Nuclear Education for International Students and Professionals in Russia
Dear friends!

Nuclear power today is one of the most important development vectors of the world energy system. It allows not only solving the problem of access to sustainable and highly potent energy source but also serves as a locomotive of the sustainable development, because the use of nuclear technologies inevitably entails the development of the national scientific infrastructure, training of high skilled specialists, and development of modern branches of science and applied knowledge.

ROSATOM offers its international partners a comprehensive set of services in nuclear, which includes not only construction of a nuclear power plant, its fuel supply throughout the entire fuel cycle but also the assistance in training of specialists.

The Russian Federation has a vast experience in the export of education, which originates from the time of the USSR when thousands of foreign students did their training in the Soviet higher education establishments. The level and quality of the education we provide are evidenced by the fact that many of graduates of our universities have been able to successfully promote in their countries and now represent national political and intellectual elites.

Today in the Russian Federation every opportunity has been created to get educated in nuclear physics at a high quality level. Students from Turkey, Vietnam, Bangladesh, Jordan and other countries where nuclear power plants of Russian design will be built in coming years, are doing their education courses in Russia. The nuclear education system for international students in Russia has been developed with the IAEA’s methodological support. Under the aegis of this respectful organization the International Center for training of national nuclear infrastructure specialists, including nuclear power plant operators, has been established in Obninsk, Kaluga Region. The leading nuclear university of Russia – NRNU MEPHI – cooperates with the IAEA in compiling training courses for master’s programs. Shortly, the NRNU MEPHI students will be able to use the IAEA’s virtual education platform that includes virtual training courses and a possibility to do laboratory operations via the Internet.

We have all the conditions for adaptation of international students, including the Russian language training. The professional training includes lecture courses and seminars given by not only the best teachers of nuclear universities but also leading specialists of largest nuclear enterprises of Russia. The students are benefiting from internship at Russia’s nuclear power plants.

We will be happy to see you students of our universities!
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In September 1942, the resolution entitled «On the Organization of Uranium Activities» was signed. It was the starting point in the creation of Russian nuclear industry.
The research of uranium properties and nuclear spallation reactions had begun in Russia (Soviet Union) before World War II. When intelligence started to arrive on the A-bomb creation projects implemented first in Germany and later in the USA, scientists had to switch to the research of military applications of atomic energy.

In September 1942, a State Defense Committee (SDC) resolution entitled “On the Organization of Uranium Activities” was signed to become what is believed to be the starting point in the creation of Russian nuclear industry. In April 1943, Instrumentation Laboratory No. 2 of the USSR Academy of Sciences (currently the famous Russian Research Center “Kurchatov Institute”, Russian leader in nuclear research) was formed.

The end of the war and the successful A-bomb test in the USA in July 1945 gave the uranium effort a new impetus. In August later that year, a Special Committee formed of top state officials and physicists including legendary Igor Kurchatov, was set up by an SDC resolution. Also, the First Central Directorate (FCD) headed by B.L. Vannikov, who became in fact the first to lead Russian nuclear industry, was established under the USSR Council of People’s Commissars.

The work went into full swing. Vast material and human resources were brought to achieve the goal. Integrated mills were built from the very beginning with many of the existing facilities adapted to the “uranium project” needs (an example is a weapons plant in Elektrostal, currently OJSC “Machine-Building Plant”,...
Kurchatov, Igor Vasilyevich (1903 – 1960) – the founder of Soviet nuclear industry. Born in the family of a land surveyor in the town of Sim in Ural (now Chelyabinsk Region). He spent his early years in Simferopol where his family moved to. In 1920 Kurchatov finished a grammar school in Simferopol with a gold medal and entered straight away the Faculty of Physics and Mathematics at the Crimea University. Instead of four years, it took him three years to complete the university course. In 1923 Kurchatov joined the Faculty of Shipbuilding at the St. Petersburg Polytechnical Institute directly at third year. In 1925 he started working as a researcher at the Leningrad Physico-Technical Institute. Ferroelectricity was the subject-matter of his first scientific publications.

In 1932 Kurchatov the first in the country started the research in the physics of nucleus. In 1934 he observed the branching of nuclear reactions resulting from the neutron irradiation of materials and subsequently carried out research on artificial radioactivity and discovered nuclear isomerism, that is the decay of identical atoms at different rates. In 1940 Kurchatov, together with G.N. Flyorov and K.A. Petrzhak, discovered spontaneous uranium fission.

During the Great Patriotic War, Kurchatov led the effort on the Black Sea Fleet ship protection against enemy magnetic mines and in 1943 began working on a nuclear weapon project at Laboratory No.2 of the USSR Academy of Sciences (currently Russian Research Center “Kurchatov Institute”. By a decision of the USSR State Defense Committee dated 20 August 1945, Kurchatov was enrolled on the Special Committee and its Technical Council and was actually the nuclear project leader. Under his direction the USSR’s first A-bomb and later the first H-bomb were created. Kurchatov was also one of those behind the construction of the world’s first nuclear power plant in Obninsk that began electricity production in 1954. For his last years, Kurchatov worked on problems of controlled fusion reaction.

I.V. Kurchatov was Thrice Hero of Socialist Labor and awarded five Orders of Lenin. Kurchatov gives his name to the Beloyarskaya NPP and two cities (one in Kursk Region and the other in Kazakhstan). In 1964, his name was also given to the 104th element of the periodic table, Kurchatovium.
a world’s leading producer of nuclear fuel for nuclear power plants (NPP). This was one of the most ambitious efforts in history, of a scale comparable to that of space exploration programs.

Thanks to the tremendous efforts of scientists and workers, the project moved on rapidly. In 1946 in Eura-sia a uranium fission chain reaction was for the first time accomplished at the F-1 reactor under the leadership of Kurchatov. Two years later, this led to the first commercial plutonium production reactor, indexed A, started up at integrated mill No. 817 (now Production Association “Mayak” in Ozersk, Chelyabinsk Region). And it was in August 1949 when the first Soviet nuclear device was tested successfully.

The reconversion of nuclear industry was gradually getting an increasingly firm basis. Large-scale construction of nuclear power plants had begun. Thus, the first WWER-1 reactor of 210 MW (Novovoronezhsky NPP) was started in 1964. In 1973, BN-350, the world’s first fast-neutron reactor and the world’s first nuclear-propelled icebreaker (named after Lenin).

The first nuclear station in the world.

The first nuclear bomb of USSR.

During the Great Patriotic War, he was involved in programs on combat uses of artificial explosives. In 1943, joined the nuclear project at Laboratory No.2 of the USSR Academy of Sciences where he led a team responsible for nuclear weapon issues. In 1946, Yu. B. Khariton becomes Chief Designer and later Scientific Supervisor at Design Bureau No. 11 (now Russian Federal Nuclear Center-VNIIEF), which developed and successfully tested the first A-bomb (August 1949) and H-bomb (August 1943) models.

Yu.B. Khariton held the post as VNIIEF’s Scientific Supervisor for 46 years, right up to 1992, being responsible for the theoretical issues and R&D coordination in the Soviet nuclear munitions program. For 33 years he headed Scientific and Technical Council No. 2 of the USSR Ministry for Medium Machine-Building, being in charge of nuclear weapon issues. From 1992 and until his death, he was VNIIEF’s Merited Scientific Supervisor. He contributed greatly to the integration of scientists’ efforts on peaceful uses of atomic energy.

Thrice Hero of Socialist Labor (1949, 1951, 1954), Winner of the Lenin Prize (1956) and three State Prizes (1949, 1951, 1953). Member of the USSR Academy of Sciences (1953)
In 1954, under the direction of Kurchatov, the world’s first NPP was put into operation in Obninsk. NPPs were built to Russian (Soviet) designs in Bulgaria, Hungary, Czechia, Finland and other countries. Nuclear fuel supplies to these were streamlined with servicing and personnel training issues settled. Research reactors were being built under Made-in-Russia designs in many countries of the world. The advancement of home nuclear power was paralleled by the formation of the nuclear icebreaker fleet and the work on controlled fusion.

