

*Федеральное государственное бюджетное
образовательное учреждение высшего
профессионального образования*

**“Московский государственный
технический университет
имени Н. Э. Баумана”**

105005, Москва

2-я Бауманская ул., 5

Тел.: +7 (499) 261-40-55

Факс: +7 (499) 267-98-93

E-mail: ums@interd.bmstu.ru



*Federal State Budgetary Educational Institution of
Higher Professional Education*

**Bauman Moscow State
Technical University**

5, 2-nd Baumanskaya Str.

Moscow 105005, Russia

Tel.: +7 (499) 261-40-55

Fax: +7 (499) 267-98-93

E-mail: ums@interd.bmstu.ru

List of educational programs of Bauman MSTU

Code of department	Educational programs	* Programs	Description/basic knowledge requirements for Master program/competence
Faculty of biomedical engineering			
BMT1	Biotechnical and Medical Equipment and Systems	B	biophysics, biotechnology systems theory, methods of measurement and analysis of biosignals, biology, biochemistry, anatomy, pathology, physiology and clinical medicine
	Biometric Technologies of Personal Identification	M	
	Methods of Analysis and Synthesis of Medical Images		
BMT2	Engineering in Biomedical Practice	B	functional anatomy, biochemistry, biophysics, biomechanics, medical IT, technology monitoring functions, sensors and biosensors, medical biotechnological processes and systems, defense and aerospace medical equipment
	Biomedical Equipment, Systems and Complexes for Noninvasive and Remote Control of Vital Parameters of a Human Organism	M	
	Biomedical Equipment, Systems and Complexes		

Code of department	Educational programs	Programs *	Description/basic knowledge requirements for Master program/competence
	Management and Marketing in the field of Biomedical Engineering		
Faculty of power Engineering			
E1	Liquid Rocket Engines	B	basic knowledge of the aerospace and rocket engines
	Design of Liquid Rocket Engines	S	
	No master's program	M	
E10	Hydraulic Machines, Hydraulic Drive Trains and Hydropneumatic Automation	B	fluid mechanics, hydraulic machines, hydraulic and hydropneumoautomation
	Research and Modeling of Work Processes and Calculation of Automotive Diesel Elements	M	
	Reciprocating and Composite Engines	M	
E2	Combustion Engines	B	thermodynamic cycles in internal combustion engine. Fuels, combustion reaction, properties of fuels and combustion products. Simulation and design of intake and exhaust processes, mixing, pressurization, and heat exchange. The toxicity of the combustion products
	No master's program	M	
E3	Gas and Steam Turbine Plants and Engines	B	dynamics of subsonic and supersonic gas flows, aerodynamics propellers and jets, the intensification of heat transfer and thermal protection, combustion theory, control theory of technical systems
	Converters of Renewable Energy Sources	B	
	Aviation Engines and Propulsion Systems	B	
	Design of Ground Propulsion Systems on the Basis of Aviation Engines	S	
	Design of Aviation Engines and Propulsion System	S	
	No master's program	M	
E4	Refrigerating Cryogenic Equipment and Life Support Systems	B	processes of boiling, condensation, pressure increasing, and expansion. Thermal conductivity. Heat transfer. The calculation of heat exchangers. Reverse cycle of refrigerating. Evaluation of the cycle cooling capacity by the energy balance. Refrigeration efficiency. Processes of internal cooling. Gas liquefaction processes. Properties of
	Life Support, Thermostating and Defense Systems of Rocket and Space Complexes	S	
	Thermocryostating of Rocket and Space Systems	S	
	Cryogenic Equipment and Special Life Support Systems	S	

