to analyze the history of the development of philosophical thought;

- ability to identify alternative ways of raising and solving worldview issues in the history of human development;

- ability to identify the main theoretical approaches in the relationship of a person with society;

- ability to master the methodology of performing independent work;

- search and systematization skills;
- ability to debate freely and make rational decisions;

- skills of ethical principles in professional activities.

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The basics of electronics CODE-ROB156 CREDIT – 6 (1/1/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to develop students knowledge of the basics of electronics and methods of designing and calculating electronic devices.

Course objectives-the student must master the principles of device and physical basis of operation of semiconductor devices, their characteristics and parameters, as well as the basic principles of building analog electronic circuits, signal generators, the principles of operation of integrated circuits, in addition, the student must study the principles of building and functioning of integrated logic elements, methods of synthesis of logical devices of combinational and serial types.

BRIEF DESCRIPTION OF THE COURSE

Obtaining knowledge, skills and abilities to read the structural and schematic diagrams of electronic devices, understand the principles of their operation and make the right choice of electronic equipment elements.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

should know:

- operating principle and design features of electronic devices;
- physical phenomena occurring in electronic devices;
- main characteristics of electronic devices;
- conduct research and analyze physical phenomena in electronic circuits. must be able to:

- experimentally determine the parameters and characteristics of electronic devices and devices;

- make measurements of electrical quantities in semiconductor devices;

- design electronic components, understand and be able to read simple diagrams of typical electronic equipment;

- use various electronic devices in electrical circuits, choose types of electronic devices depending on the specifics of their application.

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Strength of materials CODE-GEN104 CREDIT – 6 (1/1/1) PRECONDITION – PHY111, MAT101, MAT102

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline «resistance of materials» is to teach students the basics of the science of strength of materials and structures, preparing them for the correct choice of calculation and design methods, familiarizing them with the latest achievements of science and technology in the field of mechanics of a solid deformable body.

BRIEF DESCRIPTION OF THE COURSE

The discipline studies withtemporary methods of calculation of elements of machinebuilding constructions on durability, rigidity under various types of deformation (restageresearch Institute, compression, torsion, bending), the mechanical properties of major structural materials, geometric characteristics of flat sections, the theory of the stress and deformed state, hypothesis strength, General case of forces, the calculations of statically nepredelmykh systems, calculations, stability calculations for dynamic forces, calculations of structural elements beyond the elasticity limits.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying discipline the student acquires the ability to accurately and thoroughly substantiate the reasoning to apply what is learned in diverse areas of practical skills based on strength, rigidity and stability of the elements of engineering structures, acquires competence – the ability to solving problems related to various kinds of deformations in mechanical systems, the ways to improve the efficiency, reliability and economy of structures and machines, practical skills for the experimental study fur thetechnical properties of materials and stress-strain state of simple elements of structures the treatment of modern testing machinery and measuring equipment.

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Standardization and technical measurements CODE-ROB131 CREDIT – 6 (1/1/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

Objective: students acquire scientific knowledge, as well as skills in applying methods and practical bases of standardization, and technical measurements in the design of equipment, instruments, mechatronic and robotic complexes, the development of standards, as well as the calculation of errors in electronic equipment.

BRIEF DESCRIPTION OF THE COURSE

The essence and content of standardization; normative documents on standardization and types of standards; application of normative documents and the nature of their requirements; legal bases of standardization and its tasks; information support of standardization activities; international organizations that develop standards, including the IEC; fundamentals of metrological quality control of products. Basic provisions of the theory of errors; metrological characteristics of measuring instruments; methods of performing measurements; accuracy classes of measuring instruments.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

should know:

- principle of operation and design of measuring instruments and transducers;
- causes of errors and ways to exclude them;
- methods of building information and measurement systems.

must be able to:

- select a measuring device or sensor;
- develop a mathematical model of measurement tools;
- calculate the accuracy of the information and measurement system.

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Matlab ordinary differential equations KOД – MAT CODE126 CREDIT – 6 (1/0/2) PRECONDITION-MAT103

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course "Matlab Ordinary differential equations Matlab" is to form basic knowledge of the course sections, which helps to analyze, model and solve theoretical and practical problems using both analytical and numerical methods using Matlab; to instill students with the ability to independently study the educational literature.

Course objectives teach you to recognize the types and forms of integrable equations and systems, integrate them and apply differential equations for mathematical solutions of applied problems.

BRIEF DESCRIPTION OF THE COURSE

About new differential equations of the 1st order. Higher-order ordinary differential equations. Differential equations system. Linear equations with variable coefficients. Numerical integration of differential equations and systems. Using Matlab for numerical solution of differential equations.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- master methods of solving ordinary differential equations;
- set mathematical problems;
- be able to build mathematical models;

- be able to solve problems modeled by differential equations using both analytical, and numerical methods using Matlab.

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Partial differential equations MATLAB KOД – MAT CODE127 CREDIT – 6 (1/0/2) PRECONDITION-MAT126

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the course "Partial Differential Equations Matlab" is to form basic knowledge of the course sections, which help to analyze, model and solve theoretical and practical problems.

Course objectives: apply the theory of partial differential equations to solve and research applied problems from various fields of natural science, Economics, medicine, biology and ecology; form ideas about the implementation of numerical methods for solving boundary value problems using Matlab.

BRIEF DESCRIPTION OF THE COURSE

Basic equations of mathematical physics. Classical boundary value problems for partial differential equations. Analytical and numerical methods for solving classical boundary value problems. Using Matlab for numerical solution of boundary value problems.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- master the given mathematical apparatus that allows you to analyze, model and solve classical boundary value problems;

- master the methods of solving classical boundary value problems;

- be able to pose a problem, choose methods of solution, both in analytical form and using computer technologies;

- use modern software-Matlab package;

- master the methodology and skills of numerical implementation of a mathematical model, analysis of the results obtained, interpretation of them to Refine the model;

- independently expand your mathematical knowledge.

