Bulgarian Academy of Sciences

The Bulgarian Academy of Sciences (BAS) is the biggest national research centre with 145 years of tradition. It performs research, education and activities of national and international importance and provides solutions related to the development of the Bulgarian society and state.

Mission: *The Bulgarian Academy of Sciences is dedicated to the development of science in conformity with the universal human values and with the country's national interests and promotes the enhancement of the intellectual and material wealth of the Bulgarian people.*
The main objectives of the Academy are in accordance with the recent priorities for science development of the European Union to reinforce and extend the excellence of science base and to attract young scientists in a changing world for smart, sustainable and inclusive economy and for achievement of high level of employment, productivity and social cohesion.

History

In September 1869, nine years before restoring the national independence of Bulgaria, a small group of enlightened and patriotically minded Bulgarians established in the town of Braila, Romania, the first Bulgarian academic institution – the Bulgarian Learned Society (BLS). It was built on a broad democratic national and European basis. Immediately after the liberation of Bulgaria in 1878 (after being part of the Ottoman Empire for centuries), the BLS moved to the capital of Sofia.
A new stage in the BLS development began in 1898, when as a Chairman was elected the prominent Bulgarian statesman Ivan Evstatiev Geshov, also a generous donator of the Academy. Thanks to his activity, in March 1911 the BLS was renamed into Bulgarian Academy of Sciences (BAS) and in 1912, when the first BAS Act was passed, the Academy was officially included in the state structure.
In 1940 Bogdan Filov, who was at that time both BAS Chairman and Prime Minister of Bulgaria, initiated a new BAS Act. A new branch on literature, visual arts and music was established, which lead to renaming of the Academy into Bulgarian Academy of Sciences and Arts (BASA).
After the Second World War, in 1947 the old name as Bulgarian Academy of Sciences was restored. The fall of the totalitarian regime in 1989 coincided with the beginning of the process of democratization in the government and realization of scientific research in BAS. In 1991 the Grand National Assembly of Bulgaria passed a new Act on the BAS. There, the Bulgarian Academy of Sciences was defined as a "national autonomous organization for scientific research" with three main activities: fundamental research, applied scientific research, and training of highly qualified specialists. The Act set new governing principles and restored the independence of the Academy. The spirit and main principles of the Act were elaborated in the BAS Statutes, accepted by the BAS General Assembly in 1992.
In 2009, upon request of the BAS the European Science Foundation (ESF) and the European Federation of National Academies of Sciences and Humanities (ALLEA) conducted an international scientific audit of all BAS research units. The conclusion of the international committee was that "The Review Committee has come to the unambiguous conclusion that the majority of BAS Institutes perform valuable research as judged by international standards. In some cases the panels found research groups that operate at the forefront worldwide." It stated also that "This overall result is regarded by the review team as an impressive achievement, considering the particularly difficult circumstances for research in Bulgaria".
After a thorough analysis and motivated by the recommendations made by the international audith, the BAS performed difficult but necessary reformation towards improvement of the effectiveness of research activities. The number of research units was decreased, they were

grouped into 9 divisions, based on their program rather than disciplinary nature. The new structure of the Academy was introduced in 2011.

Governance and governing bodies

The General Assembly is the supreme governing body of BAS. The General Assembly is composed of senior scientists, representing the research units of the Academy and scientists elected by secret ballot by the researchers in the research units. The General Assembly elects the President and the members of the Executive Council of BAS by secret ballot. It elaborates, adopts, modifies and amends the Statutes, allocates the budget and is responsible for the properties and the investments of the Academy. The General Assembly is competent to setting up and closing down research units of the Academy.

President: The President represents the Academy in the country and abroad, allocates and governs the budget of the Academy. He organizes and supervises the implementation of all academic activities. He chairs the Executive Council and the Assembly of Academicians and Corresponding Members of BAS. Eligibility to this position is restricted to academicians (fellows) and corresponding members of BAS. Vice-Presidents, the Scientific Secretary General and the Scientific Secretaries are proposed by the President and elected by the General Assembly. They constitute the Board of the Academy.

The Executive Council is composed of 25 members, elected by the General Assembly. The members of the Board are members of the Executive Council by statute. The Executive Council elects the directors of the research units of the Academy and is responsible for the implementation of the decisions of the General Assembly and for the assessment of the research units. The chairperson of the General Assembly is ex officio member of the enlarged format of the Executive Council. Directors of research units are not eligible for membership in the Executive Council.