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	Cryogenic Equipment and Technology	M	refrigerants. Reverse cryogenic cycles. Compressors and expanders in refrigeration and cryogenic cycles
E5	Vacuum, Compressor Machinery and Pneumatic Equipment	B	create vacuum, compressors and pneumounit modern ground-based and airborne equipment spacecraft
	Development of Vacuum and Compressor Machinery and Pneumatic Equipment	S	
	Vacuum Machinery	M	
	Pneumatic Units and Systems		
E6	Thermal Physics	B	energy resources and their use, the energy machinery with direct and reverse cycle; processes of boiling, condensation, pressure increasing, expansion. Thermal conductivity. Heat exchange. The calculation of heat exchangers
	High Temperature Thermal Physics	M	
E8	Plasma Power Plants and Plasma Accelerators	B	energy resources and their use, the energy machinery with direct and reverse cycle, Plasma and ion power plants: types, principal theory of operation, application, lasers
	Electric Propulsion Systems	B	
	Design of Electric Propulsion Systems and On-Board Power Installations	S	
	Plasma Power Plants	M	
E9	Engineering Protection of Environment	B	technosphere and its relation to the biosphere, its impact on the environment. The principles of industrial enterprise environmental problem solutions. Ecology. Environmental monitoring. Physical and chemical methods of control of the environment. Water treatment methods. Methods for purifying gases. Types of filters. Adsorption and absorption
	Life Safety in Technosphere	B	
	Multipurpose Use of Water Resources	M	
Faculty for people with hearing disabilities			
GUIMC	individually for all departments		the main research and training and methodological center of vocational rehabilitation of persons with disabilities (people with hearing disabilities)
Faculty of engineering Business and Management			
IBM2	Innovation Business Mangement	B	organization of high-tech industries, the management of innovation in enterprises, planning firms, controlling, a feasibility study to create designs and manufactures, valuing
	Innovation Controlling	B	
	Economics and Industrial Management	B	

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	Management of high tech projects	M	the investment
	Controlling of organizations		
IBM3	Systems and Instruments of Innovation management	B	marketing, management of material, financial and information flows in complex industrial systems
	Innovation Management in High Tech Industries	B	
	Financial Management on the basis of Information Technology	B	
	Logistics	B	
	Marketing	B	
	Organizational and Economic Business Projection	M	
IBM4	Organization of Innovative Control Systems	B	human resource management, productivity of staff, and personnel policies of the company
	High Tech Commercialization	B	
	IT management	B	
	HR Management	B	
	Economic Resources of State Regulation	M	
	Innovative project management		
	Technologies of information management		
IBM5	Investment Management in High Tech Industries	B	design, implementation, effective use, purchase and sale on the market of modern information technologies, methods of information
	Economics and Finances	B	
	Accounting, Analysis and Audit	B	
	Enterprise Financial Management	B	
	Accounting, Analysis and Audit	M	
	High tech financial projects		
	Investment Management in High Tech Industries		
IBM6	Technologies of International Business	B	business organization and sale of high-tech products, the management of the market value of high-tech industry based on the organizational and economic analysis of the business and modern information and communication technologies
	IT Project Management	B	
	Business Management	B	
	Government regulation of economic resources	M	

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	Logistics-Oriented High Tech Enterprise Management		
	Organization of Logistic Systems in High Tech Industries		
	Corporate IT-business		
IBM7	Innovation Business	B	conducting business on the basis of project-based management and investment management, the ability to organize work on a new product in accordance with international standards and management skills are an innovative company
	Innovation Management	M	
Faculty of informatics and Control Systems			
IU1	Control and Informatics in Engineering Systems	B	Methods of classical and modern theory of automated control. Theory and computer methods of stochastic systems study. Time-dependent automatic control system. The theory of nonlinear systems of automatic control
	Information Technology for Control	B	
	Mathematical and Software Support of Control Systems	B	
	Flight Vehicle Control Systems	B	
	Flight Vehicle Movement Control Systemes	S	
	Mathematical and Software Support of Control Systems	S	
	Mathematical and Software Support of Control Systems	M	
Flight Vehicle Control Systems			
IU2	Automatic Stabilizers of Flight Vehicles	B	Gyroscopes, navigation accelerometers, autopilot, navigation systems for space, air, ground and underwater robots, and methods of data processing in airborne systems, precision elements of the instruments, micromechanics, systems for orientation, navigation and control of mobile robots
	Gyroscopic Instruments, Gyrostabilizers and Attitude Control Systems	B	
	Inertial Navigation Systems of Flight Vehicles, Mathematical, Software and Hardware Support for These Systems	B	
	Production Technology of Electromechanical, Optical, Micromechanical and Nanomechanical Navigation Devices	B	
	Flight Vehicle Control System Devices	S	
	Automatic Stabilizers of Flight Vehicle Control Systems	S	
	Inertial Navigators of Flight Vehicle Control Systems	S	