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Integrated and microprocessor circuitry CODE-ROB110 CREDIT – 6 (2/1/0) PRECONDITION-ROB 156

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course-The purpose of studying the discipline "Integrated and microprocessor circuitry" is to familiarize students with the basics of digital integrated circuits and their practical application in instrument engineering.

The objectives of the course are to give an idea of the development of integrated digital circuitry, of architecture and programming of typical microprocessor systems, methods of automated modeling and design of electronic circuits

BRIEF DESCRIPTION OF THE COURSE

The study of the discipline consists of stages of mastering knowledge in the field of basic logic elements, combination circuits and complex microprocessor systems.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

you should know-the principle of operation of digital integrated elements, their classification, marking and conditional graphic images; methods of interfacing and assembling complex devices; the composition and purpose of microprocessor devices and methods of programming them;

must be able to design digital nodes, including on the basis of microprocessor elements; read and understand circuit diagrams; read, understand and draw functional diagrams; select the necessary chips and elements for reference information for the implementation of schemes; apply theoretical knowledge to solve problems related to the construction of digital and microprocessor systems and devices.

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Theory of mechanisms and machines CODE-GEN147 CREDIT – 6 (1/1/1) PRECONDITION-GEN128

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the disciplines is to form students ' scientific bases of knowledge of General methods of research and design of mechanisms of machines and devices, to prepare scientific and theoretical bases for the development of special disciplines and the basics of modern technology.

BRIEF DESCRIPTION OF THE COURSE

In the discipline "Theory of mechanisms and machines" the main types of mechanisms are studied: hinge – lever, Cam and gear mechanisms. Structural, kinematic and dynamic analysis and synthesis of various mechanisms, and their kinematic and dynamic properties are considered. Practical methods of solving problems of analysis and synthesis of mechanisms are studied.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student will learn to understand the General principles of implementing movement using mechanisms, the interaction of mechanisms and machines, which determines the kinematic and dynamic properties of a mechanical system. Acquires competence - to systematically approach the design of mechanisms, to find the optimal parameters of mechanisms for specified working conditions.

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Fundamentals of information and measuring technologies CODE-ROB187 CREDIT – 6 (2/1/0) PRECONDITION-MAT103

PURPOSE AND OBJECTIVES OF THE COURSE

ЦТhe main goal of the course is to study the basic methods and means of electrical measurement, methods of evaluating the accuracy of measurement results, familiarizing students with modern measuring technologies and their application in instrument engineering.

The objectives of the course are to develop students ' knowledge of devices, switching schemes and errors of measuring instruments, and measuring converters.

BRIEF DESCRIPTION OF THE COURSE

Study of basic methods and means of measuring electrical, magnetic and non-electrical quantities, methods of evaluating the accuracy of measurement results, familiarization of students with modern measuring technologies and their application in instrument engineering.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

I should know:

- principle of operation and design of measuring instruments and transducers;
- causes of errors and ways to exclude them;
- methods of building information and measurement systems. must be able to:
- select a measuring device or sensor;
- develop a mathematical model of measurement tools;
- calculate the accuracy of the information and measurement system.

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Power supply CODE-ROB116 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

Studying the material of this course allows you to get some knowledge about the device of power supplies, skills of using these devices as a tool in your professional activities.

BRIEF DESCRIPTION OF THE COURSE

Primary power supply sources. Chemical power supplies. Electromagnetic elements of power supply devices. Transformers. Three-phase transformers. Basic concepts and definitions of rectifier devices. Types of loads of rectifiers and rectifier units. Basic parameters and calculated coefficients of the rectifier. Smoothing filter. Parametric stabilizers. Compensation stabilizers of constant voltage with continuous regulation. Switching power supplies. Control of the control element in switching power supplies. Switching power supplies with multiple outputs. AC-DC converters. PWM controllers.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE:

As a result of studying the discipline, the student should know the structure, purpose and principle of operation of power supplies.

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Fundamentals of automation CODE-ROB158 CREDIT – 6 (2/1/0) PRECONDITION-MAT103

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of this disciplineis to learn the General principles of building automation systems and automatic control, methods of selecting and calculating elements and systems of automation.

Objectives of the discipline: familiarization with the technical means of automatic systems and control systems, mastering the methods of practical calculation of automatic control and control systems, familiarity with the current state of technical means of automation.

BRIEF DESCRIPTION OF THE COURSE

Have an idea of: modern control methods and automation tools, tasks and ways to improve control methods and tools, and control.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

The student must:

Know: fundamentals of functioning of automation systems, methods of design and modeling of automation elements, and systems in General.

Be able to: calculate automation systems and units, and their research; evaluate General technical and metrological characteristics; synthesize automation systems based on their qualitative indicators.

Acquire practical skills in calculating relays, regulators, actuators, selecting sensors, correcting and actuating devices, and matching signal levels in automatic control and regulation systems.

Be competent: in the field of modern control and management tools.

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Optical methods of monitoring and analysis CODE-ROB163 CREDIT – 6 (2/0/1) PRECONDITION-PHY112

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to acquire students ' deep scientific knowledge , as well as skills in applying the methods and practical foundations of opto-lighting engineering, optoelectronics in the design of optical devices for monitoring and analyzing the composition and properties of substances and materials.

BRIEF DESCRIPTION OF THE COURSE

In the discipline "Optical methods of analysis and control", the methods and practical foundations of optical in the design of optical devices for monitoring and analyzing the composition and properties of substances and materials are considered. The discipline considers the main provisions of optics, the principles of photometry, colorimetry, refractometry, polarimetry and others. The classification of measuring instruments, as well as the design of optical devices, is considered.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Know:

- knowledge of the theory of light distribution, reflection, refraction, absorption and scattering;

- knowledge of basic photometry, the concepts of error, diffraction, dispersion, light interference;

- design of optical devices based on coherent and incoherent light sources;

- knowledge of methods for measuring the composition and properties of substances based on the laws of optical radiation;

Be able to:

- basic provisions of optics;

- methods of radiating the composition and properties of materials based on lighting and optoelectronic devices;

- classification of optical measurement tools for the composition and properties of substances.

