1 General module

Foreign Language (English)

Development of all critical skills needed for using a foreign language: listening, speaking, reading, writing and grammar.

Physical Training

Elements of healthy life, and how to optimize personal performance. General physical training, sports.

Russian History

History as a science, Russian history as an integral part of the world's history. The history of Russia from ancient times to the present. Culture.

Political science

Functions of Political Science. The role and the place of politics in modern societies. The function of social laws and regulations.

Sociology

Sociology as a science, its functions. Social action and social interaction, culture, social communication, social groups and structures, the family.

Human in Culture Context

What is culture, its history, typology. Culture and identity. The place of men in culture.

Law

The state and the law, their role in society. The main legal systems. International law.

Russian Language and Culture Speech

Styles of the modern Russian written language. Language norms, they role in formation and functioning of the language. The key issues in improving literacy skills of speaking and writing.

Philosophy

The subject of philosophy. The importance of philosophy in culture. The history of philosophy and major philosophical schools.

Economics

Introduction to economics. Goods, needs and resources. Economic systems. Microeconomics.

Life Safety

People and the environment. The criteria of comfort. The dangers of technical systems. Means of reducing harmful effects of traumatic and technical systems. Emergency situations.

2 Natural Science module

Physics
Mathematical physics, classical mechanics, electromagnetic theory, quantum mechanics, thermodynamics, optics and nuclear and particle physics.

Chemistry
Chemical systems, the particulate nature of matter, atoms, elements and compounds, chemical reactions, acids, bases and salts, the Periodic Table.

Ecology
The biosphere and the man. Global environmental problems, environmental principles of rational use of natural resources and protection of the environment.

3 Mathematics module

Algebra and Geometry
Linear Algebra: basic structures, systems of linear equations, matrices and operations on them. Analytic Geometry: basic curves and figures, vectors.

Discrete Mathematics
Logical calculations, graphs, theory of algorithms, combinatorics.

Algorithms for Discrete Mathematics
Algorithm, analysis of algorithms. The Turing machine. Combinatorics. Algorithms on graphs, depth-first and breadth-first searches.

Mathematics of Logic
Logical structures, logical consequence, the principle of deduction, predicate logic, the principles of logic programming.

Calculus Mathematics
Numerical solutions of mathematical problems, interpolation and approximation, solving systems of linear and nonlinear equations, differentiation and integration of functions, Fourier transform, error estimation.

Mathematical Analysis
Differential and integral calculus, elements of function theory and functional analysis, differential equations.

Laplace and Fourier transform
The basic concepts of complex analysis, Laurent series, zeros of functions. Residues and their applications. Fourier series, the Fourier integral. Laplace transform.

Probability and Statistics
Mathematical foundations of probability theory. Discrete and continuous random variables, expectation and variance, basic distributions. The model of random processes, hypothesis testing, statistical methods of data processing.

Statistical Analysis of Time Series

Linear models. The method of least squares. Discrete and continuous time series. Analysis of time series: regression analysis, spectral analysis. Programming and modeling in MATLAB and Fortran.

4   Specialization module

Informatics

Informatics and information processes, the basics of programming. The Pascal programming language.

Electrical and Electronics

Electric and magnetic circuits. Basic definitions, calculation and analysis methods. Electromagnetic devices. Basic electronics and electrical measurements. Basic elements of modern electronic devices.

Metrology, Standardization and Certification

Theoretical basis of metrology, standardization and technical measurements. Certification, and its role in improving quality of products.

Information Technologies

General classification of information technologies. Transformation and procession of data. Data storages as information systems. Basic programming techniques for processing and storing data.

Theory of Information Processes and Systems

The concept of information systems. System analysis, types and models of information systems. Creation and decomposition of information systems. Information models for decision-making processes.

Data Management

Databases and data base management systems (DBMS). Architecture and design of data storages. Representation of data structures in computer memory. Normal forms. SQL. An overview of commercial and free DBMS.

Information Networks

Basic concepts of networks. Models and structure of information networks, methods of transmitting information. Software and hardware. The OSI model and the TCP/IP protocol. Security of information.