The Assembly of Academicians and Corresponding Members of BAS is composed of national (academicians and corresponding members) and foreign members. As a rule, the total number of academicians should not exceed 80 and that of the corresponding members is limited to 120. At the end of 2007 there were 55 academicians and 96 corresponding members. The members of the Assembly of Academicians and corresponding members of BAS are elected by the Academicians of BAS.

Structure and current status of the BAS

The BAS includes 42 research units, 8 academic specialized units and 8 specialized/supporting units. The research and academic specialized units of BAS are autonomous legal entities performing basic and applied research, postgraduate and postdoctoral training. The research units are organized in 9 divisions as follows:

I. INFORMATION AND COMMUNICATIONSCIENCES AND TECHNOLOGIES

Institute of Mathematics and Informatics (IMI)
Institute of Information and Communication Technologies (IICT)
Institute of Mechanics (IMech)
Institute of System Engineering and Robotics (ISER)
National Laboratory of Computer Virology (NLCV)
Laboratory of Telematics (LT)

II. ENERGY RESOURCES AND ENERGY EFFICIENCY

Institute of Nuclear Research and Nuclear Energy (INRNE)
Institute of Electrochemistry and Energy Systems (IEES)
Institute of Chemical Engineering (IChE)
Central Laboratory of Solar Energy and New Energy Sources (CLSENES)

III. NANOSCIENCES, NEW MATERIALS AND TECHNOLOGIES

Institute of Solid State Physics „Acad. Georgi Nadjakov“ (ISSP)
Institute of Electronics „Acad. Emil Djakov“ (IE)
Institute of Optical Materials and Technologies „Acad. Jordan Malinovski“ (IOMT)
Institute of Mineralogy and Crystallography „Acad. Ivan Kostov“(IMC)

Institute of Metal Science, Equipment and Technologies „Acad. A. Balevski“ with Centre for Hydro- and Aerodynamics (IMSET-CHA)
Institute of General and Inorganic Chemistry (IGIC)
Institute of Organic Chemistry with Centre of Phytochemistry (IOCCP)
Institute of Physical Chemistry „Acad. Rostislaw Kaischew“ (IPC)
Institute of Polymers (IP)
Institute of Catalysis (IC)
Central Laboratory of Applied Physics-Plovdiv (CLAP)

IV. BIOMEDICINE AND QUALITY OF LIFE

Institute of Molecular Biology „Acad. Roumen Tsanev“ (IMB)
Institute of Neurobiology (INB)
Institute of Microbiology „Stephan Angeloff“ (IMicB)
Institute of Biophysics and Biomedical Engineering (IBPhBME)
Institute of Biology and Immunology of Reproduction „Acad. K. Bratanov“(IBIR)
Institute of Experimental Morphology, Pathology and Anthropology with Museum (IEMPAM)

V. BIODIVERSITY, BIORESOURCES AND ECOLOGY

Institute of Biodiversity and Ecosystem Research (IBER)
Institute of Forestry (IF)
Institute of Plant Physiology and Genetics (IPPG)
National Museum of Natural History (NMNH)
Botanical Garden (BG)

VI. CLIMATE CHANGES, RISKS AND NATURAL RESOURCES

Geological Institute „Acad. Strashimir Dimitrov" (Gl)
National Institute of Geophysics, Geodesy, and Geography (NIGGG)
National Institute of Meteorology and Hydrology (NIMH)
Institute of Oceanology „Prof. Fridtjof Nansen“ (IO)

VII. ASTRONOMY, SPACE RESEARCH AND TECHNOLOGIES

Institute of Astronomy with National Astronomical Observatory (IA NAO)
Space and Solar-Terrestrial Research Institute (SSTRI)

VIII. CULTURAL-HISTORICAL HERITAGE AND NATIONAL IDENTITY

Institute for Bulgarian Language „Prof. Lyubomir Andreychin“ (IBL)
Institute for Literature (IL)
Institute for Balkan Studies with Centre of Thracology „Prof. Alexandar Fol“ (IBSCT)
Institute of Ethnology and Folklore Studies with Ethnographic Museum (IEFSEM)
Institute for Historical Studies (IHistS)
Institute of Art Studies (IAS)
National Archaeological Institute with Museum (NAIM)
Cyrillo-Methodian Research Centre (CMRC)

IX. MAN AND SOCIETY

Institute for Economic Studies (IES)
Institute for the State and Law (ISL)
Institute for Population and Human Studies (IPHS)
Institute for the Study of Societies and Knowledge (ISSK)

Research activities by divisions (scientific areas)

Information and Communication Sciences and Technologies: There are well-established scientific traditions in the fields of mathematics, informatics, and information and communication processes, systems and services. The progress in theoretical research will result in innovative applications in technologies, education, industry and the society as a whole. The mathematicians are widely known for their aspiration for discovering and developing mathematical talents and applying mathematical and information methods in the national educational processes and programs. The technologies for processing and control of knowledge and modeling the educational processes, for optimization of and assistance to decision making, for signal processing and image recognition, are important products of the research in the field of information sciences.

