Контрольный экземпляр 45.4.2.ур.

BELARUSIAN STATE UNIVERSITY

Rector
Belarusian State University
Andrei D. Karol
«30» 12 2019 г.
Registration number 031а-122/ур.
«30» 12 2019 г.

CURRICULUM
for foreign students

Degree: Master

Speciality: 1-31 80 20 Applied physics

Period of Study: 1 year 8 months

Profiling: High-Current Electronics

Form of Education: full-time

I. Schedule of the educational process

II. Summary (in weeks)

Years	September	October	November	December	January	February	March	April	May	June	July	August	Academic Studies	Exams	Internship	Research	Master's Thesis	Vacation	Total
I								11	= = = =	7	: : :	= = = =	18	3				8	29
I/II			17	: : : : = =	9			= = = =	5	: X X X X / /		= = = =	31	5	4	2		10	52
II	8	:	/ / //										8	1		2	1		12
													57	9	4	4	1	18	93

Legend: [ ] — Academic Studies; [X] — Internship; [//] — Master's Thesis; [:] — Exams; [/] — Research; [=] — Vacation

III. Curriculum

No	The name of the module, academic discipline, course project (course work)	Exams	End-of-term test	Academic hours: Total	Total in class	As follows: Lectures	Laboratory work	Workshops	Seminar classes	Semesters: I year, 1 semester, 18 weeks: Total	Total in class	Credits	I year, 2 semester, 17 weeks: Total	Total in class	Credits	II year, 3 semester, 14 weeks: Total	Total in class	Credits	II year, 4 semester, 8 weeks: Total	Total in class	Credits	Competence Code
1.	**State Component**			**1560**	**462**	**246**	**72**	**120**	**24**	**846**	**318**	**24**	**534**	**144**	**15**	**90**		**3**	**90**		**3**	
1.1.	*Modulus «Technical applications of theoretical physics»*																					
1.1.1	Condensed state physics	1		216	90	46		44		216	90	6										UC -1, 2 DPC -1
1.1.2	Applied problems in thermodynamics and statistical physics	1		216	90	46		44		216	90	6										UC -1, 2 DPC -2
1.1.3	Modern problems of physics	1		108	48	36			12	108	48	3										UC -1, 2 DPC -3
1.1.4	Physics of energy and wave processes		2	108	48	36			12				108	48	3							UC -1, 2 DPC -4
1.2.	*Modulus «Mathematical methods in physics»*																					
1.2.1	Mathematical modeling methods for physical processes	2	1	324	138	54	52	32		216	90	6	108	48	3							UC -3, DPC -5
1.2.2	Computational methods in physics and physical experiment	2		108	48	28	20						108	48	3							UC -3, DPC -6
1.3	*Modulus «Research activities associated with the subject of master's thesis»*																					UC -1-3
1.3.1	Research seminar		1,2,3, 4	360						90		3	90		3	90		3	90		3	
1.3.2	Course paper on the subjects of thesis			120									120		3							
2.	**Higher Education Institution Component**			**2166**	**834**	**396**	**180**	**142**	**116**	**216**	**90**	**6**	**600**	**240**	**15**	**864**	**324**	**27**	**486**	**180**	**15**	
2.1	*Modulus «Physics of high voltage»*																					
2.1.1	Principles and methods for high voltage generation	1		216	90	46		44		216	90	6										SC -1
2.2	*Modulus «Engineering physics»*																					
2.2.1	Contemporary experiment techniques		2	120	48	36			12				120	48	3							SC -2
2.2.2	Foundations of pulsed power technologies	2		120	48	36			12				120	48	3							SC -3
2.2.3	Radiation generation by electron beams	2		120	48	36			12				120	48	3							SC -4
2.2.4	Modeling and design of physical devices		3	90	36	36										90	36	3				SC -5
2.2.5	Microwave measurements in time and frequency domains		3	90	36	20			16							90	36	3				SC -6
2.3	*Modulus «Contemporary laser systems»*[1]																					
2.3.1	Quantum phenomena in atomic and molecular systems	2	2	240	96	54		26	16				240	96	6							SC -7

