RATIFIED
Rector
_____________ Andrei D.Karol
«22» 02 _______ 2022

Registration No Ма-180/уч.

Контрольный экземпляр 45.2.2 уч.

BELARUSIAN STATE UNIVERSITY

CURRICULUM

for foreign students

Speciality: 1-31 80 20 Applied Physics

Profiling: Physical Informatics

Degree: Master

Period of Study: 1 year 8 months

Form of Education: full-time

I. Schedule of the educational process

YEARS	September					October				November				December					January				February				March					April				May				June					July				August			
	1-7	8-14	15-21	22-28	29.09-05.10	6-12	13-19	20-26	27.10-02.11	3-9	10-16	17-23	24-30	1-7	8-14	15-21	22-28	29.12-04.01	5-11	12-18	19-25	26.01-01.02	2-8	9-15	16-22	23.02-01.03	2-8	9-15	16-22	23-29	30.03-05.04	6-12	13-19	20-26	27.04-03.05	4-10	11-17	18-24	25-31	1-7	8-14	15-21	22-28	29.06-05.07	6-12	13-19	20-26	27.07-02.08	3-9	10-16	17-23	24-31
I										18									:	:	:	=	=										18									:	:	:	=	=	=	=	=	=	=	=
II									18										:	:	=	=	X	X	X	X	/	/	/	/	/	/	/	/	//																	

II. Summary (in weeks)

	Academic Studies	Exams	Internship	Research	Master's Thesis	Vacation	Total
I	36	6				10	52
II	18	2	4	8	1	2	35
	54	**8**	**4**	**8**	**1**	**12**	**87**

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

III. Curriculum

No	The name of the module, academic discipline, course project (course work)	Exams	End-of-term test	Academic hours						Semesters												Total credits	Competence Code
						As follows:				I year						II year							
										1 semester, 18 weeks			2 semester, 18 weeks			3 semester, 18 weeks			4 semester				
				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		
1.	**State Component**			**1560**	**462**	**246**	**72**	**120**	**24**	**846**	**318**	**24**	**534**	**144**	**15**	**90**		**3**	**90**		**3**	**45**	
1.1	**Module «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	Physics of Energy and Wave Processes	1		108	48	36			12	108	48	3											UC-1, 2, DPC-3
1.1.4	Modern Problems of Physics		2	108	48	36			12				108	48	3								UC-1, 2, DPC-4
1.2	**Module «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	**Module «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**			**1926**	**690**	**270**	**420**			**198**	**102**	**6**	**522**	**210**	**15**	**1206**	**378**	**36**				**57**	
2.1	**Physics of Processing, Storage and Transmission of Information**																						
2.1.1	Physics of Computational Technologies	1		90	54	18	36			90	54	3											SC-1
2.1.2	Telecommunication Systems		1	108	48	20	28			108	48	3											SC-2
2.1.3	Physics of Information Processing and Storage	2		198	60	28	32						198	60	6								SC-3
2.1.4	Reliability of Electronic Systems		2	108	48	16	32						108	48	3								SC-4
2.1.5	Sensorics and Microsystem Technology / Intelligent Sensors	2		108	48	18	30						108	48	3								SC-5, SC-6
2.1.6	Ad Hoc Electronics of Information Systems		3	198	54	18	36									198	54	6					SC-7
2.2	**Information Processing Technologies**																						
2.2.1	Applied Data Analysis		2	108	54	18	36						108	54	3								SC-8
2.2.2	Intelligent Technologies for Processing Physical Experimental Data	3		198	54	18	36									198	54	6					SC-9
2.2.3	Machine and Deep Learning Technologies		3	198	54	20	34									198	54	6					SC-10
2.3	**Information Measuring Systems Technologies**																						
2.3.1	Information Systems Design Technologies	3		108	48	18	30									108	48	3					SC-11
2.3.2	Radiophysical Methods of Information Security and Electromagnetic Compatibility	3		198	60	30	30									198	60	6					SC-12
2.3.3	Fiber-Optic Information and Measurement Systems and Technologies / Processing and Analysis of Optical Information		3	198	54	24	30									198	54	6					SC-13, SC-14
2.3.4	Laser Information and Measurement Systems / Laser Methods of Recording Information		3	108	54	24	30									108	54	3					SC-15, SC-16
3.	**Optional Subjects**			**/108**	**/56**	**/30**		**/26**		**/108**	**/56**	**/3**										**/3**	
3.1	Creative Teaching Techniques at Higher School / Pedagogy and Psychology of Higher Education		/1	/108	/56	/30		/26		/108	/56	/3										/3	UC-4
4.	**Series of Disciplines for Candidate Exams and Additional Training**			**/568**	**/316**	**/96**	**/36**	**/140**	**/44**	**/358**	**/202**	**/6**	**/210**	**/114**	**/9**							**/15**	
4.1	Foreign Language for Professional Communication / Foreign Language [1]	/2	/1	/220	/140			/140		/110	/70	/3	/110	/70	/3							/6	UC-6
4.2	Philosophy and Methodology of Science [1]	/2		/240	/104	/60			/44	/140	/60		/100	/44	/6							/6	UC-5
4.3	Information Technologies: Basics [1]		/1	/108	/72	/36	/36			/108	/72	/3										/3	UC-7
Number of Hours				**3486**	**1152**	**516**	**492**	**120**	**24**	**1044**	**420**	**30**	**1056**	**354**	**30**	**1296**	**378**	**39**	**90**		**3**		
Number of Hours per Week											**23**			**20**			**21**						
Number of Exams				**11**							**4**			**4**			**3**						
Number of End-of-term tests				**13**							**3**			**4**			**5**			**1**			