Fundamentals of Control Theory ("Foundation of Management Theory" in the transcripts)

Information Technology and Control Theory, general principles: stability, controllability and observability. Mathematical models of objects and systems. Methods of analysis and synthesis of control systems. Digital control systems. Practice in MATLAB Simulink.

System Modeling

The basic concepts of the modeling theory. Types of modeling. Simulation models of information processes, mathematical models. Formalization of information processes, building conceptual models. Modeling in GPSS World.

PC and Systems Architecture

The Von Neumann architecture. CPU and RAM. The model of interruptions. I/O and peripherals. Parallel systems, information and computer systems and networks.

Operating Systems

Design principles of operating systems, the basic functions. A review of modern operating systems. Management of computing processes, I/O. Real and virtual memory. How to create an OS. Linux basics.

Programming Technology

The main stages of solving problems using computer. Quality criteria of programs. Program life cycle. Programming in high-level programming languages Delphi and PHP.

Computer Geometry and Graphics

Computer graphics, geometric modeling. Graphical primitives and attributes. Raster and vector graphical editors. 3D modeling using AutoCAD.

Knowledge Representation in Information Systems

Basics of knowledge representation. Models, semantic networks and reasoning. Acquisition and analysis of knowledge, expert systems. Languages of artificial intelligence, the logic programming model, practice in Lisp and Prolog.

Information Safety and Protection

Access control systems, telecommunications and network security. Introduction to cryptography, implementation of basic algorithms in C. Watermarking for information protection.

Corporate IT Systems (IT for Enterprises)

Structure of enterprises, architecture of enterprise information systems. MRP and ERP systems. Examples of ERP systems. Designing an ERP system. Basics of data warehousing.

IT Systems Administering

Administration services. Services of accounting and security. Maintenance of information systems. Administrating Windows and Linux operation systems. Bash and PowerShell scripting.

Intelligent IT Systems

The basic concepts of artificial intelligence, information and data. Expert systems. Information models of knowledge, semantic network, data processing rules. The methods of knowledge representation in information systems.

Multimedia Technologies

The concept of multimedia technologies. Classification and application of multimedia technologies. Types and file formats: text, images, audio, video. Virtual reality. Software technologies for creating multimedia products.

Reliability of IT Systems ("Safety of information systems")

The basic definition of reliability. Faults and characteristics of reliability. Testing for reliability, and methods of increasing reliability of information systems. The human and information systems.

Reliability of Automated Systems ("Safety of computer-based systems")

Basic concepts and components of reliability. Reliability of automated systems. Reliability of robust and renewable systems. Reliability and quality of software

Information Systems

General characteristics of information systems. Designing a functional model of an information system. User interface. Structure of software modules in information systems. Algorithms. Performance analysis. Project management: documentation and designing tools. Typical design solutions. Creating an information system in Delphi.

High-Level Programming Methods

The basic concepts of programming. Main paradigms of programming: Modular programming, Object-oriented programming. Programming languages and systems. Testing and debugging. Programming in Delphi.

Automata Theory

The concept of the state machine. Basic definitions. Deterministic functions. Types of machines: finite automata, structural machines, linear automata.

Mathematical IT

An overview of mathematical systems: classification, structure, user interface, data types. Syntax: operators, functions, and expressions. Practice in MathCAD, Maple and MATLAB.

5 Others

Adaptation System for First-Year Students

Psychological and sociological aspects of studying at university. How to study effectively. How to deal with stress.

Engineering Psychology

Errors and their implications. Theoretical analysis of professional activities. A programmer's professional activity: simple and complex tasks. Cognitive processes at work. The programmer as an integral part of a team.

Career Technology

Career, its basic concepts. Research into the labor market. How to obtain information about the labor market. Self-presentation and building an attractive CV.

Fundamentals of Scientific and Engineering Research

The methodological foundation of researching and engineering creativity. Searching, storing and processing scientific and technical information. Experiments and their outcomes. Statistical analysis of the experimental data.