Unfortunately, the progress of nuclear power both in Russia and worldwide was slowed down substantially by the 1986 accident. The operators across the industry shifted focus to preserving the existing potential, technologies and manpower.

Over time, the industry continued to evolve. In February 2001, Rostov-1 was physically started up. In October 2006, a Russian government resolution let federal target program go ahead to have 26 nuclear units commissioned in the country by 2020. The world’s largest nuclear icebreaker, 50 Let Pobedy, was completed at the Baltiysky shipyard in St. Petersburg in 2007. A year later, the world’s first floating NPP construction project was launched in Severodvinsk.
Russian nuclear industry is one of the world’s leaders in terms of the level of scientific and technological developments in the area of reactor design, nuclear fuel, experience of nuclear power plant operation, NPP personnel qualification.
Today, Russian nuclear industry is a powerful complex of over 500 enterprises and organizations employing about 200 thousand people. It may be said without exaggeration that this is a critical sector of the country’s economy; its dynamic development is one of the basic conditions for ensuring energy independence and sustained economic growth. Nuclear industry also promotes progress in other industries through placing orders in machine building, metallurgy, materials technology, geology, civil engineering etc.

Structurally, the industry comprises four large scientific and production complexes: enterprises of the nuclear fuel cycle, nuclear power and the nuclear weapon complex and research institutes. Besides, it includes the most high-power icebreaker fleet and such a challenging and innovative field of activity as nuclear medicine.

The industry’s leader, Rosatom State Corporation, incorporates over 200 enterprises and organizations, including all civilian companies in Russian nuclear industry, nuclear weapon complex plants, research institutes and the nuclear icebreaker fleet.

Thanks to Concern “Rosenergoatom” which is a
Dollezhal, Nikolay Antonovich (1899 – 2000) – Member of the Russian Academy of Sciences, designer of the whole range of unique reactor facilities and chief designer of the first Soviet reactors. Born in the village of Omelnik, Yekaterinslav Province (Zaporozhye Region), in Ukraine in 1899. In 1912 his family moved to Podolsk, Moscow Region, where N.A. Dollezhal finished a modern school. In 1923, graduated from the Moscow N.E. Bauman Higher Technical School and worked, in parallel to the studies, at a depot and then at a locomotive repair plant. After graduation, worked as a design engineer at Moskvaugol having moved in 1925 to Joint-Stock Company «Heat and Power». In 1930 he wrote a book entitled «Fundamentals of Designing Steam Power Plants».

In 1933 he was appointed Technical Director of Giproatozmash in Leningrad. In 1934, becomes Chief Engineer at Khimmashtrest in Kharkov, and, in 1935, Chief Engineer at Bolshevik plant in Kiev. In 1941, he was appointed Chief Engineer at Uralkhimnash in Sverdlovsk.

In 1943-1953 N.A. Dollezhal was Chief Engineer and then Director and Scientific Supervisor at the Research Institute of Chemical Engineering (NIIkhimmash). In 1952 he was placed in charge of the newly formed Research and Development Institute of Power Engineering (NIKIET) and occupied the post for 34 years. In 1961 he established and for nearly 25 years led the Chair of Power Machines and Plants at the Moscow N.E. Bauman State Technical University. The installations built under the direction of N.A. Dollezhal include the world’s first NPP, the nuclear propulsion system for the first Soviet nuclear submarine and high-power pressure-tube uranium-graphite reactors.

N.A. Dollezhal was twice conferred upon the title of the Hero of Socialist Labor, and awarded six Orders of Lenin, the Order of the Red Banner of Labor, the Order of the Red Star, the Order of the October Revolution, the Services to the Fatherland Order, 1st Class, (1999) and the Kurchatov Gold Medal of the Russian Academy of Sciences(2000). Winner of the Lenin Prize and five State Prizes of the USSR. N.A. Dollezhal’s gives his names to the Research and Development Institute of Power Engineering (NIKIET).
part of it, Rosatom is world second by installed capacity company that produces over 16% of electricity in the country. Presently, Russian 10 nuclear power plants operate 33 units of the total installed capacity 25, MW, including the world’s only commercial fast-neutron reactor (BN-600). No grave safety incidents were recorded at Russian NPPs for many years of operation.

Rosatom is the world’s second largest holder of explored uranium reserves and the world’s third producer of uranium. ARMZ Uranium Holding (Atomredmetzoloto) is Rosatom’s authorized uranium mining company. Uranium is mined both in Russia (in Kurgan Region, Buryatia and Trans-Baikal Territory) and abroad through joint ventures and acquisition of foreign assets. For more than 40 years, Priargunyeva Mining and Chemical Production Association in Krasnokamensk has been the biggest Russian uranium mining company which numbers up to 90% of the uranium mined in the country. As far as foreign operations are concerned, there are joint uranium prospecting and mining projects implemented in Mongolia, Namibia, Canada, Armenia and Ukraine.

Russia possesses unique uranium enrichment facilities. These are Angarsk Electrolysis Chemical Integrated Mill (Angarsk, Irkutsk Region), Electrochemical Plant (Zelenogorsk, Krasnoyarsk Territory), Ural Electrochemical Integrated Mill (Novouralsk, Sverdlovsk Region) and Siberian Chemical Integrated Mill (Seversk, Tomsk Region). These are powerful enterprises rightfully referred to as the “diamonds in the crown” of Rosatom. They are structural parts of a nuclear fuel company, TVEL, a potential player in the world market of nuclear fuel supplies. In its niche, TVEL holds 17% of the market. In the world market of uranium enrichment services and uranium products, Rosatom is exclusively represented by Tekhsnabexport, a company holding a 45% share of the

During the Great Patriotic War led a naval mine defense program. Joined the nuclear project in 1943. As Director of the Institute for Physical Problems of the USSR Academy of Sciences, Deputy Head of Laboratory No.2 of the USSR Academy of Sciences and later Director of the I.V. Kurchatov Atomic Energy Institute, contributed greatly to the progress of nuclear science and technology. Immediately under his scientific supervision, a thermal-diffusion uranium isotope separation process was developed and the reactors for the first nuclear power plant, nuclear submarine and nuclear ice-breaker were built. Forty years of his life A.P. Aleksandrov gave to the making of ship nuclear plants.

international market. It has customers in all parts of the world.

Rosatom is also the leader in the world market of nuclear technologies being the first in the world in the number of NPPs built simultaneously abroad. Kudankulam NPP in India, Bushehr NPP in Iran are now under construction. They are being built by Atomstroyexport, a company also controlled by Rosatom.

Atomenergomash is also a part of Rosatom, a group of companies, which is one of five largest organizations in Russian power machine-building industry. The group incorporates over 40 Russian and foreign companies, including production enterprises, engineering centers and research organizations. The company carries out design, production, supply, installation, engineering and servicing of equipment for nuclear and thermal power plants, as well as for gas and petrochemical industries. Atomenergomash includes enterprises based in Russia, Czech Republic, Hungary and other countries. The equipment manufactured by them is in operation in more than 20 countries and is used at 13% of the world’s NPPs.

Rosatom’s research complex is formed by a large number of institutes and design organizations carrying out a broad spectrum of research in such fields as atomic and nuclear physics, physics of plasma, quantum optics, gas-, hydro- and thermodynamics, radiochemistry, acoustics and many others. These include recognized leaders in respective fields: Gidropress Experimental Design Bureau and I.I. Afrikantov Experimental Design Bureau for Mechanical Engineering, developers and designers of reactors; Leading Research Institute for Chemical Technology (VNIKhT), a developer of advanced technologies for mining and processing of uranium and other metals; A.A. Bochvar All-Russian Research Institute for Inorganic Materials (VNIINM), a developer of new types of fuels and structural materials; and
others. Russian nuclear centers are equipped with “hot cells”, cyclotrons, various test rigs and other unique machinery. The potential of this complex lies in the fact that it is possible to fully materialize any scientific idea, from fundamental research to design developments and production of prototypes.