IV. Internship				V. Research			VI. Final Certification
Internship Title	Semester	Weeks	Credits	Semester	Weeks	Credits	Master's Thesis
Research	4	4	6	4	8	12	

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 problems 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 in order to analysis data 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 the modern methods of thermodynamics and statistical physics, in order to perform an 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 approaches of the theory of vibration and the wave theory in order to analyze the energy transfer processes in real systems	1.1.3
DPC-4	Ability to use the progress of modern physics achievements in order to solve applied problems; using of theoretical techniques to analyze behavior of nonlinear dynamic systems	1.1.4
DPC-5	Ability to construct and develop mathematical models of physical phenomena, to realize them with the use of modern information technologies; to analyze the proposed product in context of the latest achievements of mathematical modelling	1.2.1
DPC-6	Ability to understand and apply professionally the computational experiment techniques; to perform the efficient numerical simulations within models for description of physical systems and processes	1.2.2
SC-1	Mastering methods and technologies for performing computational operations based on systems and processes of various physical nature, including electronic digital and analog, optical and quantum computing	2.1.1
SC-2	Abilities to design and modernize telecommunication systems and various hardware and software systems based on them and to develop technical specifications for design and modernization in accordance with a given specification and customer requirements	2.1.2
SC-3	Skills in research and modelling of physical processes in semiconductor devices; abilities to develop new methods and technologies for storing and managing information	2.1.3
SC-4	Ability to analyze the causes of failures of complex electronic systems and to predict their reliability	2.1.4
SC-5	Mastering the methods of precision control of the parameters of the developed sensor systems, the construction and manufacture of circuits for their temperature stabilization	2.1.5
SC-6	Mastering the methods and technologies for converting the physical and chemical effects of observation objects into information; to know the physical foundations of the smart sensors operation	2.1.5
SC-7	Abilities to analyze physical phenomena and processes occurring in the elements of special electronics of information systems: mastering methods for the development and evaluation of the parameters of such systems	2.1.6
SC-8	Abilities to use the methods of applied data analysis in the statistical programming environment R for solving scientific and practical problems of processing physical information	2.2.1
SC-9	Abilities to conduct a qualitative and comparative analysis of the results of a physical experiment based on artificial intelligence technologies for processing data arrays	2.2.2
SC-10	Abilities to use machine learning and deep learning methods to solve applied data processing problems	2.2.3
SC-11	Abilities to apply modern CAD technologies to design intelligent information and measurement systems	2.3.1
SC-12	Mastering the methods of development and application of technical tools and systems to secure information and to ensure electromagnetic compatibility of radioelectronic systems	2.3.2
SC-13	The skills of applying modern technologies in the development of fiber-optic information and measurement systems based on active and passive components of fiber optics	2.3.3
SC-14	Mastering the methods of computer processing and analysis of optical information; mastering methods of interpretation of measurement information	2.3.3
SC-15	Mastering the methods of constructing laser measuring and diagnostic systems under conditions of a priori uncertainty; abilities to use laser location methods to carry out various measurements	2.3.4
SC-16	To know the basics of the laser radiation interaction with solid-state materials and to master the skills of working on modern experimental equipment for high-precision laser processing of materials	2.3.4

It is developed on the basis of the curriculum for specialty 1-31 80 20 Applied Physics, approved on 11.04.2019 (Registration number G 31-096/уч.)

[1] General educational disciplines «Foreign Language», «Philosophy and Methodology of Science», «Information Technologies: Basics» are studied at the choice of a master's student. The study of general education disciplines «Philosophy and Methodology of Science», «Foreign Language» ends by the passing of the candidate exam, the general education discipline «Information Technologies: Basics» – the candidate end-of-term test.

Vice-Rector for Academic Affairs and Internationalization of Education	Academic Affairs Department Head	Dean of the Faculty of Radiophysics and Computer Technologies	Expert norm controller
Konstantin V. Kozadaev	Natalia I. Morozova	Dmitrii V. Ushakov	Anzhelika V. Kostenevich
« 22 » 02 2022	« 22 » 02 2022	« 22 » 02 2022	« 22 » 02 2022

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