BELARUSIAN STATE UNIVERSITY
CURRICULUM
for foreign students

Speciality: 7-06-0533-09 Aerospace Technologies

Profiling: Satellites and unmanned aerial vehicle engineering

Degree: Master of Science

Period of Study: 2 years

Form of Education: full-time

RATIFIED
Rector

Andrei D. Karol

« 11 » 2023

Registration No

I. Schedule of the educational process

YEARS	September 1–7	8–14	15–21	22–28	29/09–05/10	October 6–12	13–19	20–26	27/10–02/11	November 3–9	10–16	17–23	24–30	December 1–7	8–14	15–21	22–28	29/12–04/01	January 5–11	12–18	19–25	26/01–01/02	February 2–8	9–15	16–22	23/02–01/03	March 2–8	9–15	16–22	23–29	30/03–05/04	April 6–12	13–19	20–26	27/04–03/05	May 4–10	11–17	18–24	25–31	June 1–7	8–14	15–21	22–28	29/06–05/07	July 6–12	13–19	20–26	27/07–02/08	August 3–9	10–16	17–23	24–31
I									16																										16					:	:	:	:	=	=	=								
II									17													:	:	:	=	=	X	X	X	X	X	X	X	/	/	/	/	/	/	/	/	/	/	/	/	/	/	//				

II. Summary (in weeks)

	Academic Studies	Exams	Internship	Research	Master's Thesis	Vacation	Total
I	32	8				12	52
II	17	3	8	12	1	2	43
	49	11	8	12	1	14	95

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

III. Curriculum

№ п/п	The name of the module, academic discipline, course project (course work)	Exams	End-of-term test	Total	Total in class	Lectures	Laboratory work	Workshops	Seminar classes	1 sem Total	1 sem Total in class	1 sem Credits	2 sem Total	2 sem Total in class	2 sem Credits	3 sem Total	3 sem Total in class	3 sem Credits	4 sem Total	4 sem Total in class	4 sem Credits	Competence Code
1.	State Component			774	398	190	208			576	298	18	90	48	3	108	52	3				
1.1	Module «Satellites and Unmanned Aerial Vehicle Engineering 1»																					UC-1,2,4-6, DPC-1
1.1.1	Satellites and Unmanned Aerial Vehicle Data Handling and Processing Systems	1		90	48	24	24			90	48	3										
1.1.2	Satellites and Unmanned Aerial Vehicle Electrical Power Systems		1	90	48	20	28			90	48	3										
1.1.3	Satellites and Unmanned Aerial Vehicle Attitude Determination And Control Systems	1		90	48	20	28			90	48	3										
1.2	Module «Flight Control»																					UC-1,2,4-6, DPC-2
1.2.1	Dynamics and Control of a Small Satellites	1		108	52	28	24			108	52	3										
1.2.2	Aerospace Navigation Systems		1	108	54	30	24			108	54	3										
1.3	Module «Aerospace Engineering Materials»																					UC-1,2,4-6, DPC-3
1.3.1	Materials and Protection Technologies for Corpuscular and Electromagnetic Cosmic Radiation		1	90	48	20	28			90	48	3										
1.3.2	Manufacturing Technology of Radiation-Resistant, Antifriction, Thermoregulatory Materials and Coating	2		90	48	24	24						90	48	3							
1.4	Space Mission Design	3		108	52	24	28									108	52	3				DPC-4
2.	Higher Education Institution Component			2124	682	276	268	24	114	396	86	12	864	320	27	864	276	27				
2.1	Project Management in the Aerospace Industry		1	108	54	24			30	108	54	3										UC-4-7, SC-1
2.2	Module «Satellites and Unmanned Aerial Vehicle Engineering 2»																					DPC-1
2.2.1	Computer-Aided Design of Satellites and Aerial Vehicles	2		90	48	20	28						90	48	3							SC-2
2.2.2	Applied Aerodynamics	2		90	44	20		24					90	44	3							SC-3
2.2.3	Methods and Means of Technological and Qualification Tests/ Fundamentals of Sensor Engineering and 3D Micromechanics in Aerospace Systems	3		90	44	20	24									90	44	3				SC-4/ SC-5
2.2.4	Fundamentals of Design and Flight Dynamics of Launch Vehicles/ Small Satellite Propulsion Systems	3		90	44	20	24									90	44	3				SC-6/ SC-7
2.3	Module «Ground Segment»																					
2.3.1	Ground Stations for Data Control, Reception and Processing	2		108	56	28	28						108	56	3							SC-8
2.3.2	Antenna Systems		2	90	48	20	28						90	48	3							SC-9
2.3.3	Ground-Based Optical Space Surveillance Systems	3		90	48	20	28									90	48	3				SC-10
2.3.4	Software-Defined Radio Systems	3		90	48	20	28									90	48	3				SC-11
2.3.5	Laser Systems Application in Aerospace Technology/ Laser And Ion-Plasma Technologies	3		90	48	20	28									90	48	3				SC-12 / SC-13
2.4	Module «Data Processing and Analysis, Information Security»																					
2.4.1	Applied Analysis of Aerospace Experimental Data/ Distributed Computing in Digital Signal And Image Processing	2		108	52	24	28						108	52	3							SC-14 / SC-15
2.4.2	Information Security Systems	2		90	40	20			20				90	40	3							SC-16
2.4.3	Cybersecurity in Aerospace Technologies	3		90	44	20	24									90	44	3				SC-16
2.5	Module «Research Work»																					UC-1,2
2.5.1	Scientific Seminar «Advanced Aerospace Technologies»	1,2		180	64				64	90	32	3	90	32	3							
2.5.2	Research on the Subject of Master's Thesis	1-3		720						198		6	198		6	324		9				
2.6	Optional Subjects			/216	/140				/140	/108	/70	/3	/108	/70	/3							
2.6.1	Russian as a Foreign Language [1]	/2	/1	/216	/140				/140	/108	/70	/3	/108	/70	/3							UC-3
2.7	Series of Disciplines for Candidate Exams and Additional Training			/338	/218	/66	/24	/96	/32	/206	/138	/2	/132	/80	/7							
2.7.1	Philosophy and Methodology of Science [2]	/2		/124	/72	/40			/32	/62	/40		/62	/32	/3							UC-1
2.7.2	Foreign Language [2]	/2		/142	/96			/96		/72	/48		/70	/48	/4							UC-3
2.7.3	Information Technologies: Basics [2]		/1	/72	/50	/26	/24			/72	/50	/2										UC-2
	Number of Hours			2898	1080	466	476	24	114	972	384	30	954	368	30	972	328	30				
	Number of Hours per Week										24			23			19					
	Number of Exams			9							3			3			3					
	Number of End-of-term tests			17							6			6			5					