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The design of electronic circuits CODE-ROB109 CREDIT – 6 (1/2/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to study the principles of organization and methods of designing electronic circuits, including computer-aided design methods, mathematical models and software tools, that is, what allows modern specialists to set and solve complex problems of designing devices and complexes of electronic technology.

BRIEF DESCRIPTION OF THE COURSE

To study this discipline it is necessary to know the basics of the disciplines "Informatics", "Physics", "Math", "Electricalengineering ", " Fundamentals of electronics".

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of mastering the discipline, the student must:

Know:

-principles of organization and methods of designing electronic circuits;

-computer-aided design methods;

- mathematical models and software tools;

-terms and definitions of the design process.

Be able to: based on the use of the algorithm for generating equations of electronic circuits and elements of graph theory, and matrices, analyze electronic circuits in statics and dynamics, as well as perform engineering calculations of various electronic circuits in order to analyze the operability of projected electronic circuits and the optimality of their operating modes.

Possess: skills of composing equations of electronic circuits, including the method of state variables, as well as possess methods of analyzing electronic circuits in statics, dynamics and engineering calculation methods of various switching and amplifying circuits in order to reduce their operating modes to optimal.

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Microcontroller control systems CODE-ROB127 CREDIT – 6 (2/1/0) PRECONDITION-ROB110

PURPOSE AND OBJECTIVES OF THE COURSE

LThe main goal of the course is to teach basic principles of robot management. Acquisition of skills in controlling various sensors and solving the problem of microprocessor control.

The objectives of the course are to Study the basic principles of building information and measurement systems and control systems based on open microcontroller platforms, to develop skills in developing hardware and software for automated control systems and robot control

BRIEF DESCRIPTION OF THE COURSE

Discipline "Microcontroller control systems" is a fundamental discipline for the study of microcontroller control of robots. The course is intended for students of mechatronics and robotics.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

you should know: at the end of this course, students should learn the basics of programming microcontrollers, algorithms for working with microprocessor devices, using libraries, and creating their own libraries.

must be able to: use the acquired knowledge in solving practical problems related to the design and operation of microcontroller controls. To be able to program microcontrollers, to be able to connect different sensors and devices, and also to be able to calculate the algorithms of robot control.

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Simulation of dynamic systems CODE-ROB169 CREDIT – 6 (2/1/0) PRECONDITION-ROB197

PURPOSE AND OBJECTIVES OF THE COURSE

Course goals "Simulation of dynamic systems»:

- teach students the ability to create models with components from various fields of engineering;

- introduce components of energy storage and dissipation from various fields into the model;

to obtain the equations of the state space

Course objective:

- learn how to use систему the MATLAB and Simulink computer system to solve, analyze and visualize results;

- be able to interpret the results obtained when designing such systems.

BRIEF DESCRIPTION OF THE COURSE

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KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student

I should know:

otheoretical foundations for creating various dynamic models from various fields of engineering;

- MATLAB and Simulink computer systems;

otypes of calculations performed and ways to configure them;

f methods of modeling and analysis of systems;

- principles for building models

be able to:

h perform an analysis of the system or process under study;

e choose a reasonable modeling method;

- build an adequate model of the system or process using modern computer tools;

d to interpret and analyze the simulation results.

have the skills:

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s methods and techniques of working in MATLAB and Simulink based on the experience gained during laboratory work;

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- work and use of scientific and technical information, Internetresources, databases and catalogs, electronic journals and patents, search resources, etc. in the course of modeling. in the modeled area, including in a foreign language.

have the following competencies:

- the ability to independently teach new research methods, to change the scientific and scientific-production profile of their professional activities;

- willingness to choose methods and develop algorithms for solving problems of complex dynamical systems.

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Machine learning theory and neural networks CODE-ROB144 CREDIT – 6 (2/1/0) PRECONDITION-ROB198

COURSE OBJECTIVE

The purpose of mastering the discipline is to familiarize yourself with the basic concepts of machine learning, with the main algorithms of machine learning, and features of their application. To give a systematic review of models of modern biological and artificial neural networks, to study and master the ways of their application for information processing and pattern recognition.

COURSE OBJECTIVE

As a result of theoretical study of the discipline, the student should know the theoretical foundations of artificial and neural network technologies of intelligent systems, technologies for creating rules of the knowledge base, the construction and analysis of algorithms, elements of functional analysis, technologies for multi-level information processing, problems of optimal mapping of structures of intelligent control systems (ICS)keywords: optimizationmethods , methods of intellectual systems theory and technology, methods of synthesis of expert systems of technological processes management, methods of synthesis of control systems on neural networks, methods of studying the quality of intelligent systems, etc.

BRIEF DESCRIPTION OF THE COURSE

This course examines methods for building algorithms that can learn, namely deductive learning, which involves the formalization of experts 'knowledge and their transfer to a computer in the form of a knowledge base.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

must know and be able to:

- fundamental concepts, modern approaches, methods and problems of machine learning and data mining;

- understand and formalize the task of data analysis;
- use modern machine learning methods for practical solution of data analysis problems;
- if necessary, dictated by the specifics of the task, create new machine learning methods;
- conduct numerical experiments on model and real data and interpret their results.

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Software for mechatronic and robotic systems CODE-ROB 134 CREDIT – 6 (2/1/0) PRECONDITION-ROB197

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the discipline is to obtain knowledge about the structure of software mechatronic and robotic systems, the formation of skills and competencies in the development of such software.

Discipline objectives:

- study the software classes of mechatronic and robotic systems, and their purpose;
- study the features of developing software for robotic systems;
- get familiar with common software development tools.