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	Precision Devices of Flight Vehicle Control Systems	S	
	Device Technology of Flight Vehicle Control Systems	S	
	No master's program	M	
IU3	Information Systems and Technology	B	Information system and technology theory, architecture, modeling, design and analysis of digital device reliability. Intelligent systems and technologies. Information-measuring devices and metrology. Circuit design of electronic devices. Information and communication systems and networks. Operational systems. Data bases.
	Development technology IT systems	M	
IU4	Design and Technology of Electronic Computing Means	B	Electronic equipment design and process design. Design and technology of printed circuit boards.
	Design and Technology of Radio Electronic Means	B	
	Engineering of Nanoelectronic Means	B	
	No master's program	M	
IU5	Automated Systems of Information Processing and Control	B	Computer systems and networks. Automated system software design. Automated Data Processing and Control systems. Computer architecture. Programming in high level language. Basics of the theory of control. Operation systems. Data bases. Computer information security techniques and means
	Development of Information and Software Systems	M	
	Automated Systems of Information Processing and Control	M	
IU6	Computing Machinery, Complexes, Systems and Networks	B	Computer operation systems. Small-scale computer operation systems. Design of computer networks. Telecommunications. Computer circuitry engineering.
	Intellectual subsystems for synthesis of optimal project solutions	M	
IU7	Development of Software and Information Systems	B	data bases. Data structures and types. Expert systems. Application of the theory of fuzzy sets in the development of an expert system. Mathematical models and methods for the numerical solutions. Programming in C and C++.
	Development of Software and Information Systems	S	
IU9	Applied Mathematics and Informatics	B	development of unique algorithms, including the solution of

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	No master's program	M	problems of class NP; Computational linguistics, including a variety of word processing tasks in natural language; The creation of new programming languages; Architecture analysis and use of operating systems, application software on high-performance computing systems; Development, analysis and administration of computer networks and communications; Visualization in three-dimensional environment (3D-rooms) data, including the results of engineering calculations; Development and system maintenance of complex information systems, with special processing algorithms, including geographic information, test and training systems
Faculty of manufacturing technologies			
MT1	Metal Working Machines and Complexes	B	principles of system design. Principal theory of analysis and design of machine tools; Design of machine tool drives. Dynamic processes in machines. Principal theory of automated equipment design. Machine software control systems. Machine tool manufacture and testing. Design of automated machine systems.
	Design of Metal Cutting Machines and Complexes	S	
	No master's program	M	
MT10	Design of Technological Complexes in Pipe and Tube Production	S	energy savings and the creation of combined metallurgical plants; equipment and manufacturing techniques of composite materials, powder metallurgy wire; technology of formed sections. theory of continuous metal forming processes; design process rolling; computer design and automation of metallurgical equipment.
	Design of Technological Complexes in Casting and Rolling Engineering	S	
	No master's program	M	
MT11	Engineering Nanotechnologies in Mechanical Engineering	B	physical principles of micro and nanoelectronics: Dielectric

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	Nanoengineering	M	and magnetic properties of solids. Crystals. Semiconductors. Semiconductor devices. Optical photoelectron and vacuum devices. Gas discharge. Plasma. Technology of micro and nanostructures obtaining: physics of different techniques of thin film deposition. Nanotechnologies: Equipment for micro and nanoelectronic device manufacture. Methods of study micro and nanoelectronic materials and devices
MT12	Machinery and Technology of High Performance Processes of Material Treatment	B	physics of technological lasers; special chapters on the technology of laser processing; computer-aided design of laser treatment; technology of optical components and assemblies; operating parameters of the laser radiation processing plants
	Design of Industrial Technological Complexes with the Use of High Concentrated Energy Flows	S	
	No master's program	M	
MT13	Renovation of Means and Objects of Material Production in Mechanical Engineering	B	theoretical foundations of renovation processes processes renovation; triboengineering; economic issues renovation; basics of marketing, technology utilization
	No master's program	M	
MT2	Instrumental Systems of Mechanical Facilities	B	Theory of cutting, physical and engineering methods of metal processing; Principles of instrumentation system design, CAD processes; computer-aided design and simulation; information technologies in machining
	Equipment, Instruments and Processes of Machining and Physical Treatment	B	
	Design of Machining and Instrumental Complexes in Mechanical Engineering	S	
	No master's program	M	
MT3	Manufacturing Technology	B	Principles of design and analysis of technological processes. Principles of tool design. Design and reconstruction of machine building shops and plants. Computer aided design of technological processes. Automation of assembly processes.
	Design of Technical and Technological Complexes	B	
	Technologies, Equipment and Automation of Mechanical Facilities	B	
	Machinery and Technology of Foundry	B	
	Design of Technological Complexes and Mechanical Assembly Facilities	S	
	Design and Engineering Support of Mechanical Facilities	M	
MT4	Metrology and Metrological Support	B	Metrology, standardization and certification. Organization and