Finally, Rosatom includes Atomflot, a company operating 6 nuclear icebreakers, 1 nuclear-propelled transport barge and maintenance ships. Today, Russia has the world’s most powerful icebreaker fleet and a unique experience in design, construction and operation of such ships. The task of the fleet is to ensure stable operation of the Northern Sea Route as well as provide access to the territories in the Extreme North and the Arctic shelf. Nuclear icebreakers are annually used to guide merchant ships through the ice and for scientific expeditions.
Guaranteed supply of complete life-cycle products and services

Flexible capabilities of NPP supply from components and services to turn-key and BOO projects.

Being a state corporation Rosatom is taking advantage of unique industry access to privilege resources.
Rosatom Global Operations
5 continents. More than 40 countries.

№1 in key segments:
№ 1 - in uranium deposits
№ 1 - in uranium enrichment
№ 1 - in new NPPs construction
№ 1 - Russian electricity generation company, 24.4 GW installed capacity
According to the IAEA, there are over 430 nuclear units in the world producing the total power of 372.2 gigawatt (GW). Nuclear power plants number about 17% of global electricity generation, meanwhile 57% of all nuclear electricity is generated in the USA (103 units), France (59 units) and Japan (54 units). The share of nuclear generation amounts to 76.9% in France, over 64% in Lithuania and over 54% in Slovakia and Belgium. In total, atomic energy numbers more than 25% in the energy balance of 16 countries of the world (the IAEA 2007 data).

The economic growth and the increase in the energy demand force many countries to actively expand their generating facilities. As stringent quotas are imposed on the atmospheric emission of greenhouse gases and prices for conventional energy sources are growing, the whole range of countries have opted for atomic energy to stake on. The process of revising national energy strategies in favor of peaceful atom has been called “nuclear renaissance”.

At present time, many countries have developed and are implementing projects to intensify evolution of nuclear power. Along with Russia, active construction of new power units is under way in China, India, USA, Canada, Japan, Iran, Finland and other countries. More countries, including Poland, Vietnam, Turkey, Belarus, Morocco and others have disclosed plans to develop nuclear energy.

Russian company “JSC Atomstroyexport” actively participates in implementation of these projects. This is the world’s only organization simultane-

Got a degree as a shipbuilder/heat engineer. In 1939-1942, led a design bureau team at a shipbuilding yard in Stalingrad (plant No. 246). Worked subsequently at plant No. 92 in Gorky (later the Gorky Machine-Building Plant or GMZ) where he held the posts as Head of Department, Deputy Shop Superintendent, Tool Shop Superintendent, Deputy Chief Technologist, Deputy Head of the Special Design Bureau for Pilot Projects and Deputy Head/Chief Designer of the Special Design Bureau (SDB). Chief Designer of the plant’s SDB in 1951-1954, Head and Chief Designer of the plant’s SDB in 1954-1964 and Head and Chief Designer of the Pilot Design Bureau for Mechanical Engineering in 1964-1969. Was immediately involved in and directed programs on making components of diffusion plants, commercial nuclear reactors, and reactors and steam supply systems (SSS) for nuclearpropelled surface ships and submarines.

Russian nuclear power plants rank second in the world by the criterion of reliable performance.

Previously building 6 power units abroad. The share of Atomstroyexport in the international NPP construction market is about 20% with its portfolio of orders exceeding 4.5 billion dollars.

According to the IAEA experts, up to 130 new power units of the total capacity 430 GW may be built across the world by 2020. This is expected to make up for the retirement of old units and bring the nuclear generation share in the global energy balance up to 30%.

Nuclear power and global warming

Global warming is believed to be one of the many causes of the so-called nuclear renaissance worldwide. This is a hazardous process responsible for the global climate being gradually unbalanced and the annual average air temperature increase. One of the major causes of it is “greenhouse effect”, that is an increase in the atmospheric content of carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), perfluorocarbons (PFC), hydrofluorocarbons (HFC) and sulfur hexafluoride (SF6), the latter resulting from active burning of coal, oil and gas at power stations. It causes an increase in the average air temperature near the Earth and Ocean water surface. This effect is responsible for the growth of average Earth temperature by 0.74°C in the period from 1906 to 2005. According to long-term observation data, 2007 had the highest ever rate of the annual average temperature increase. Thawing of permanent Arctic and Antarctic glaciers is becoming increasingly active.

The aftermath of the ongoing climate changes shows itself now, including more frequent and intense hazardous natural phenomena (floods, tornadoes, droughts) and the spreading of dangerous infectious diseases. Other potential consequences include more frequent and intense precipitation, thawing of glaciers and a sea level in-
crease, growing threats to ecosystems and biodiversity. All these factors cause a major economic damage; they endanger stability of ecosystems, human health and life. In the near term, it is reasonable to expect an increase in the Ocean level and the flooding of large coastland portions in different countries of the world.

In this situation, nuclear power plants are helpful as they do not produce atmospheric emission of «greenhouse gases». Specifically, thanks to the operations of Russian NPPs, 210 million tons of carbon dioxide are prevented from being released into the atmosphere annually. In total, as scientists estimate, nuclear power globally helps to avoid generation of over 3 billion tons of CO2 (so much gases would be released if generated at conventional heat power stations). This has a beneficial effect on the atmosphere and the rate of consumption of fossil fuels.

One should not also forget that NPPs are potent generators of electricity the human demand for which has been growing increasingly from year to year. Projections for the energy consumption growth rate and the development pace show that the demand is growing much faster than the supply. Lack of sufficient extractable energy resources is becoming an increasingly acute problem. Most of the countries in the world have rather limited capabilities for the construction of new hydroelectric power stations. Alternative energy sources
(wind farms, solar-battery power stations and biomass fuel production mills) are developing actively but will reach the commercial scale of output at competitive prices not earlier than in 2030.

One potential solution is an active development of nuclear power, one of the youngest and dynamically growing industries of global economy. Already now the installed capacity of all nuclear power plants in the world amounts to nearly 375 GW. The IAEA forecasts say that by 2030 there will be up to 600 new power units built across the world (compare it with slightly more than 440 currently existing units).

The process is slowly but surely gaining momentum. In the world the construction of seven new NPP units began in 2007. There were 10 of them in 2008 and 12 a year later. Finally, the construction of 14 new power units was launched last year. As of the end of 2010, there were 65 units with a capacity of 40 to 1600 MW under construction across the world.

China is the most active country advocating for “nuclear renaissance”. Beijing seeks to bring the share of nuclear power in its energy balance to 5% by 2020 (now it is less than 2%). Only last year the construction of 10 new power units was launched. Eight new units were laid down in 2009 and six the year earlier. The progress of Chinese nuclear power is greatly aided by Russian, French and US companies. Rosatom built the first stage of Tianwan NPP, China’s most powerful nuclear plant, and is starting construction of its 2nd stage. In total, Russian “Atomstroyexport” in the nearest fifteen years is planning to put into operation 30 - 45 new reactors in Iran, Bulgaria, India, China and Czech Republic.

More and more countries are drawn into “nuclear renaissance”. An increasingly large number of countries, both developed and developing, find it necessary now to start con-
There are plans to develop nuclear power in Jordan, Namibia, Egypt, Vietnam, Turkey, Belarus, United Arab Emirates, Qatar and Venezuela. And the advent of small reactors, such as Akademik Lomonosov, the world’s first floating NPP, constructed in Russia, is expected to considerably expand the geography of the “peaceful atom” presence in the map of the world.

The foregoing means not just that there will be a great demand for steel, concrete and dedicated nuclear and power equipment. There will also be a need for experts in nuclear law and supervision, assembly personnel and control room operators. In the near future, the demand for graduates majoring in nuclear power will be practically general. It makes the choice of “nuclear” professions rather perspective.