- master the technologies of designing, developing and debugging software for mechatronic and robotic systems.

BRIEF DESCRIPTION OF THE COURSE

The process of discipline is aimed at forming the following competencies: ability to develop the software necessary for information processing and control in mechatronic and robotic systems and their design; the ability to conduct experiments on existing layouts, samples, mechatronic and robotic systems according to set procedures and process the results with the use of modern information technologies and technical means; the ability to conduct computational experiments using standard software packages with the aim of the study of mathematical models of mechatronic and robotic systems.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student must:

Know: Features of software development processes for mechatronic and robotic systems. Be able to: Develop and debug software tools for mechatronic and robotic systems that implement control algorithms.

Own: Skills of software data processing in information systems.

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Biomorphic and anthropomorphic robotics CODE-ROB199 CREDIT – 6 (2/0/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

Formation of basic knowledge about biomorphic and anthropomorphic robotic systems, their applications and design solutions, as well as training in methods for calculating manipulator parameters.

The objectives of studying the discipline are: acquisition by students of the ability to calculate kinematic and dynamic variables of movement of manipulative systems; knowledge about bionic and anthropomorphic robotic devices of constructive design.

BRIEF DESCRIPTION OF THE COURSE

Introduction to mechatronics and robotics. The history of the development of mechatronic and robotic devices. Problems solved by mechatronics. Anthropomorphic robots and mechanisms. Classification and construction of anthropomorphic robots. Application of anthropomorphic mechanisms. Walking and mobile robots. Classification and construction of walking bots. The use of robots. Direct and inverse kinematics and dynamics problem. Quaternions. Definition of a quaternion. Application of quaternions in solving the problem of the position cxbaraof the grip of the manipulator.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE know:

- about robotic devices of bionic and anthropomorphic design versions;

- composition and principles of construction of systems of movements of components of bionic and anthropomorphic robotic systems.

be able to:

- to develop mechanical components of robotic devices of bionic and anthropomorphic design.

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Fundamentals of biomechanics CODE-ROB105 CREDIT – 6 (2/0/1) PRECONDITION-no

The purpose of the DISCIPLINE: formation of students ' knowledge about the fundamental laws and principles of biomechanics, theoretical knowledge about the mechanical properties of biological tissues, systems and their substitutes, as well as physical phenomena occurring in them during the life and movement of the body in space.

COURSE OBJECTIVE: study of mechanical aspects of the structure and functioning of biological systems and their interaction with the environment, engineering research methods to solve various problems of medicine.

BRIEF DESCRIPTION OF THE COURSE

Mechanical properties of biological tissues and liquids. External influences on the human body. Biomechanics of the heart. Biomechanics of the vascular system. Biomechanics of the respiratory tract. Biomechanics of the musculoskeletal system. Biomechanics of the eye. Biomechanics of hearing. Biomechanics of the vestibular apparatus. Biomechanics of speechformation . Biomechanics of the digestive system. Biomechanics of excretory organs. Mechanics of biological tissue substitutes. Biomechanics of artificial organs.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE know:

- main theoretical provisions of biomechanics as a scientific discipline, directions of development of biomechanics as a science;

- different levels of organization of living matter: biological macromolecules, cells, tissues, organs, organ systems;

- structures and forms of biological structures;

- features of the structure of biological materials and systems, their deformation and strength properties, as well as the destruction of various tissues and systems;

- features of the motor capabilities of biological systems;

- features of substitutes for biological tissues and systems. be able to:

- use methods of theoretical and applied mechanics in combination with methods used in biology and medicine;

- experimentally investigate the mechanical properties of biological tissues, systems and their substitutes;

- determine the parameters of processes in biological materials and systems;

- to build a design scheme and mathematical model for analysis of the physical state of organs and processes that occur in biological systems in health and disease;

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- to apply the tools of computer technology for analysis and modeling of processes in biological materials and systems.

own:

- by means, methods and organizational forms of conducting biomechanical research to solve various problems of medicine.

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Electric and hybrid vehicle technology CODE-ROB401 CREDIT – 6 (2/0/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline introduces the basics of a new type of vehicle, such as electric and hybrid vehicles. The main technical and economic parameters of electric vehicles, their impact on the energy sector, ecology and social sphere of the city are studied. The purpose of the discipline is to give the student an idea of the future of the urban transport sector, in which he could freely navigate and find his field of activity.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "Technology of electric vehicles and hybrid vehicles", the student will get acquainted with the designs of electric vehicles and hybrid installations, the system of urban infrastructure for electric vehicles, the features of operation, recycling and restoration of electric vehicles.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, the student must:

- know what an electric car is and its distinctive features from other vehicles;

- understand the differences between hybrid installations and electric vehicles;

- be able to perform calculation and graphical work on the design of engineering and economic processes associated with the introduction of zero-emission vehicles;

- have experience in operating an electric vehicle.

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Autonomous mobile robots CODE-ROB101 CREDIT – 6 (2/0/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline is to master the basics of robotics and form the knowledge, skills, and competencies necessary to use mobile robotic systems. Teach modern developments in robotics in the field of education. Teach students a set of basic technologies used in creating mobile robots.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "Autonomous mobile robots", the student forms a knowledge base on the basics of organizing the design process, on the principles of parallelization of design works, on ways to achieve optimal technical and economic parameters of the developed products of mobile robotic systems.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- Know the principles of operation and mathematical description of the components of mobile robotic systems; basic principles of designing automation and object management systems; various purposes in real time using procedural object-oriented modeling of design methods;

- Know the composition of the design documentation of electrical and electronic components (including microprocessor) of mobile robotic systems; the composition of the working design documentation of mechanical Assembly units and parts of mobile robotic systems; modern systems for modeling mobile robotic systems.