IV. Internship				V. Research			VI. Final Certification
Internship Title	Semester	Weeks	Credits	Semester	Weeks	Credits	
Research	4	8	12	4	12	18	Master's Thesis

VIII. Competence Matrix

Competence Code	Competence	Module Code, Discipline Code
UC-1	Use the scientific cognition techniques in research activities, to generate and to realize innovative ideas	1.1, 1.2, 1.3, 2.5, 2.7.1
UC-2	Solve research and innovative problems using advanced information technologies	1.1, 1.2, 1.3, 2.5, 2.7.2
UC-3	Communicate in a foreign language in an academic, scientific, and professional environment for research and innovation activities	2.6.1, 2.7.3
UC-4	Ensure communication, demonstrate leadership skills, be capable of team building and developing strategic goals and objectives	1.1, 1.2, 1.3, 2.1
UC-5	Improve innovation receptivity and innovation skills	1.1, 1.2, 1.3, 2.1
UC-6	Predict the conditions of professional activity and solve professional problems in conditions of uncertainty	1.1, 1.2, 1.3, 2.1
UC-7	Apply psychological and pedagogical methods and information and communication technologies in education and management	2.1
DPC-1	Determine methods, tools, and component bases for unmanned aerial vehicles and satellites development	1.1, 2.2
DPC-2	Apply basic algorithms and methods for flight dynamics controlling small satellites	1.2
DPC-3	Use knowledge about the space environmental effects on different materials, the basic principles of creating advanced materials and coatings for the aerospace systems design	1.3
DPC-4	Develop space missions, hardware and software design for scientific and technological aerospace research	1.4
SC-1	Apply a systematic approach, manage methods and business analysis to project implementation in the aerospace industry	2.1
SC-2	Use computer-aided design and solid modeling tools for unmanned aerial vehicle and spacecraft development	2.2.1
SC-3	Solve applied problems of aerodynamics, apply methods for calculating aerodynamic schemes and performance of aerial vehicles	2.2.2
SC-4	Determine methods and tools for qualification testing of aerial vehicles, satellites, and ground systems	2.2.3
SC-5	Design and test functional elements of aerospace systems based on sensors and MEMS devices	2.2.3
SC-6	Use constructive solutions and knowledge of the flight dynamics' physical foundations in the design of launch vehicles	2.2.4
SC-7	Use knowledge about the propulsion system design principles to control the flight of small satellites	2.2.4
SC-8	Develop architecture, determine the principles of ground-based mission control centers operation	2.3.1
SC-9	Use the theoretical design foundations and methods to achieve the required performance of the operated antennas	2.3.2
SC-10	Develop hardware and software architecture of ground-based optical space surveillance systems	2.3.3
SC-11	Design and operate software-defined radio systems	2.3.4
SC-12	Design laser measuring systems for aerial vehicles, satellites, and ground systems	2.3.5
SC-13	Design laser and ion-plasma control and processing systems	2.3.5
SC-14	Structure and process heterogeneous data arrays of aerospace information systems	2.4.1
SC-15	Use methods for design and managing computer systems, methods of scaling, load distribution and information flows for signal and image processing	2.4.1
SC-16	Apply information security methods for ground and onboard information infrastructure of aerospace systems	2.4.2, 2.4.3

Vice-Rector
for Academic Affairs and Educational Innovations

_____ Alesia G. Prakharenka

11.04.2023

Dean of the Faculty of Radiophysics and Computer Technologies

_____ Dmitrii V. Ushakov

11.04.2023

Department of Physics and Aerospace Technologies

_____ Vladimir A. Saetchnikov

11.04.2023

Academic Affairs Department
Head

_____ Natalia I. Marozava

11.04.2023

Expert norm controller

_____ Anzhelika V. Kostenevich

11.04.2023

Recommended for approval by the
Scientific and Methodological Board of
Belarusian State University
Record dated 04 April 2023 No. 6