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	Metrology of Nanostructures and Nanotechnology	B	technology of testing. General theory of measurements. Theory and analysis of measuring transducers and instruments. Automation of measurements, control and testing.
	Standardization and Certification	B	
	Test and Certification	M	
MT5	Design of Technological Complexes in Foundry	S	theory of the formation of castings; general and special casting techniques; physico-chemical processes in foundries; theory of casting machines and robotic systems.
	No master's program	M	
MT6	Machinery and Technology of Metal Forming	B	Applied theory of plasticity; advanced technology processing pressure; progressive pressure treatment equipment; automated and robotic systems of plastic material handling.
	Design of Technological Complexes in Press Forging Engineering	S	
	No master's program	M	
MT7	Equipment and Technology of Welding Engineering	B	Classification of welding processes. Heat sources. Thermodynamics. Weldability. Deformations, stresses and cracks. Strength of welded joints. Automation of welding processes.
	Design of Technological Complexes in Welding Engineering	S	
	No master's program	M	
MT8	Material Science and Technology of Coating and Surface Treatment of Materials	B	theory of the structure and properties of the machine-building and instrument-making materials; methods and means of controlling the composition, structure and properties of materials; modeling and optimization of the processes of heat and chemical-heat treatment; theory and methods of corrosion protection materials; physics of strength, ductility and fracture of materials; physical chemistry and engineering of materials and surface coatings; technology and equipment for ion-plasma coatings; computer design of materials; micro-and nanocrystalline materials; intellectual materials
	Material Science in Mechanical Engineering	B	
	Manufacturing Technology of Materials with Special Properties	M	
MT9	Industrial Design	B	Industrial Design
MT11	Electronic Engineering	B	physical foundations of electronic equipment; Vacuum Technology; electron and ion technology; design of automatic machines and machine systems; automatic control system; information support for research and development in electronics.
	Electronics and Nanoelectronics	M	

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Faculty of Robotics and Complex Automated Systems			
RK10	Ergonomics of Robotic and Mechatronic Systems	B	Theory of system control. Microprocessor systems. Design and structure of robots. Control of robots
	Robotic System Control	B	
	Industrial Robotics	B	
	Service Robotics	B	
	Robotic System Control	M	
	Autonomous Mobile Robots	M	
RK4	Road, Construction, Hoisting and Transport Vehicles and Equipment	S	Conveying System
	Ground Transport and Technological Complexes	M	
RK5	Mathematical and Computer Modeling of Mechanical Systems and Processes	B	Stress, deformation and strength of solids. Torsion. Bending. Theory of destruction. Theory of stability. Critical load. Vibrations. Resonance.
	Experimental Mechanics	B	
	Mathematical models of solid mechanics	M	
RK6	Automated Design Systems	B	Programming, languages and algorithms. Computational mathematics and mathematical modeling. Data bases. Computer graphics. Organization of computers, computer systems and networks. Information support of life cycle stages of products.
	Information Support of Product Lifecycle	B	
	Computer Technology and Modelling	B	
	Intellectual Systems	M	
	Information and Software Support of Automated Systems		
RK9	Complex Automation of Technological Processes and Production	B	Principles of flexible automation of technological and production processes. Specific characteristics of automation in current period. Flexibility and adaptability. Basic principles of organization of technological and production processes in automated manufacturing systems (AMS). Efficiency and performance of AMS. Reliability of AMS. Modeling of technological and production processes. Basics of engineering systemology.
	Automated Control of Product Lifecycle	B	
	Intellectual Systems for Control of Technological Processes and Production	M	
RK10	Industrial Robotics	B	fundamentals of industrial robots and robot design; control theory of technical systems; microprocessor technology and
	Robotic System Control	B	