- Be able to perform calculation and graphical work on the design of information, Electromechanical, electrohydraulic, electronic and microprocessor modules of mobile robotic systems; evaluate the projected nodes and aggregates on the basis of economic efficiency.

- Have experience in designing automation and control systems, using software and hardware tools for building mobile robotic systems;

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Biomedical electronics CODE-ROB100 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE: formation of students ' systematic knowledge in the medical-biological and scientific-technical fields and readiness to apply the knowledge obtained at the University not only for the design of traditional devices of electronic systems, but also for the collection and analysis of raw data for the calculation and design of biomedical equipment. Objectives of the course: formation of an understanding of biomedical micro-and nanoelectronics; development of readiness to collect and analyze raw data for the calculation and design of parts, nodes and modules of biomedical equipment.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Biomedical electronics" refers to the profiling cycle as one of the fundamental Sciences in the field of electronics, related to the concept of receiving information, processing and transmitting it. The elements of diagnostic and physiotherapy equipment used in clinical medicine are based on electrical devices, electrical converters (sensors). Students should have certain knowledge and skills when working with electrical devices and medical equipment, know its functional features.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

- know General information about modern physiological and biophysical models of human body functioning, the specifics of electrical measurements of biophysical and physiological indicators of the body, safety rules for electrical measurements of biomedical parameters and design of biomedical equipment, features of designing electronic equipment, diagnostic and therapeutic devices in medicine;

- be able to operate terms in the field of designing biomedical equipment; use the achievements of domestic and foreign science, technology and technology; measure some characteristics of the functioning of the human body; develop new devices of medical electronics using microprocessor technology and computer systems;

- possess modern methods of collecting, processing, analyzing, systematizing scientific and technical information, presenting the results of research and design activities.

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Sources of Autonomous power for electric vehicles CODE-ROB143 CREDIT – 6 (2/0/1) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline introduces at a deeper level the process of development, operation and utilization of modern energy sources in electric vehicles.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "sources of Autonomous power for electric vehicles", the student will get acquainted with the production technologies of chemical sources of electric energy used in modern electric vehicles. Features of operation of energy sources in various climatic conditions, the influence of "charge-discharge" cycles on the service life of an energy source, types of Li-ion batteries, features of electronic circuits for monitoring the process of charging and discharging the battery are studied. Alternative ways of recharging the battery of an electric vehicle are being studied.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, the student must:

- know the technical features of various energy sources used in electric vehicles;

- understand the chemical and physical processes occurring in electric vehicle energy sources;

- be able to perform calculation and graphical work on the choice of energy sources for electricvehicles .

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Embedded systems in robotics CODE-ROB181 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

Training in basic principles of robot management. Studying the basic principles of building information and measurement systems and control systems based on open microcontroller platforms, forming skills in developing hardware and software for automated control systems and robot control.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Embedded systems in robotics" is a fundamental discipline for the study of microcontroller control of robots. The course is intended for students of mechatronics and robotics.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE At the end of this course, students should be able to program robots, connect various sensors and devices, and calculate robot control algorithms.

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Artificial life support systems CODE-ROB182 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of studying the course "Artificial life support systems" is to form students ' knowledge about the General purposes and classifications of artificial life support systems, and the principles of building artificial replacement equipment.

The objectives of the course are to study devices and General principles of operation of artificial life support devices, engineering research methods for solving various problems of medicine.

BRIEF DESCRIPTION OF THE COURSE

Designation and classification apparatus of artificial life support: the method of playback of body function or system; method of use; the type of substitution of organ function or system. Principles of constructing artificial substitution equipment.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Student

I should know:

-General purposes and classification of artificial life support devices,

- principles of building artificial substitution devices.

must be able to:

- use engineering research methods to solve various problems of medicine.

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Data collection, sensors and electric vehicle control systems CODE-ROB400 CREDIT – 6 (2/0/1) PRECONDITION-ROB187

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline is to acquaint the student with the complex process of collecting data from various systems in an electric vehicle, the design of sensors and control systems of a modern electric vehicle.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "data Collection, sensors and control systems of an electric vehicle", the student will get acquainted with data collection technologies for information buses of a modern electric vehicle. He will study the basic control systems, navigation, safety, climate control of a modern electric car.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE At the end of the course, the student must:

- know the basic principles of data collection in an electric vehicle, the types of sensors and control systems used;

- understand the standards used in modern electric vehicles;

- be able to perform calculation and graphical work on configuring electric vehicle control systems.

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Robot drives CODE-ROB171 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of teaching the discipline is to study by students industrial robots and manipulators of technological equipment, features of design and calculation of modern designs of robotic complexes, their layout and structures, characteristics and requirements, conditions for the use of various types of manipulators in production.

BRIEF DESCRIPTION OF THE COURSE

The main task is to provide students with the necessary complex of knowledge on modern production automation tools, the ability to determine a rational combination of basic technical and economic indicators, and instill practical skills necessary for the research, calculation and design of industrial robots and manipulators.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student must:

- know the technological functions performed by machines,

- design and calculation of basic parameters of industrial robots and manipulators;
- various types and types of automation tools,
- basic designs of industrial robots,
- conditions for creating flexible production complexes of modern industrial production;

- be able to choose the optimal operating conditions of complexes using various types of control,

- perform calculations of the main parameters of industrial robots and manipulators,

- put forward and justify proposals for the modernization and design of these automation tools;

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Medical visualization CODE-ROB172 CREDIT – 6 (2/1/0) PRECONDITION – CSE174

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the course: students study the physical laws underlying the processes of human life activity, as well as familiarize students with the basics of modern mathematical apparatus as a means of solving various theoretical and practical problems of physics, chemistry, biology and a number of clinical disciplines.

Discipline objectives: students acquire knowledge about discrete structures and methods of data encoding; mastering methods of signal visualization; training in methods of data representation in computers; studying the main provisions of image visualization; training in visualization methods in medical practice.