The applied scientific research in the field of mechanics, composite materials, biomechanics and mechatronics leads to the development of technologies for inspection and non-destructive control, for intelligent modeling and prosthetics of functions and structures of the human

body. In order to solve complex industrial problems, built-in smart devices, specialized sensors, actuating devices and sensor systems are being created on the basis of novel principles, together with micro- and nano-systems, manipulators, robots and mechatronic systems for the micro- and nano-technologies. Unique equipment, software and hardware have been developed in support of the scientific research, technical safety, national defense and environmental protection.

Energy Resources and Energy Efficiency: The problems of power generation, of the development and application of renewable energy sources and of raising the efficiency in using the conventional energy sources take a principal place in the scientific and applied research performed in the Bulgarian Academy of Sciences. Exhaustive research activity is geared to the scientific assistance and support of the nuclear power generation and the safety of Kozloduy Nuclear Power Plant, to applying nuclear technologies in the industry, medicine and civil protection, to eliminating the illegal traffic of radioactive materials. In accordance with Bulgaria's priorities and long-term energy interests, technological processes and materials are being developed and components and devices are being implemented for industrial and household utilization of the solar energy and for industrial electrical energy generation optimization via transformation of the solar energy into electrical energy. The advancement continues of the strong Bulgarian school in the field of the electrochemical power sources - batteries and accumulators, as well as in the field of the usage of hydrogen as an energy source and of the fuel cells. Of particular interest are the chemical technologies focused on the development of engineering solutions related to "green" and waste-free technologies, integrated management of household, industrial and hazardous wastes, in combination of their recycling and use as raw materials.

Nanosciences, New Materials and Technologies: The development of novel materials is a complex interdisciplinary scientific activity pertaining to all spheres of the modern society. These materials, together with the technologies for their production and application, are of paramount importance in diverse modern industries as the manufacture of energy-efficient household appliances, computers or communication satellites, the production of new catalysts, drugs and high-quality foods, the development of new approaches to natural resources utilization.

The Nanosciences, New Materials and Technologies Research Division unites Academic Institutes and Units and research potential active in various scientific fields with the aim of conducting research related to the design and fabrication of novel materials with tailored properties that can find applications in medicine, pharmaceutical industry, electronics, environmental protection and national security.

Employing the achievements of the nanosciences and nanotechnologies for controlling and handling matter on micro- and nano-scales is an approach that will lead to the development of innovative products and technologies and as such is a prerequisite for the sustainable growth of Bulgarian economy.

*Biomedicine and quality of life:*The medical and biological research carried out in the Bulgarian Academy of Sciences has led to numerous applications in medicine and healthcare. The research is aimed at clarifying the biological basis of human health, of the reproductive processes and ageing, and of the causes and course of diseases of social significance.

The studies in the fields of microbiology, virology and immunology have to do with the development of techniques for diagnostics, treatment and prevention of diseases with the purpose of the improving human health and quality of life.

Biomedical, biotechnological and biopharmaceutical approaches and products are being developed, as well as individualized medicinal treatment in view of enhancing man's physical and intellectual abilities. Techniques are being developed for bacterial biosynthesis in conjunction with biotechnologies to be applied in medicine, food industry and power

generation; moreover, bioengineering methods and devices are being developed finding applications in cardiology, neurology and laryngology.

*Biodiversity, Bioresources and Ecology:*Bulgaria is among the European countries with richest biological diversity. Bearing in mind the Bulgaria's relatively small surface area, the fauna of vertebrate and invertebrate animals and the variety of plant species are particularly abundant.

The biodiversity studies are of special significance for conducting a knowledge-based national policy for protection of the environment and for establishing a national "green strategy". The diversity of our flora and fauna has a considerable value for Bulgaria's economy and population livelihood. Their management in a sustainable manner has a direct bearing on the development and growth of public welfare. The Natura 2000 European Program is of vital importance for the preservation Bulgaria's biological diversity, and for the long-term protection of specific plant and animal species and their habitats. Preserved nature means preserved soils, waters, air and natural resources and is a prerequisite for successful eco-tourism, eco-agriculture and sustainable forestry.

*Climate Changes, Risks and Natural Resources:*The performance of meteorological, hydrological and agro-meteorological observations forms the basis of issuing forecasts in the respective fields necessary for the normal functioning of the state and society as a whole. The round-the-clock monitoring assists the comprehensive studies of climate changes and their impact on the various economic sectors, including agriculture and water resources management. The research conducted results in the improvement of the early-warning systems related to hazardous meteorological and hydrological phenomena.