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	Service Robotics	B	controls robots; information devices and systems sensitizing robots; robot control; control robot systems; electric, hydraulic and pneumatic actuators of robots; methods of artificial intelligence; automated methods of research and modeling of technical systems.
	Ergonomics of Robotic and Mechatronic Systems	B	
	Robotic System Control	M	
	Autonomous Mobile Robots	M	
Faculty of Radio Electronic and Laser Technology			
RL2	Laser Devices and Technology	B	Basics of optics: optical systems, Maxwell's equations, electromagnetic field propagation, interference, diffraction, quantum theory of radiation. Optical and optoelectronic instruments and systems. Fourier's series. Dispersion function. Principal physics of lasers. Active media. Laser types. Optical resonators.
	Optoelectronic Information Measurement and Tracking Devices and Systems	B	
	Optoelectronic Information and Measurement Devices and Systems	S	
	Optical and Optoelectronic Devices	M	
RL3	Optoelectronic Systems and Devices	B	Principles of optics, optical measurements, applied optics, optical materials and technologies. Optical-mechanical device manufacturing technology. Optical methods and devices for research
	Optical System Calculation	B	
	Technical Optics	B	
	Optical Instrumentation	B	
	Optoacoustic Devices	B	
	Design of Optical Systems	S	
	Optical and Optoelectronic Devices for Research	M	
RL6	Informational Radio Electronic Means	B	Information radio electronic systems and components. Automated control systems. Telecommunication facilities. Environmental monitoring of natural resources. Information technology and computer-aided design of electronic systems and their production. Processes of electronic systems
	Engineering Nanotechnologies in Instrumentation	B	
	Engineering Nanotechnologies in Instrumentation	B	
	Design of Technology of Electronic Computing Means	M	
	Elements and Devices of Electronic Computing Means	M	
	Nanoengineering	M	
Faculty of Special Machinery			
SM1	Composite Structures and Technologies for Rocket and Aerospace Applications	B	Design and engineering of rockets and spacecraft, Structural Mechanics of rockets and spacecraft, Dynamics of missiles,

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	Manned and Automatically Controlled Spacecraft and Systems	S	space vehicles and drop large space structures, thermal conditions for spacecraft
	Deployable Space Constructions	S	
	Composite Structures and Technologies for Rocket and Aerospace Applications	M	
SM10	Motor Car and Tractor Construction	B	The theory of vehicle movement. Dynamics, the methods of analysis and design, the structure of wheeled vehicles. Modeling wheeled vehicles systems. Principles of research and testing wheeled vehicles.
	Ground Transport and Technological Vehicles with Combined Power Plants	B	
	Motor Cars and Tractors	S	
	Ground Transport and Technological Complexes	M	
SM11	Underwater Robotic Complexes and Vehicles	B	Design, Traffic control systems, optical and general navigation, Trainers, Technical Animation, assembly, testing and operation of underwater technology
	Robotic System Control	M	
	Autonomous Mobile Robots	M	
SM12	Production и Technological Execution of Rockets and Spacecraft	S	Technology Aerospace Engineering, Fundamentals of computer-aided design, Process engineer, Special methods of forming, Technology of functional coatings, technology to make the connections, Building Products, product testing, Management in Engineering Systems, Automation of the equipment and processes, Design of production systems
	Assembly and Test of Rockets and Spacecraft	S	
	No master's program	M	
SM13	Composite Structures Designing and Manufacturing	B	Principles of rocket flight techniques: propulsion, liquid and solid propellants, aerodynamic forces, flight, control of flight. Polymer composite materials: properties, structure, technology. Strength and design of structural elements made of composite materials.
	Manufacturing Technology of Materials with Special Properties	M	
	Rocket and Space Composite Structures		
SM2	Manned and Automatically Controlled Spacecraft and Systems	S	Vibration theory, Structural Mechanics, Management in Technical Systems, Strength, Construction of special machines and devices, Design of spacecraft, Design components and assemblies, Fundamentals of computer-aided design
	Aerospace Rocket Systems	S	
	No master's program	M	
SM3	Dynamics and Flight Control of Rockets and Spacecraft	B	Design and structure of rockets and spacecrafts. Structural