The perspectives of the industry development in Russia

Russia is implementing a large-scale nuclear power development program expected to bring the share of nuclear power from 16% to 25-30% by 2020. There has been adopted and is under implementation Rosatom State Corporation’s long-term program of activities (for 2009-2015) as approved by Russian Government resolution No. 705 dated 20 September 2008. This stipulates a government funding for the NPP construction in the amount of 674.8 billion rubles. Under implementation is the General Layout for the deployment of electric power facilities by 2020 (Russian Government order No. 215-r dated 22.02.2008). This document plans that 32.3
GW of generating facilities will be introduced by 2020, this expected to bring the installed capacity of Russian NPPs to over 53 GW. According to experts’ estimations, the program implementation will raise the share of nuclear-generated electricity by 2020 to 20-30% nationally and to 30-40% in European part of Russia. Now 7 power units are under construction in Russia. As before 2007 only the construction of units laid down in Soviet times was completing, so in 2007 the construction of two new NPPs Leningrad -2 and Novovorenszhskaya-2 (of 2 units each one), as well as the construction of the world’s first floating NPP Akademik Lomonosov has begun. There are also Rostov-2, Kalinin-4 and Beloyarskaya-4 units that are under the construction.

In 2009 preparatory works started at Tver NPP and Seversk NPP sites, sitting formalities are being cleared for the South-Ural, Nizhny Novgorod, Central and Kaliningrad NPPs. In parallel with the construction of new power units, there was an effort undertaken to raise the installed capacity of nuclear power plants which was 76% and 77.7% respectively in 2006 and 2007 (the prediction for 2008 was 79%). The measures taken have also greatly improved the safety and security of power units.
The innovative development of Russia is supported by state program “Russian Innovation Strategy 2020”. State Corporation Rosatom is one of the leaders of implementation of this strategy. Rosatom strategic objectives are to gain global technical leadership of the State Corporation in the nuclear industry both on traditional (power) and new (nonpower) nuclear markets.

Rosatom Innovation Policy objectives are:
- To update existing technologies, products and services for traditional markets
- To create and launch new technologies, products and services for traditional markets
- To develop infrastructure projects and programs

Rosatom Innovation Policy was recognized to be the best in an “Innovation Policies’ rating” held by state rating agency “Expert RA” in 2012.

For successful innovative development Russian Fed-
eneration needs a supply of scientific personnel. This is one of the key programs implemented under the edges of Rosatom Innovation Policy. To gain a flow of scientific and research personnel Rosatom:

- Creates favorable conditions and incentives for the talented young people that are interested in the research work to come in science
- Consolidates young researchers in Russia
- Supports existing scientific schools that unite the researchers of different generations
- Attracts leading foreign and Russian scientists to work with PhD students in research institutes

**Forming innovative environment in Russia**

The implementation of Russian innovation development policy by Rosatom promotes interaction of fundamental and applied sciences, leading national education, innovation business in nuclear technology and leading companies. Its effectiveness is based on:

- Elimination of barriers that restrain innovation activity of enterprises and spread of progressive technologies in economics
- Strengthening incentives to innovation activities, use and development of new technologies to provide competence.
NPPs are not only strategic facilities but companies employing tens of thousands of people. Continuity and devotion underpinned by stability and high remuneration are the key guarantees of the sector’s development.
Specialties, professions and jobs at NPPs

Nuclear power plant (NPP) is a very large and technically complex power generation facility which requires well-coordinated labor of hundreds employees of different professions and specialties. Only well-organized work can ensure safe and continuous operation of the plant.

Director (plant manager) and chief engineer are key people at a nuclear power plant. As a rule, they are top-class managers and highly competent specialists with a vast experience in working at nuclear facilities. They must have a full picture of how all systems function at the plant entrusted to them. For this, ideally, they have to advance their career through several levels starting from low positions and gradually studying aspects of the work.

The lower tier of the plant management is occupied by deputies of the director and chief engineer. Normally, at a NPP there are positions such as deputy directors for human resources, security and finance. The chief engineer has deputies for operation, quality, maintenance and repair. NPP operation is not possible without these specialists. A mandatory requirement for this staff category is related higher education and respective work experience.
The next tier is intermediate level managers who directly coordinate work at the facility. Positions such as the “plant shift supervisor” and “unit shift supervisor” are of special significance, as well as the “leading engineer for the unit operation” (LEUO), “senior reactor engineer” (SRE) and “senior turbine operator” (STO). Positions of the “production engineer for operation of automated control system”, “duty senior electrician” and “senior water treatment engineer” are also of importance. Then, there are the engineers of the CMS operational support and plant operation technical support engineers. They ensure reliable and safe operation of major structural divisions of the plant, i.e. reactor and turbine sections.

Another tier is comprised of various units which staff consists of the head (engineer), his/her subordinates and support staff. For example, the Nuclear and Radiation Safety Unit lists a radiation safety engineer and health physicists. The Repair Control Unit (Dispatch Unit) consists of the unit head and engineers who coordinate all related planned activities; they are superior to the line staff. Apart from the equipment of so-called “nuclear island” at NPP there is a lot of thermal mechanical equipment and mechanisms; they are serviced by the Thermal Equipment and Mechanisms Maintenance Unit. It consists of the unit head and engineers. There is also the Automated Control System Maintenance Unit, Electrical Equipment Unit, Radioactive Waste Management and Radioactive Waste Solidification Unit, Nuclear, Radiation and Industrial Safety Unit, and Training Unit.

Lastly, goes the basic tier of NPP operation, i.e. the operating personnel. These are the Main Control Room operators who work on daily shifts monitoring the reactor conditions, electrical fitters, heating specialists and service-men, as well as security officers, drivers, accountants, custodians releasing work overalls and personal dosimeters and many other specialists who support daily operations of the nuclear power plant. All of them must be of sound psyche and ready for continuous advancement of their knowledge and skills and for strict observance of technical regulations, rules and procedures; they should not have pernicious habits. Such employees are not always on the staff schedule (especially, if they work for servicing organi-
The technical efficiency of our nuclear power plants and the high professionalism of their personnel guarantee the safe and faultless functioning of such a complex technological organism as the nuclear industry of Russia.

Organizations engaged during planned maintenance outages), but again sustainable operation is not possible without them.

Specialties, professions and jobs at other nuclear facilities

Construction of a nuclear power plant is a large-scale task which requires involvement of engineers who are specialists in capital projects, work superintendents and workers of different construction-related trades from high-grade welders through steeplejacks. One may judge on the work scale by this quote of a Leningrad II construction control panel’s meeting: “At present, the work is underway at 72 on-site facilities (56 at the first power unit and 16 at the second one). The site employs 127 items of construction machinery and mechanisms. A number of Leningrad II construction staff is about 3,000 persons.”

Managers in the “Construction” area are responsible for planning, drafting design cost estimates and executive documents, support of construction of the NPP and related infrastructure. They should know the detail design and project, cost estimates (especially in case of development engineers), industrial safety standards and regulations. A preferable level of education for them is a higher technical background. Thereat, the basic specialty is a construction engineer. They have to be experienced in industrial and civil construction, heat and natural gas supply and ventilation.
Regular workers should have a high level of competence in respective construction trades and possess skills in construction and installation and do these in strict compliance with the customer’s requirements and applicable regulations. Here, a preferable education level is intermediate vocational background (job related). Experience in construction of power generation facilities is encouraged. Thereat, nuclear power plant construction sites sometime offer rather specific jobs which require special competences, for instance, building of reinforcement and concreting of the inner reactor containment.

The work at uranium mining facilities requires special (mining) background. Thereat, mining engineers and technology chemists with large work experience and knowledgeable in open-cast and underground mining of resources, in-situ leaching technology, and mining operations are of
Construction of a nuclear power plant is a large-scale task which requires involvement of engineers who are specialists in capital projects, work superintendents and workers of different construction-related trades from high grade welders through steeplejacks.