No	The name of the module, academic discipline, course project (course work)	Exams	End-of-term test	Academic hours						Semesters												Competence Code
						As follows:				I year						II year						
										1 semester, 18 weeks			2 semester, 17 weeks			3 semester, 14 weeks			4 semester, 8 weeks			
				Total	Total in class	Lectures	Laboratory work	Workshops	Seminar classes	Total	Total in class	Credits	Total	Total in class	Credits	Total	Total in class	Credits	Total	Total in class	Credits	
2.3.2	Advanced laser systems	3		198	72	48			24							198	72	6				SC -8
2.3.3	Specialized laboratory works «Contemporary laser systems»		3	198	72		72									198	72	6				SC -9
2.4	*Modulus «Laser spectroscopy»* [1]																					
2.4.1	Laser spectroscopy	3		198	72	48			24							198	72	6				SC -10
2.4.2	Specialized laboratory works «Laser-emission spectroscopy»		3	90	36		36									90	36	3				SC -11
2.5	*Modulus «Software and hardware for automation of experiment»* [1]																					
2.5.1	Programmable microcontroller systems	4		90	36	36													90	36	3	SC -12
2.5.2	Specialized laboratory works «Physical principles of high voltage electronics»		4	198	72		72												198	72	6	SC -13
2.5.3	Specialized laboratory works «Microcontroller systems»		4	198	72		72												198	72	6	SC -14
3.	**Optional Subjects**																					
3.1	Creative Teaching Techniques at Higher School/ Pedagogy and Psychology of Higher Education		/1	/108	/56	/30		/26								/108	/56	/3				UC -4
4.	**Series of Disciplines for Candidate Exams and Additional Training**																					
4.1	Philosophy and Methodology of Science [2]	/2		/240	/104	/60			/44	/140	/60		/100	/44	/6							UC-5
4.2	Foreign Language [2]/ Russian language for international communication	/2	/1	/220	/140			/140		/110	/70	/3	/110	/70	/3							UC-6
4.3	Information Technologies: Basics [2]		/1	/108	/72	/36	/36			/108	/72	/3										UC -7

Number of Hours	**3726**	**1296**	**642**	**252**	**262**	**140**	**1062**	**408**	**30**	**1134**	**384**	**30**	**954**	**324**	**30**	**576**	**180**	**18**	
Number of Hours per Week							23			23			23			23			
Number of Course Works	1						1			1									
Number of Exams	12						4			5			2			1			
Number of End-of-term tests	14						2			4			5			3			

IV. Internship				V. Research			VI. Final Certification
Internship Title	Semester	Weeks	Credits	Semester	Weeks	Credits	Master's Thesis
Research	4	4	6	4	4	6	