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	Flight Control of Automatically Controlled and Manned Spacecraft	B	Mechanics of rockets and spacecrafts. Dynamics of rockets, spacecrafts and deployed large-scale space structures. Thermal conditions of spacecrafts
	Design Balistic of Rockets and Space Systems	B	
	Aerodynamics of Rockets and Space Transport Systems	B	
	Space Achievements Applied in Remote Sensing of the Earth, Satellite Communications and Navigation	B	
	Ballistics and Aerohydrodynamics	M	
SM5	Autonomous Information and Control Systems	B	Technology Aerospace Engineering; Computer-aided design processes; Special methods of formation of products from structural and composite materials; Thermal protection materials and technology of plasma coatings rocketry products; Assembly technology rocketry products; Control technology, testing and diagnosis rocketry products; Ensuring product quality and reliability of CT technology systems; Design of assembly and testing equipment; Computer information systems support decision making; Marketing aerospace engineering.
	Intellectual Control Systems	M	
	Location Autonomous Information and Control Systems	M	
	Signal Processing in Autonomous Information and Control Systems	M	
SM7	Autonomous Mobile Robots	B	Space flight modeling and control. Ballistic and navigation support of rocket and spacecraft flights, the synthesis of orbital structures of satellite systems, ballistics and aerodynamics of flight vehicles, experimental aerodynamics, testing rockets and spacecrafts
	Mechatronic System Control	B	
	Special Robotic Systems	B	
	Robotic System Control	M	
	Autonomous Mobile Robots	M	
SM8	No master's program	B, S	Fundamentals of space engineering, ground equipment missile systems, structural mechanics systems, Dynamics hardware launch facilities, Fluid Mechanics, Heat and mass transfer in the ground equipment, optimization of structures and systems, reliable equipment plant, machinery equipment design, management of technical systems
SM9	Ground Transport and Technological Vehicles with Combined Power Plants	B	The theory of the design and testing of tracked vehicles, Technology of tracked vehicles, The theory of motion of

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	Motor Cars and Tractors	S	multi-purpose tracked vehicles and extraterrestrial vehicles, Controllability and stability of motion tracked vehicles, triboengineering multipurpose vehicles, Design of extraterrestrial vehicles and multipurpose mobile robots, Designing military tracked vehicles and vehicles dual-use
	Ground Transport and Technological Complexes	M	
Faculty of Fundamental Sciences			
FN1	Mathematical Modelling of Random Processes and Engineering System Testing	B	Students studying in depth the classic sections of higher mathematics and modern methods of implementing the most important computing algorithms on computers, acquire sound knowledge in the field of general engineering disciplines and applied branches of aerospace technology. Among the special disciplines such as computational methods, methods of optimization and control theory, operations research, the equations of mathematical physics, principles of mathematical modeling, probability theory and mathematical statistics, mathematical theory of the physical and mechanical processes, mathematical modeling of aerospace systems, etc.
		No master's program	
FN2	Mathematical Modelling in Technology	B	
		No master's program	
FN11	Mathematical and Computer Modeling	B	
		Supercomputer modeling in Engineering	
FN4	Physical and Chemical Material Science	B	
	Physics of Nanotechnology and Nanoscale Structures	B	
	Radio Physics and Electronics	B	
	Physical Optics and Quantum Electronics	B	
	Applied Physics of Solid	M	
	Optical Physics and Quantum Electronics	M	
	Thermal and Molecular Physics	M	
FN12	Dynamic Systems and Control Processes	B	Nonlinear Control Systems: Differential-Geometric Approach

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	Science in Nonlinear Dynamical Systems and Automatic Control	M_english **	and Static Feedback Linearization; Differentially Flat Systems and Dynamic Feedback Linearization; Control of Nonminimum-Phase Systems; Integrator Backstepping and Forwarding; Stability Theory and Lyapunov Functions; Linear Matrix Inequalities: Application to Nonlinear Systems; Passivity-Based Control and Dissipative Dynamical Systems; Nonlinear State Observers and Output Feedback Control; Nonlinear Adaptive and Robust control; Time-Delay Systems; Nonlinear Control: Applications to Mechanical, Electro-Mechanical Systems and Flight Dynamics

*
B – Bachelor, S – Specialist, M – Master

**
Duration: 2 years, 120 ECTS credits

Applicants are expected to have a Bachelor's degree in one of the following subjects: Electrical Engineering, Mechanical Engineering, Computer Sciences or Applied Mathematics. The mathematical prerequisites are calculus, linear algebra and differential equations. Furthermore, an applicant must have background in linear control theory. International applicants should have a good command of the English language, since all courses are taught in English.

Контакты:

+7 (499) 263-63-07

+7 (499) 263-69-77

Website: <http://priem.bmstu.ru/>

e-mail: orisa@bmstu.ru

Contacts:

+7 (499) 263-63-07

+7 (499) 263-69-77

Website: <http://priem.bmstu.ru/>

e-mail: orisa@bmstu.ru