Some positions require knowledge in hydrogeology (for example, geology engineer). As to technology chemists, their job-related specialty is the “Technology of rare and rare earth elements.” One of the standard requirements is the knowledge in sorption apparatuses.

To ensure sustainable execution of state functions associated with nuclear regulatory control, the industry needs a large number of inspectors knowledgeable in the national legislation, standards and regulations concerning industrial and radiation safety. They carry out regular inspections of operation of nuclear power plants and other nuclear industry facilities. For them, higher technical education is a preferable background.
Russian educational system is one of the best educational systems in the world. In Russia there are more than 300 universities. More than 20 universities have educational programs in nuclear energy field.
Education in Russia: description of the educational system, forms and educational programs.

**Educational system in the Russian Federation is based on:**

- consecutively implemented educational programs and state educational standards;
- educational institutions that implement these educational programs and state educational standards;
- administrative and other organizations providing leadership and management of the education system.

**Two types of educational programs are provided in the Russian Federation:**

- General education;
- Vocational education.

**General education includes:**

- Pre-school education;
- Primary general education;
- Basic general education;
- Secondary (complete) general education.

**Vocational education includes:**

- pre-vocational education;
- non-university higher education level (secondary vocational education);
- higher vocational education;
- post-graduate professional education, including post-graduate training programs.

Levels of higher education. Under the influence of the Bologna Process, which participant Russia became
in 2003, Russia moved to a two-level system of education: Bachelor (4 years on the basis of secondary (complete) general education) and Master (2 year on the bachelor basis). Bachelor degree (diploma) is state-type diploma, conferred usually once four-year-course is completed. Tuition programs for bachelor cover all areas of knowledge except medicine. Bachelor degree entitles the professional activity and is also a prerequisite for admission to the master tuition program.

Specialist’s diploma is a traditional diploma of the education system of the Russian Federation. It has two functions: it provides access to the professional practice (e.g., for engineers, teachers, chemists, etc.) and is a traditional prerequisite for admission to the program for academic degrees. The diploma is conferred after five or six years of study after getting secondary education. The diploma exists in all fields of knowledge.

Master degree is usually a two-year tuition program. The program is open for the individuals having bachelor degree. Those who have bachelor’s degree in the area relevant to selected Master degree pass the entrance test in the form of exams, interviews, etc. If bachelor degree does not correspond to the chosen field there is a need to pass extra examination. Compulsory Master Thesis is part of an independent research prepared under the guidance of the supervisor. Master degree as well as a diploma is a prerequisite to enter the programs for academic degree.

Enrolment and tuition of foreign nationals: enrolment procedure, terms and conditions, documents required. According to the Federal Law “On Education” as of 10 July 1992 (www.mon.gov.ru/dok/fz/obr/3993/) tuition in Russian educational institutions is conducted in Russian. In exceptional cases, there is a practice of teaching separate courses in the language of the intermediary (usually English).

Foreigners wishing to enter the Russian higher educational institutions should speak Russian language at the level not below than the first certificate level – TOEFL-I (information on Russian language testing of foreigners and levels of proficiency in Russian is available at www.langrus.ru/content/view/228/339).

Foreigners who do not speak Russian may be
pre-university trained in Russian language and other majors depending on the chosen specialty. It takes about one academic year for pre-university training course. Russian higher educational institutions provide educational services to foreigners on a contractual basis and through the federal budget of the Russian Federation.

The information on the opportunities to become a candidate for the Russian government scholarship can be obtained from the local Ministries of Education or the Embassy of the Russian Federation, as well as via the Permanent missions of “Rossotrudnichestvo” in the countries of residence.

The official invitation issued by the host university through the Federal Migration Service of Russia is the ground for obtaining a student visa for entry into the Russian Federation. Educational institution is in charge with registration of invitation entrance in Russia. For this purpose it is necessary to address to the educational institution and to draw all the necessary documents (as usual, an institution enters into a contract to train and issue the visa application form). It will take about 3-4 weeks for educational institution to design an invitation.
Levels of Russian educational system.

- Entrance examinations EE

* secondary (full) general education received within the program

** 2 to 4 semesters are taken into account where education is continued at a higher educational establishment in the same specialization
Reference information associated with the entry into and exit from the territory of the Russian Federation is described in detail on the web portal “Education in Russia for foreigners” and the official website of the Federal Migration Service of Russia:

- [www.russia.edu.ru/information/borders/INOUT](http://www.russia.edu.ru/information/borders/INOUT)
- [www.russia.edu.ru/information/borders/Customs](http://www.russia.edu.ru/information/borders/Customs)

**List of Documents.**

01 | The application form with 3x4 cm photo in original.

02 | The photocopy of passport. Validity of the passport must be not less than 1,5 years from the moment of entrance to Russia.

03 | The photocopy of Academic documents, equivalent to the academic documents of Russian Federation, with the academic degree, the full list of learned subjects and full list of marks, with a
notarized translation into Russian:
- For Bachelor studies (BSc/BA): school-leaving certificate
- For Master studies (MSc/MA): Bachelor’s or Specialist’s degree-certificate
- For Post-graduate studies (Candidate’s degree): Master’s or Bachelor’s certificate

04 | Transcript (the document showing the list of the subjects with results) with a notarized translation into Russian;

The academic documents and transcript must be legalized by the Russian Embassy or Consulate in the country where they were issued.

05 | Medical certificate confirming that you haven’t got contra-indications for study in the Russian Federation.

06 | After arrival in Russia the foreign citizen should make the medical policy. The policy is made out at the expense of personal means of the student. More often, the educational institution promotes in acquisition of the medical policy.

07 | In certain cases the recognition procedure of the previous educational document can be demanded. This procedure can be passed in the Main government expert center for estimation of education (http://new.glavex.ru/).
Universities of Russia
NRNU MEPhI is organized as the network regionally-distributed innovation education and scientific complex located in 5 Federal Districts and dominating within the structure of nuclear education cluster of Russia. The University structure consists of 11 profile educational institutions of higher professional education and 15 colleges and secondary technical schools offering secondary professional educational programs. The following refer to the number of higher education institutions included in the NRNU MEPhl:

- Moscow Engineering Physics Institute, Moscow
- Obninsk Institute for Nuclear Power Engineering, Obninsk, Kaluga Region
- Novouralsk State Institute of Technology, Novouralsk, Sverdlovsk Region
- Ozersk Institute of Technology, Ozersk, Chelyabinsk Region
- Sarov State Physics and Engineering Institute, Sarov, Nizhniy Novgorod Region
- Seversk Institute of Technology, Seversk, Tomsk Region
- Snezhinsk Physics and Technology Institute, Snezhinsk, Chelyabinsk Region
- Institute of Technology, Lesnoi, Sverdlovsk Region
- Trekhgornyi Institute of Technology, Trekhgornyi, Chelyabinsk Region
- Volgodonsk Engineering Technical Institute, Volgodonsk, Rostov Region
- Dimitrovgrad Institute of Technology, Dimitrovgrad, Ulyanovsk Region
Intermediate vocational education establishments – MEPHI branches:
- Angarsk Polytechnic College, Angarsk, Irkutsk Region
- Balakhna Polytechnic College, Balakhna, Nizhniy Novgorod Region
- Volgodonsk Polytechnic College, Volgodonsk, Rostov Region
- Krasnoyarsk Industrial College, Zheleznogorsk, Krasnoyarsk Territory
- Krasnoyarsk Electromechanical College, Zelenogorsk, Krasnoyarsk Territory
- Krasnokamensk Polytechnic College, Krasnokamensk, Chita Region
- Novovoronezh Polytechnic College, Novovoronezh, Voronezh Region
- Obninsk Mathematical College, Obninsk, Kaluga Region
- Obninsk Polytechnic College, Obninsk, Kaluga Region
- Siberian Polytechnic College, Novosibirsk
- Urals College of Technology, Zarechny, Sverdlovsk Region
- South Urals Polytechnic College, Ozersk, Chelyabinsk Region
- Mathematical College, Moscow
- Moscow Regional Polytechnic College, Elektrostal, Moscow Region
- Moscow Industrial College, Moscow

NRNU MEPhI offers higher professional education curricula teaching engineers-researchers, engineers, bachelors and masters majoring in high-priority fields of science, engineering and technology to become experts in high-technology fields of economy, science-intensive industries, as well as in new innovative directions, such as nuclear and radiation technologies, nanotechnologies, medical physics and technology, ecology and biophysics, informatics and others. The University also performs under higher professional education curricula education of skilled personnel in the field of international scientific and technological cooperation, economics, management, technical and financial monitoring and audit in high-technology sectors of the Russian and international economy.