BRIEF DESCRIPTION OF THE COURSE

The basic physical and engineering principles underlying the main medical imaging techniques will be described, and their relative advantages and disadvantages will be considered. The capabilities of visualization methods will be explained in terms of performance criteria such as spatial and temporal resolution, contrast, and signal-to-noise ratio. The effectiveness of the methods will be illustrated in terms of their clinical applications. The historical perspective of the development of each method, as well as the latest innovations, will be presented. Finally, potentially new and novel medical imaging techniques will be considered.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Know: the place and role of visualization tools in scientific research, technology, education, medicine; the structure and basics of the main nodes of medical equipment; basic physical and biophysical phenomena, peculiarities and regularities underlying the processes underlying the receiving person images; mechanisms and characteristics of the impact of physical factors on the organism; the physical basis of the functioning of medical equipment, the purpose and fundamentals of device physiotherapeutic and diagnostic equipment;

Be able to: effectively use in practice theoretical knowledge in the field of medical imaging; read structural, functional and fundamental schemes, identify the nodes of medical equipment and their connections.

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Electric vehicle charging systems CODE-ROB402 CREDIT – 6 (2/0/1) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the discipline is to teach the production technology of charging stations for electric vehicles. Introduce the main international standards in the field of charging infrastructure for electric vehicles.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "electric vehicle charging Systems", the student will get acquainted with the designs of charging stations of low power (up to 22 kW) and high power (more than 20 kW). He will study standard algorithms for interaction of electric vehicle control systems with charging infrastructure. Get an idea of the future of urban infrastructure for electric vehicles and find out what areas will be affected by the development of charging infrastructure.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, the student must:

- know what an electric vehicle charging station is and what types of charging stations there are;

- understand the impact of a network of charging stations on the city's energy system;

- be able to perform calculation and graphical work on the design of a network of charging stations for electric vehicles .

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Designing robots CODE-ROB166 CREDIT – 4 (1/1/0) PRECONDITION-ROB102

PURPOSE AND OBJECTIVES OF THE COURSE

The purpose of the discipline "robot Design" is to study the design algorithms of electronic and mechanical parts of a robotic device. Study of methods and examples of design calculations in the design of robots and robotic systems.

BRIEF DESCRIPTION OF THE COURSE

"Robot design" is a discipline that covers the design of robots from the point of view of creating robotic systems, including mechanical and electronic systems. The discipline gives an idea of the main stages of creating a robotic device.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student should be able to solve design problems related to the design of robots and robotic systems with a comprehensive coverage of the main technological and auxiliary processes, including the processing of parts, control and Assembly of products, their transportation and storage, repair and maintenance.

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Physics of the human body CODE-ROB167 CREDIT – 4 (1/1/0) PRECONDITION-PHY112

PURPOSE AND OBJECTIVES OF THE COURSE

Master the theory of functioning of human body systems.

BRIEF DESCRIPTION OF THE COURSE

The course will present the fundamental physics needed to understand function and failure - some of the major systems of the human body that link physics to physiology and health.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE Know

- the principle of operation of the main systems of the human body;
- causes of occurrence and ways to eliminate malfunctions of human body systems;
- methods of modeling the functions of the human body.

Skills and abilities

- to implement the information processing systems of the human body;
- develop a mathematical model of human body systems;
- to select the methods of elimination of malfunctions of systems of the human body.

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Electric drive of electric vehicles CODE-ROB404 CREDIT – 4 (1/0/1) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline "Electric drive of electric vehicles" studies the design of modern electric vehicles. The purpose of the course is to introduce the student to the operating modes of an electric vehicle's electric drive, the features of regenerative braking, production, repair and maintenance of an electric vehicle's electric drive.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "electric vehicle Drive", the student will get acquainted with modern technologies of electric vehicle drive. Will study the principles of the structure of Converter technology in power modules of an electric car.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE At the end of the course, the student must:

- know the main characteristics of an electric vehicle's electric drive;

- understand terms in electric drive and electric vehicle conversion technology;

- be able to perform calculation and graphic work on the design of an electric vehicle's electricdrive .

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Optoelectronic technologies CODE-ROB121 CREDIT – 6 (2/1/0) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

ИзучениеLearning theprinciples of operation of basic elements of modern optoelectronics, consideration of the properties of materials and technological processes used, familiarization with the basic device designs and principles of construction of optoelectronic circuits, as well as the formation of students ' knowledge and skills that allow them to conduct information search within the framework of the research task, plan and carry out experimental and theoretical research.

BRIEF DESCRIPTION OF THE COURSE

The discipline is a logical continuation of the course "electronics". It discusses the basic principles of transmitting and processing information using both electrical and optical methods and devices.

The physical effects, operating principles and design features of the main types of optoelectronic devices are described. Physical and technical characteristics of such devices are given, and issues of their application in information processing systems are considered. Much attention is paid to the current state of the optoelectronics element base and its development trends based on nanotechnologies.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Students who have completed the study of this discipline should: Know:

- about the structure and development trends of modern optoelectronics;

- about the principles underlying the construction of optoelectronic devices and circuits

- about the possibilities and problems of modern technologies in optoelectronics. Know:

- physical phenomena underlying the operation of optoelectronic devices, and physical laws describing them.

- basic designs of optoelectronic devices, principles of their operation, parameters and characteristics.

- basic materials for optoelectronics and their production technology, methods of designing optoelectronic devices and circuits.

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Cardiac engineering CODE-ROB177 CREDIT – 6 (2/1/0) PRECONDITION-no

GOALS AND OBJECTIVES OF THE DISCIPLINE

Familiarization with the main directions and problems of fundamental and applied research in cardiac engineering. Formation of future specialists 'knowledge on modern problems of biomedical nanoengineering, as well as practical skills of predictive assessments of innovative directions of its development.