The studies of the geo-systems and geo-resources (mineral and energy resources and ground waters) within Bulgaria's territory and across the Balkan Peninsula have the purpose of ensuring the sustainable development of the modern society and limiting the risks for and consequences of natural disasters. The operative expert information in the fields of seismology and early warning, in conjunction with studying the earthquake vulnerability of buildings, engineering facilities and infrastructure form the basis necessary for the development for scientifically sound policies for prevention of natural and man-made risks. Establishing the prerequisites necessary for the sustainable use of Bulgaria's Black Sea coast includes managing the organic and inorganic resources, studying the geology and geomorphology of the sea bed and the dynamics of the coastal zone, as well as the integrated management of the latter.

Astronomy, Space Research and Technologies: Remote and direct techniques and the respective equipment have been developed necessary for studying the near-Earth space and the planets. Scientific equipment and systems have also been developed for research using rockets, satellites, planetary probes and manned space flights. Important results have been obtained in the study of the development of stars and stellar associations and in searching for planets outside the Solar System. The results from the studies on the Sun and the asteroids and comets in the Solar System have become widely popular. These were achieved thanks to the efficient use of the Rozhen National Astronomical Observatory, which has gained the status of a national, regional and European research and education center.

The space scientists gather and process satellite data and carry out remote observations of the Earth surface for various purposes, including following climate changes of Solar and space origin. Considerable experience has been accumulated in the fields of space bio-technologies, medical and biological space research and remote medicine. Active research is also being performed on developing aerospace equipment and technologies with particular emphasis on their transfer to the industry and other sectors of the economy.

Cultural-historical Heritage and National Identity: The research in this field is aimed at studying, preserving and disseminating the Bulgarian cultural and historical heritage as a part

of the common European cultural tradition and history. Interdisciplinary studies are being conducted in the fields of literature, visual arts, music, theater, cinematographic arts and architecture.
With the above purpose, the scientists employ information technologies, electronic publication and digitalization of information databases concerning the Bulgarian cultural, historical and scientific heritage, thus creating digital depositories that systematize the samples of this heritage and allow an efficient access to them.
Planned, rescue and emergency archeological studies and field investigations are being conducted in conjunction with active participation in the preparation for implementation of nation-wide infrastructural projects, such as highways, natural gas and oil pipelines, coal and mineral mining, as well as in projects related to cultural tourism.
The collections preserved and exhibited in the National Ethnographic Museum and the National Archeological Museum are priceless.
Man and Society: Scientifically substantiated variants for the Bulgarian society's economic and social development, which include policies aimed at overcoming the demographic crisis, the criminality and the crisis of values, as well as at developing the individual potential for life-long education and quality of life improvement. Of particular importance are the policies contributing to a more intelligent and more ecologically sustainable social market economy and the establishment of a democratic society where the well-being is the result of innovations and better utilization of the country's resources. The ways are outlined for Bulgaria's full-fledged socio-economic integration in the EU, for improving the governance of the country and for imposing in the modern Bulgarian society legal principles, norms and culture of conduct that comply with the best European practices.

BAS carries out yearly and round-the-clock the following **national services**:
- Meteorological, hydrological and agro-meteorological observations and forecasts, incl. those connected with potential natural disasters;
- Registration and information of seismic dynamics in the whole country and the neighbouring territories as well as of landslides and other dangerous movements of the earth crust;
- Registration and information of geomagnetic, ionosphere and other processes for the needs of defence and communications;
- Monitoring of the environment and of a wide spectrum of ecological research on the territory of the country, the Black Sea basin and Bulgarian territory waters.

International activities
The BAS maintains 50 bilateral agreements for scientific cooperation with academies of sciences, universities, research centers and funding organizations from the EU and other countries all over the world. The implementation of these international agreements for work across all research fields is financially supported by the BAS.
An explicit objective of BAS is to participate and to contribute to strengthening a European Research Area (ERA). In addition to efforts made at the national level, the participation of BAS researchers and intsitutes in EU Framework Programmes for Research and Innovation and in the EU Life –Long Learning Program (through participation in the Programs ERASMUS and ERASMUS+) have always been an important instrument to contribute to ERA.
The Academy is member of 23 international organizations. The BAS most actively participates in the work of ALLEA, Science Europe, EASAC and IAP, ESF, ICSU, UNESCO, the World Meteorological Organization and EUMETSAT (where Bulgaria is represented by the National Institute of Meteorology and Hydrology of the BAS).