NRNU MEPhI is the leading Russian scientific centers. Using unique research facilities and up-to-date equipment available in their education and scientific laboratories Departments and Institutes of the University carry out scientific research and development in scientific and technological directions highly important for the State for boosting modernization and technological development of the Russian Federation.

The University has close relations established with such internationally renowned organizations as the International Atomic Energy Agency (IAEA), European Center for Nuclear Research (CERN), International Science and Technology Center (ISTC), U.S. Civilian Research and Development Foundation (CRDF), Joint Institute for Nuclear Research (Dubna) and others.

International activities of the NRNU MEPhI are directed towards winning positions among the leaders of the world scientific and educational space and significant expansion of export of education services. For achieving the goal the University expands the list of Master and Doctoral educational programs offered to international students,
develops joint educational programs and organizes academic exchanges with leading foreign nuclear universities, obtains accreditation of educational programs in the USA, in Europe and Asia, widens scientific contacts with the International Atomic Energy Agency (IAEA), international organizations, the most prominent scientific centers of the USA, Europe and Asia.

More than 650 Specialists, Bachelors and Masters as well as almost 60 Candidates of Science from 24 countries (China, Syria, Argentina, Turkey, Pakistan, the Union of Myanmar, Mexico, South Korea, Vietnam, India, Serbia, Israel, Morocco, Ukraine, Belarus, Kazakhstan, Armenia, Uzbekistan, Moldova, Kirgizstan, Georgia, Lithuania, Latvia, Estonia) were educated at the University. Proactive policy of the State Atomic Energy Corporation ROSATOM on the international market of exported nuclear technologies, strengthening positions of the NRNU MEPhI in Russia and in the world led to significant expansion of export of educational services by the NRNU MEPhI. In 2010 International education and retraining center was inaugurated by the NRNU MEPhI on the basis of the INPE NRNU MEPhI (Obninsk) for the purpose of expansion of export of educational services in the field of peaceful use of atomic energy.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education (four-year programs leading to Bachelor degree)
Applied Mathematics and Informatics
Profiles: Physics
• Nuclear and Elementary Particle Physics
Profiles: Chemistry
• Analytical Chemistry
• Physical Chemistry
Profiles: Ecology and Environmental Management
• Ecological Safety of Nuclear Power Engineering
Profiles: Information Security
• Complex Protection of Informatization Objects
Profiles: Nuclear Power Engineering and Thermal Physics
• Operation of Nuclear Power Plants and Installations
• NPP, Equipment Installation, Commissioning and Repair
• Physical and Chemical Processes at Nuclear Power Plant

Profiles: Nuclear Physics and Technology
• Elementary Particle Physics and Cosmology
• Micro- and Nanoelectronic Devices and Systems for Physical Plants

Profiles: Materials Science and Technology
• Material Physics

Profiles: Instrumentation
• Quality and Diagnostics Control Instruments and Techniques

Profiles: Control in Engineering Systems
• Control and Informatics in Engineering Systems

Profiles: Computer and Information Sciences
• Automated Control and Data Processing Systems

Information Systems and Technology
Graduate Education
(programs leading to Master degree)
Applied Mathematics and Informatics
Profiles: Physics
• Nuclear and Elementary Particle Physics
• Control and Accountability of Fissile Materials
Profiles: Chemistry
• Radiochemistry

Profiles: Ecology and Environmental Management
• Radioecology

Profiles: Information Security
• Information Security of Credit and Financial Organizations

Profiles: Nuclear Power Engineering and Thermal Physics
• Operation of Nuclear Power Plants and Installations
• NPP: Equipment Installation, Commissioning and Repair

Postgraduate professional training programs
• Nuclear power installations including design, operation and decommissioning
• Thermal physics and theoretical heat engineering
• High energy physics
• Physics of condensed matter
• Plasma physics
• Laser physics
• Physics of charged particle beams and accelerator engineering
• Physics of atomic nucleus and elementary particles
• Solid-state electronics, radio-electronic components, micro- and nanoelectronics, quantum effect devices
- Physical chemistry
- Automation and control of technological processes and production
- Mechanics of deformed solid body
- Instruments and methods of control of environment, substances, materials and manufactured products
- Instruments and methods of experimental physics
- Radiobiology
- Differential equations, dynamic systems and optimal control
- Information, measurement and control systems
- Theoretical physics
- Mathematical physics
- Mathematical and instrumentation methods in economics
- Mathematical modeling, numerical methods and complexes
- Software for computers, computer complexes and networks
- Information protection methods and systems, information security
- Systems analysis, information management and processing
- Electrophysics, electrophysical installations
- Elements and devices of computer technology and control systems
- Real, complex and functional analysis

Programs of additional education and professional development

The following courses were developed and are actively used at present:
- Training directions
- Nuclear safety culture in handling nuclear materials
- Radiation measurement support of radiation safety
- Fundamentals of population protection from threats specific for radiological emergency situations
- Medical and biological fundamentals of radiation safety
- Physics and safety of nuclear power units
- Ensuring environmental safety during operations in the field of handling hazardous wastes
- Practical spectrometry of nuclear radiations
- Application of modern nuclear physics methods for monitoring of reactor materials and elements of structures on nuclear power installations

- Materials in nuclear power generation
- Mass spectrometry methods of isotopic and element analysis
- Professional skill upgrading courses for operation personnel of research nuclear reactors
- Physical fundamentals of nanotechnologies
- Reliability of equipment of nuclear reactors and risk management
- Problems of safety of nuclear power installations equipped with VVER-1000 reactors
- Safety of nuclear power plants
- Innovation management and quality management in nuclear industry
- Systems of management of living cycle and management of quality of knowledge-intensive production
- Modeling of algorithms for production planning and management in nuclear industry
- Innovation management in nuclear industry
- New technology platform production and services: materials and technologies of new generation for large-scale nuclear power generation
- Closed nuclear fuel cycle
- Development of nuclear power generation in Russia on the basis of new technological platform
- Materials of nuclear power installations
- Technology of NPP equipped with VVER reactors with digital automatic control system
- Experience of handling radioactive wastes in western countries
• Economic aspects of decommissioning of nuclear and radiation dangerous objects
• Safety of nuclear fuel cycle
• Application of computer-aided design engineering systems in nuclear machine-building
• Nanosystems and nanostructures in nuclear technologies
• CALS-technologies in production management and knowledge-intensive production quality management systems in nuclear industry
• Application of CALS-technologies for ensuring competitiveness of knowledge-intensive production of nuclear industry
• Application of advanced CALS-technologies and ISO-9000 standards in re-engineering of operated computer-assisted control systems
• Information technologies in economics and management of nuclear industry facilities
• Analysis of investment projects in nuclear industry on the basis of Project Expert software
• Fundamentals of business planning in operation of nuclear industry facilities using software–simulation modeling
• Project management in nuclear industry
• Strategic management in innovation business
• Nuclear and radiation safety during handling spent nuclear fuel
• Physical methods and instrumentation of active control of nuclear materials
• Maintenance of professional skills of deputy heads of the nuclear energy facilities (heads of structural units in charge of physical protection)
• Nuclear fuel cycle technologies: problems and approaches to their solution
• Imitation methods of testing of radiation resistance properties of microelectronics devices
• Radiation effects in electronic devices exposed to pulsed ionizing radiation
• Sensors for measurements of parameters of radiation on the basis of micro- and nanotechnologies
• Local networks in nuclear power generation
• Design and programming of microprocessor control systems in nuclear industry
• Calculation and experimental methods for substantiation of thermal hydraulic characteristics of new generation of nuclear power installations
• Methods of diagnostics of conditions of reactor materials
• Promising structural-phase states and properties of zirconium alloys for high burn-up values
• Low-activation heat-resistant steels and alloys for nuclear and thermonuclear power generation
• Physical basics of radiation material science
• Application of advanced nuclear physical methods for monitoring reactor materials
• Management of human resources at facilities of nuclear industry: competence-based approach, motivation management
• Management of human resources at facilities of nuclear industry: homeland and international experience
• Nuclear and atomic-molecular technologies
• Application of methods of physicochemical analysis for control of nuclear activities
• Physical basics of research and control of formation of nanostructured materials for nuclear industry