BRIEF DESCRIPTION OF THE COURSE

Principles of building systems for recording and analyzing various manifestations of the body's vital activity. Biotechnical and medical systems. Organizational principles and generalized structure. Complexes for collecting, processing, storing and presenting biosignals, survey data, and medical images. Measuring transducers for medical and biological applications and means of summing up impacts. Diagnostic systems and complexes based on the registration of various manifestations of vital activity. Therapeutic devices and systems. Physical processes under the influence of therapeutic factors. Extracorporeal and prosthetic technology. Biostimulators. Transplanted equipment. Surgical operating equipment. Automated systems for calculating and designing electronic circuits. Production technology of medical equipment. Construction of medical equipment and design. Psychological problems of using medical equipment.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE know:

- the role of digital and computer technologies in the development of medical and biological equipment.

- main problems and directions of development of fundamental and applied research in biomedical and environmental engineering;

- subject areas of using advances in biomedical and cardiac engineering.

- technical and software tools for implementing medical information technologies, the basics of working in local and global networks

- basic laws of biological processes, their properties and parameters, technical characteristics of devices and systems for biotechnical and medical purposes,

- main stages of analysis and synthesis of biotechnical systems;

be able to:

- analyze the main trends in the development of biomedical and environmental engineering;

- to consider the properties and biometric characteristics of the human body as an object of study and management of its condition;

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- formulate specific features of this type of object that characterize a person as the controlling link of a biotechnical system;

- skills of assessing changes in the parameters of biological objects, using modern measuring techniques.

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Diagnostics of electric vehicles CODE-ROB405 CREDIT – 6 (2/0/1) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline "Diagnostics of electric vehicles" studies the main methods of diagnosing electric vehicle malfunctions. Studies common faults, ways of their identification and elimination with the help of modern diagnostic devices.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "Diagnostics of electric vehicles", the student will learn to investigate malfunctions in mechanical, electrical and electronic systems of an electric vehicle. Using specialized diagnostic tools to read error codes and find solutions to problems that arise when servicing an electric vehicle.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, the student must:

- know the main faults of an electric vehicle;
- understand possible ways and methods of Troubleshooting electric vehicles;
- be able to use modern electric vehicle diagnostics devices.

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Sensor systems in robotics CODE-ROB139 CREDIT – 4 (1/1/0) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

Provide the necessary principles for building and organizing the functioning of intelligent measuring systems for research purposes and industrial applications.

BRIEF DESCRIPTION OF THE COURSE

Sensor systems of robots make up the main part of their information and measuring systems, the purpose of which is to generate and output information about the state of objects and processes in the environment and about the robot itself, for the functioning of which this information is required. We consider in more detail from the General classification of sensors sensors of mechanical quantities that are most widely used in robotics: sensors of displacement, speed and acceleration, as well as force and pressure.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Basic concepts of mechatronics and robotics, the device of robots, principles of design, construction and management of robotic systems, principles and methodological bases for the construction of mechatronic devices, modules, systems, the device and principle of operation of industrial robots, manipulators, grapplers PR, individual modules PR, classification of mechatronic modules, robots and manipulators, their main technical characteristics.

SKILLS:

Designing manipulators and mobile robots, programming manipulators and mobile robots.

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Clinical engineering CODE-ROB176 CREDIT – 4 (1/1/0) PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

Familiarization with the main directions and problems of basic and applied research in clinical engineering (CI). Analysis of the main trends in the development of BMI biomedical engineering, identification of its promising directions and opportunities for practical application. Formation of future specialists 'knowledge on modern problems of biomedical nanoengineering, as well as practical skills of predictive assessments of innovative directions of its development.

Discipline objectives: the ability to use specialized knowledge in the field of physics for the development of specialized physical disciplines; the ability to conduct scientific research in the chosen field of experimental and (or) theoretical physical research with the help of modern instrumentation (including complex physical equipment) and information technologies, taking into account domestic and foreign experience.

BRIEF DESCRIPTION OF THE COURSE

History and methodology of clinical engineering. Devices and materials for medical and biological purposes. Technical support for medical and biological research. Biomedical electronic devices, apparatuses, systems and complexes, their applications and development prospects. The main directions of development of biomedical engineering (BMI).

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

Facts: history and main stages of development of biomedical research; the role of digital and computer technology in the progress of creating equipment mediko and biological use; the main problems and directions of development of fundamental and applied research in biomedical and clinical engineering; basic laws of flow in biological processes, their properties and parameters, technical characteristics of the devices and systems of biotechnical and medical devices, fundamentals and principles of mathematical methods of analysis and processing of biomedical signals and images; Be able to: analyze the main trends in the development of biomedical and environmental engineering; consider the properties and biometric characteristics of the human body as an object of study and management of its condition; workwith special literature.

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Autonomous management systems CODE-ROB403 CREDIT – 4 (1/0/1) PRECONDITION –

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the discipline is to give an idea of Autonomous control technology in electric vehicles. Study of the principles of safe driving of electric vehicles without a driver in urban conditions.

BRIEF DESCRIPTION OF THE COURSE

In the course of studying the discipline "Autonomous control Systems", the student will get acquainted with advanced technologies for organizing unmanned control of electric vehicles. To get acquainted with the systems monitor on-road and advanced sensors ensure safety on the road.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE At the end of the course, the student must:

- know the basic principles of building self-driving electric vehicle control systems on urban roads;

- understand the processes involved in ensuring road safety in the use of unmanned vehicles;

- be able to perform calculation and graphic work on the organization of the movement of unmanned transport.

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Managing robots CODE-ROB148 CREDIT – 6 (2/1/0) PRECONDITION-ROB127

THE purpose AND OBJECTIVES of the COURSE are to develop students 'knowledge and skills in designing and programming robots.