VII. Competence Matrix

Competence Code	Competence	Module Code, Discipline Code
UC -1	Abilities to use the scientific cognition techniques (analysis, comparison, systematization, abstracting, modeling, data verification, decision-making, etc.) in independent research activities, to generate and to realize innovative ideas	1.1.1-1.1.4, 1.3
UC -2	Abilities to solve practical tasks using the knowledge acquired in theoretical physics; to realize the professional research and technological activities; to comprehend creatively scientific, engineering, and design information; to analyze the process of solving scientific and technological problems	1.1.1-1.1.4, 1.3
UC -3	Ability to use the fundamental mathematical knowledge for data analysis and verification, estimation of information completeness in the process of professional activities; if required, to find or synthesize insufficient information; to realize the activities in conditions of uncertainty	1.2.1, 1.2.2, 1.3
UC -4	Ability to realize pedagogical activities in educational institutions; to master and introduce the effective educational and information communication technologies, pedagogical innovations	3.1
UC -5	Mastering scientific cognition methods; ability to analyze the content and level of philosophical-methodological problems when accomplishing the tasks of research and innovative activities	4.1
UC -6	Mastering of foreign languages for communication in interdisciplinary and research fields, in different forms of international collaboration, research and innovative activities	4.2
UC -7	Skills to use advanced information technologies for solving of research and innovative problems	4.3
DPC -1	Ability to use the methods of theoretical physics for description of condensed matter, to apply the acquired knowledge in the process of independent design and development work, to extend the competence to new fields of modern technologies	1.1.1
DPC -2	Abilities to analyze and professionally use modern methods of thermodynamics and statistical physics, to perform analytical and numerical calculations, to use the obtained results for the creation of new technological products	1.1.2
DPC -3	Ability to use the achievements of modern physics for solving of applied problems; using of theoretical techniques to analyze behavior of nonlinear dynamic systems	1.1.3
DPC -4	Ability to use the methods of vibration and wave theory for description of real systems and energy processes in these systems	1.1.4
DPC -5	Ability to construct and to refine mathematical models of physical phenomena, to realize them with the use of advanced information technologies; to analyze the proposed product in context of the latest achievements of mathematical modeling	1.2.1
DPC -6	Ability to understand and to apply professionally the computational experiment techniques; to perform efficient numerical computations within models for description of physical objects and processes	1.2.2
SC -1	Ability to analyze and use in their professional activities the contemporary methods of creation of high voltage generation devices, to carry out appropriate analytical and numerical developments	2.1.1
SC -2	Ability to design and conduct physical experiments, to use contemporary methods of physical research and physical measurements	2.2.1
SC -3	Ability to choose electronic techniques for pulse high voltage generation fitted to assigned task, to use the results of analytical and numerical developments for pulse high voltage generation devices to create new technical objects and technologies	2.2.2

Continued for the speciality 1-31 80 20 «Applied physics». Registration number № Б31а-122/уч.

Competence code	Competence	Module Code, Discipline Code
SC -4	Ability to use knowledge about the laws of electrodynamics and interactions of electron beams with matter in development of the high-current electronic technologies	2.2.3
SC -5	Understanding of main principles and methods of calculation parameters and design of physical units. Adherence to the safety principles, ability to apply safety operation procedures and measures with high voltage systems, electron accelerators and microwave sources.	2.2.4
SC -6	Understanding of physical sense of time and frequency measurement procedures in microwave band	2.2.5
SC -7	Ability to understand the quantum nature of phenomena in high-current electronics to use this understanding for development of correspondent devices and techniques; ability to use knowledge of the physical processes underlying the interactions between laser radiation and condensed media for the development and introduction of laser material-processing technologies	2.3.1
SC -8	Ability to use knowledge on construction, operation principles of up-to-date spectroscopic laser devices and units	2.3.2
SC -9	Ability to use modern spectroscopic laser systems in research, technology, and medicine	2.3.3
SC -10	Ability to use the concepts laser physics in science and technical developments	2.4.1
SC -11	Ability to use, operation laser emission methods in experimental research	2.4.2
SC -12	Ability to choose the type of microcontroller systems for automation processes and control in high-current electronics	2.5.1
SC -13	Ability to use the knowledge of physical processes at high energy densities to develop and testing the high current pulse electronics devises and to create powerful pulse electromagnetic radiation sources	2.5.2
SC -14	Ability to produce and specify software for microcontroller systems using for automation processes and control in high-current electronics	2.5.3

It is developed on the basis of the standard curriculum, approved 21.03.2019 г. (Registration number № G 31-2-012/пр.-тип.)

[1] The enumerated moduli and their contents are annually revised and qualified by the Faculty Council in accordance with the proposals of the relevant departments and personnel recruiting organizations.

[2] Series of Disciplines for Candidate Exams and Additional Training «Philosophy and Methodology of Science», «Foreign Language», «Information Technologies: Basics» are studied according to the choice of a student.

AGREED

Vice-Rector
for Academic Affairs and Education Innovations
_____ Oksana N. Zdrok
«30» ____12____ 2019

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Academic Affairs Department,
Head
_____ Alena A. Dastanka
«30» ____12____ 2019

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Dean of the Physics Faculty
_____ Mikhael S. Tivanov
«30» ____12____ 2019