**Fundamentals of radiation transfer theory and protection from ionizing radiation at NPP**
• Radioecology
• Measurements of vibrations and vibration diagnostics of mechanical equipment of nuclear industry facilities
• Instrumentation support of radiation control
• Methods for processing statistical information in the problems of control of nuclear power installations
The Central Institute for Continuing Education and Training (CICE&T) is a leading educational center for training and professional development of managers and specialists of ROSATOM organizations. The mission of the CICE&T is to raise professionalism and competency of nuclear workers to ensure safe sustainable development of the nuclear industry and competitiveness on the world market of nuclear technologies. CICE&T is nationally accredited and holds a license for education provision. CICE&T offers more than 150 programs for advanced training and 4 programs for professional retraining. All programs are developed in accordance with the requirements of the supervisory authority, IAEA and ISO-9000.

The available programs cover the following subject areas:
- Nuclear technologies
- Nuclear, radiological and environmental safety
- Industrial hygiene, occupational health and safety
- Management
- Personnel management
- Financing and crediting
- Information technologies, information protection

The staff consists of acknowledged professionals having many-years experience, with 26 instructors possessing the degree of Candidate of Science and 6 - Doctor of Science. The Institute’s staff and teachers are invited as experts of the IAEA, which proves their highest qualification. CICE&T holds various International workshops, conferences to share experience in nuclear sphere in Russia and abroad.

CICE&T develops the International cooperation and its basic partners are:
- The International Atomic Energy Agency
- The European Nuclear Education Network Association
- Battelle Memorial Institute, Pacific Northwest Division
- UT-Battelle, LLC
- Swedish Radiation Safety Authority
- Belarusian State University
- Bangladesh Atomic Energy Commission
- Nuclear Power Plants Authority – Egypt
- Vietnam Agency for Radiations and Nuclear Safety
- Vietnam Atomic Energy Agency

Founded in 1967. 3 branches in Moscow, St-Petersburg, Yekaterinburg as well as at NPP sites.
Training areas and specialties of CICE&T that are the most demanded at nuclear industry enterprises:
- Bid invitation
- Site selection & specification
- Characteristics & design of nuclear fuel
- Security & physical protection of NPP
- NPP construction Project Management
- Emergency Preparedness and Safety Assurance During Transportation of Radioactive materials
- Reactor island: physics & equipment for engineers
- Turbine Island: thermohydraulics & equipments for engineers
- Waste management
- Secondary circuit equipment: requirements, quality control, guarantees & operating maintenance
- Research reactors
- Spent fuel management
- Introduction in nuclear technologies
- Small power reactors
Rosatom Corporate Academy is an industry-wide centre of excellence in the area of training, development, personnel assessment and other people-related processes.

**Built in April, 2011 the Academy has been focused on the following issues:**
- Providing essentially new level of management skills
- Facilitating change management process in Russian nuclear industry
- Implementing the new talent development strategy
- Disseminating new Rosatom values and corporate culture for all assets
- Improving the employer brand of ROSATOM and its companies (in particular, in the field of graduate recruitment)

The Academy has more than 50 training programmes in its portfolio covering such areas as:
- Leadership and Management Development
- Finance
- Purchasing
- IT-systems in nuclear industry
- Human Resources
- Legal issues
- Marketing

The Academy has the responsibility for all types of management development and talent development programmes within the industry.

Having Graduate Recruitment as one of the key priorities, the Academy develops and implements a number of projects together with universities and companies. These projects are aimed at selecting, involving and developing and retaining talented students in the nuclear industry.

The Academy is also an authorized operator in the field of international education. Aimed at building and maintaining international relations with universities and government organizations in the countries where Rosatom has its projects, the Academy creates opportunities for Russian Higher Educational Institutions to promote their services abroad as well as for students to get a “fast-track” career development. For example, in 2012 one of the projects (called “TEMP- Tournament of young professionals”) was acknowledged by the professional HR-community as the “best HR project of the year”
D. MENDELEYEV UNIVERSITY OF CHEMICAL TECHNOLOGY OF RUSSIA (MUCTR)
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Phone: +7(499) 978-8733
Fax: +7(495) 609-2964
e-mail: rector@muctr.ru
www.muctr.ru

Founded in 1898. Total number of students: about 8,000

Total number of higher education (bachelors, masters) and postgraduate education programs:
17 bachelor programs; 4 master programs, 3 specialist training programs; 26 postgraduate programs

Since first years of existence, D. Mendeleyev University of Chemical Technology of Russia has been training practicing engineers for industry. This remains its key mission, although the content of the training has qualitatively changed. The university graduate must be able to solve complex problems addressing science, manufacturing, environment and personality development; this is the only way to provide sustainable development of the society. The university has adopted an innovative development strategy aimed at improvement of scientific, pedagogical and administrative activities. Today MUCTR is a leader among the technical universities in Russia and has the highest ratings among the country’s chemical and technology higher education institutions. Graduates of the university occupy top posts in the scientific and manufacturing fields, in government, and in small and large businesses. We are proud that more than 40 graduates have been elected academicians and member-correspondents of the Academy of Sciences of the USSR and the Russian Academy of Sciences.

In 2007, in MUCTR there was created the Institute of Modern Energetics Materials and Nanotechnology - PCI (IMEMN - PCI) within the Engineering Physicochemical Faculty, which came into being during the advent of the nuclear power industry and energetics (1949). Nowadays the IMEMN - PCI trains experts in specialty 240501, “Chemical Technology of Materials of the Modern Energetics”. Experts in this discipline graduate from three departments of the IMEMN - PCI: the Department of High Energy Chemistry and Radioecology; the Department of Technology of Isotopes and Hydrogen Energetics, and the Department of Technology of Rare and Trace Elements and Nanomaterials on Their Basis. A special feature of specialist training in the IMEMN - PCI can be characterized as follows: an educational profile with an underlying strong basis of fundamental knowledge and ability to adapt quickly to modern conditions. Below are examples of some areas of emphasis of the IMEMN - PCI departments.
THE DEPARTMENT OF HIGH ENERGY CHEMISTRY AND RADIOECOLOGY

Recently, a new area of chemistry has begun to develop intensively – the high energy chemistry, which studies chemical processes initiated by particles with the energy considerably exceeding thermal energy. Its development led to creation of original chemical and technological processes that yield materials (including nanomaterials) with unusual properties; these materials have found wide application in various branches of the national economy – from health care to the space industry.

THE DEPARTMENT OF TECHNOLOGY OF ISOTOPES AND HYDROGEN ENERGETICS

It is known that hydrogen is the almost inexhaustible power source of the near future, and not only because it is an environmentally friendly fuel: after its interaction with oxygen, only energy and water are formed. Hydrogen isotopes – deuterium and tritium – are the basis of thermonuclear power created today within various international and national programs. Stable isotopes of other light elements – helium, lithium, boracium, carbon, nitrogen, oxygen, neon, silicon – also find a wide range of applications in various branches of industry.