BRIEF DESCRIPTION OF THE COURSE

Basic concepts of mechatronics and robotics, the device of robots, principles of design, construction and management of robotic systems, principles and methodological bases for the construction of mechatronic devices, modules, systems, the device and principle of operation of industrial robots, manipulators, grapplers PR, individual modules PR, classification of mechatronic modules, robots and manipulators, their main technical characteristics. Designing manipulators and mobile robots, programming manipulators and mobile robots.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE know:

- types and purpose of robotic devices;
- robot applications;
- types and capabilities of robotic constructors;
- stages of creating a robotic device.

be able to:

- design individual components of a robotic device;
- design and construct a robotic device for performing certain actions;
- program the actions of robotic devices;
- program the response of robotic devices to external influences.

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Management in biotechnical systems CODE-ROB 146 CREDIT – 6 (2/1/0) PRECONDITION-ROB127

GOALS AND OBJECTIVES OF THE DISCIPLINE

The purpose of the discipline is to form ideas about the properties of technical systems with feedback, the possibility of purposeful correction of indicators of the quality of functioning of biotechnical systems.

The objectives of studying the discipline are to master the methods of analysis and synthesis of automatic control systems for technical objects.

BRIEF DESCRIPTION OF THE COURSE

Discipline "Management in biotechnical systems" the previous disciplines that form the initial knowledge are the following disciplines: fundamentals of electronics, microcontroller control systems, educational and research work, electrical engineering. The process of studying the discipline is aimed at the formation of the following competencies:

- ability to solve problems of analysis and calculation of electrical circuit characteristics; - ability to use computer skills, master information technology methods, and comply with basic information security requirements.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of studying the discipline, the student must:

- facts: the mathematical apparatus used to analyze linear continuous and discrete systems of automatic control; transfer function of a typical dynamic elements of automatic control systems, their characteristics and practical implementation; methods of assessing the stability of linear continuous and discrete systems of automatic control; main frequency and time characteristics of linear continuous and discrete systems of automatic control automatic control and methods for their preparation; methods of correction accuracy, dynamic and frequency characteristics of linear continuous automatic control systems synthesis and selection of subsequent corrective devices (regulators); electronic methods of modeling of linear continuous and discrete systems of automatic control.

be able to: calculate frequency and time characteristics of linear continuous automatic control systems and analyze them; synthesize corrective devices to obtain the required indicators of control quality in single-circuit and multi-circuit automatic control systems;
possess: a method for calculating static, frequency and time characteristics of linear continuous automatic control systems; a method for analyzing and synthesizing multi-circuit electric drive systems with subordinate regulation.

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Connecting alternative energy sources with electric vehicles CODE-ROB406 CREDIT – 6 (2/0/1) PRECONDITION-ROB156

PURPOSE AND OBJECTIVES OF THE COURSE

The discipline "Connecting alternative energy sources with electric vehicles" studies issues related to the integration of advanced technologies in the field of alternative energy with electric vehicle transport.

BRIEF DESCRIPTION OF THE COURSE

The discipline "Connecting alternative energy sources with electric vehicles" covers alternative energy technologies and links achievements in these areas with electric vehicles. The possibilities of using solar cells, solar thermal systems, cavitation systems, piezoelectric elements in the electric car industry are considered.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, the student must:

- to understand the technology of alternative energy;

- understand the possibilities of introducing alternative energy sources in the electric vehicle industry;

- be able to conduct theoretical and practical calculations in the field of alternative energy.

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Defense of a thesis / diploma project CODE-ECA102 CREDIT – 4 PRECONDITION-no

PURPOSE AND OBJECTIVES OF THE COURSE

The main purpose of the diploma design is to perform independent design or research work by the student, the results of which confirm the qualification of an engineer in the direction of "Robotics and mechatronics".

The main task of diploma design is to consolidate the acquired skills of a systematic approach in the development of biomedical and robotic systems.

BRIEF DESCRIPTION OF THE COURSE

A special feature of the thesis is the solution of a problem from the field of fundamental or exploratory scientific research and contains an extended theoretical part. The diploma work should be of a research nature and represent a theoretical or experimental study of one of the actual scientific problems in the specialty. The final qualification work of the bachelor (diploma work or diploma project) must be a completed research, design or technological development related to the solution of actual problems determined by the features of training in the direction of "Robotics and mechatronics".

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

A diploma project (work) is a final work, based on the protection of which the State attestation Commission decides whether to grant a student a bachelor's degree in the direction of "Robotics and mechatronics".

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- 3 Requirements for completing training and obtaining a diploma
- 4 Working curriculum of the educational program
- 5 Descriptors of the level and scope of knowledge, skills, skills and competencies
- 6 Competencies at the end of training
- 7 policy for obtaining additional education Minor
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РЕЦЕНЗИЯ

на образовательную программу «6В07111 Робототехника и мехатроника»

Срок обучения - 4 года.

Образовательная программа построена таким образом, чтобы обеспечивалась целостность образования, сочетание фундаментальной подготовки с междисциплинарным характером профессиональной деятельности специалиста.

При разработке образовательных программ особое внимание уделялось к формированию целей обеспечения непрерывности их содержания, учитывающих логику академической взаимосвязи дисциплин, их последовательности и преемственности.

Программа обеспечивает изучение и исследование всех видов современных информационно-измерительных систем и комплексов.

Обучающимся образовательной программы «Робототехника и мехатроника» специальности Приборостроение предоставляется возможность прохождения производственной и преддипломной практики на предприятиях. Развивает у студентов способности к пониманию современных достижений в области проблем развития приборостроения.

Данная программа соответствует всем требованиям ГОСО специальности и Типовому учебному плану.

Заместитель директора по ИиИТ ТОО «Корпорация Сайман»



Байбеков К.И.

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РЕЦЕНЗИЯ

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Срок обучения – 4 года.

Образовательная программа построена таким образом, чтобы обеспечивалась целостность образования, сочетание фундаментальной подготовки с междисциплинарным характером профессиональной деятельности специалиста.

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Заместитель директора по ИиИТ ТОО «Корпорация Сайман»



Байбеков К.И.

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