THE DEPARTMENT OF TECHNOLOGY OF RARE AND TRACE ELEMENTS AND NANOMATERIALS ON THEIR BASIS

The volume of rare metals consumption is one of the most important indicators of scientific and technical progress in primary branches of the industry of any country – power, aircraft engineering, metallurgy, mechanical engineering, electronics, petrochemistry, and production of glass, ceramics, apyrous materials and many other unique materials. A considerable portion of the nanomaterials which today are attracting huge attention, was synthesized on the basis of rare metals compounds. The profound knowledge of chemistry and technology of rare metals, which is still far from completion, holds promise for an impressive range of application areas.

The traditions, amicable atmosphere and a solid base of material resources of the IMEMN - PCI promote its leadership in the educational and scientific work in MUCTR. The university does everything possible for their students to obtain elite professional education, setting the stage for a life full of interesting and important events.

Pre-University training Department for foreign students; list of disciplines: Russian, basics of mathematics, basics of chemistry and other general disciplines.

University hostel for foreign students is available.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Graduate Education
(programs leading to Specialist degree)
Chemical Technology of Modern Power Engineering Materials

Additional educational program – postgraduate studies, doctoral studies in specialty
Technology of Rare, Diffused and Radioactive Elements (technical and chemical sciences)
Far Eastern Federal University is:
• First-class education and outstanding research results.
• A modern campus in a unique geographic location; offers infrastructure for comfortable studying and accommodation.
• An international community with a cosmopolitan atmosphere; tobacco and alcohol-free area.

Far Eastern Federal University is a leading university with internationally recognized schools, highly experienced faculty and inquisitive students.

In the 2013/2014 academic year the university will launch more academic programs, including a program on pharmaceuticals in partnership with Griffith University (Australia), an “Environmental Technology in Marine Engineering” with the University of Strathclyde (UK), “Theoretical Physics” and “Nuclear Medicine” with Osaka University and the Kurchatov Institute. Our goal is to provide an international approach to the learning process.

During the same period several academic programs will be carried out by FEFU Rosatom Federal State Corporation.

FEFU offers Russian language courses for foreign and CIS students.

There are 11 dormitories that can accommodate over 11.5 thousand people.
HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education (four-year programs leading to Bachelor degree):
- Heat-Power Engineering and Heat Engineering
- Electric Power Industry and Electrical Engineering
- Technosphere Safety
- Oriental and Africa studies
- Philology
- Linguistics
- Fundamental and Applied Linguistics
- Radiophysics
- Physics

Graduate Education (programs leading to Master degree):
- Heat-Power Engineering and Heat Engineering
- Electric Power Industry and Electrical Engineering
- Technosphere Safety
- Oriental and Africa studies
- Philology
- Physics

Additional Training Courses
- Environmental protection for managers and personnel of industrial facilities
- A concept of long-life education for experts in electrics and technologies
- Environmental protection for managers and employees of ecology monitoring services and departments
- Professional training in hazardous waste management
- Environmental protection for managers and employees of hazardous waste management facilities
- English translation

- Tourist guide and translator of Chinese
- English business language
- English translation in economy and business
- English translation in social and cultural areas
- English translation in natural sciences and mathematics
- English translation in technology and industry
vanovo State Power Engineering University (ISPEU) is one of the leading higher education institutions with a 92 year background of training specialists for power engineering.

Today ISPEU is:
- 8 000 students from 23 countries;
- 9 faculties, 39 departments including 3 foreign languages departments;
- A machine-building college;
- 500 professors, 70% of them having highest scientific degrees;
- 10 research centers and 3 laboratories;
- 3 dissertation councils.

Within its administrative structure ISPEU has 18 power engineering departments, including Nuclear Power Stations Department.

ISPEU has the Research and Education Center of High Technologies in Heat and Nuclear Engineering. The Center includes a certified laboratory of nondestructive testing, a full-scale simulator of modular control board for a power-generating unit with VVER-1000 reactor and K-1000-60/3000 turbine set, the performance requirements for this unit, an analytical simulator and instructional materials (IM).

IM are developed for different classes and include electronic (multimedia) teaching aids, computer-aided training systems which are part of comprehensive approach to the instructional process. It means a step-by-step, logically consistent educational process from acquiring knowledge and skills necessary for the operating personnel at nuclear power stations to the performance evaluation of the training conducted.

In 2009 ISPEU educational program “Nuclear power stations and units” was the first in the Russian Federation to be awarded EUR-ACE accreditation certificate in this area. This certificate is recognized by 16 European countries that signed EUR-ACE project.

The hostel for foreign students is available.
HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undegraduate Education
(four-year programs leading to Bachelor degree)
Heat Power Engineering and Heat Engineering Profiles:
• Heat Power Stations
• Water and Fuel Engineering at Heat and Nuclear Power Stations
• Work Process and Production Automation

Electrical Power Engineering and Electrical Engineering Profiles:
• Relay Protection and Electric Power Systems Automation
• Electric Power Stations
• Electromechanics
• Electric Drive and Automation

Electronics and Nanoelectronics Profiles:
• Industrial Electronics

Graduate Education
(programs leading to Master degree)
Electrical Power Engineering and Electrical Engineering
Electronics and Nanoelectronics
Control in Engineering Systems

Graduate Education
(programs leading to Specialist degree)
Nuclear Power Stations (Design, Operation and Engineering) Profiles:
• Design and Operation of Nuclear Power Stations

Programs of Additional Education
Additional Professional Training Profiles:
• NPS unit control
• For the position of senior engineer operating VVER-1000 reactor and senior engineer operating K-1000 turbine set

Additional to Higher Education Profiles:
• Translator in professional communication
Tomsk Polytechnic University was founded at the end of the 19th century as the first higher educational institution in the field of engineering and it remained as such for quite a while in the Asian and Pacific part of Russia. TPU is located in Tomsk – the city in the beautiful region of western Siberia, the university represents an integral part of the city.

Tomsk Polytechnic University is already one of the top 29 research universities in Russia, it has vast experience in teaching and research. TPU has ranked in QS World University Rankings, it is the second among 59 leading universities according to National rankings of universities in the criteria of research intensive universities and it is in the top 20 universities in the criteria – demand for university graduates. TPU has already trained more than 150 000 graduates. Among TPU graduates are such outstanding scientists as Nikolai Kamov and Mikhail Mil, the founders of national helicopter engineering; Nikolai Nikitin, the designer and builder of Ostankino TV Tower; Nikolay Semenov, the Nobel Prize Winner and other. TPU’s mission is to contribute to Russia’s competitiveness through the provision of internationalization and integration of research, education and training, generating new knowledge and innovative ideas and developing resource efficient technologies.

TPU comprises 7 research and education institutes. TPU possesses the nuclear reactor on its premises – the only

NATIONAL RESEARCH TOMSK POLYTECHNIC UNIVERSITY (TPU)
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e-mail: tpu@tpu.ru; iie@tpu.ru
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Foundation Year - 1896. Total number of students: over 22 000
reactor for academic purposes in the Eastern part of Russia. TPU faculty includes more than 2,200 people, with 325 DSc and 1,340 PhD holders. By the President of the Russian Federation Decree TPU was included in the National Treasure of the Russian Culture Register. 2000 – TPU became the first university in Russia to be certified in Global Alliance for Transnational Education as a reliable provider of transnational academic programmes. Also, it underwent the independent international certification audit of the management quality system in training and professional advancement of specialists and research production development in accordance with ISO 9001:2000. 2005 – TPU became a member of the Conference of European Schools for Advanced Engineering Education and Research (CESAER) and Consortium Linking Universities of Science and Technology for Education and Research (CLUSTER). 28 TPU academic programs are awarded the EUR-ACE® label. 2007 - 2009 – TPU is the winner of competition organized by Russian government for development and implementation of University Innovative Development Program. 2009 – TPU received the status of the National Research University. 2010 – TPU is the winner of competition organized by Russian government for organizing international research mega-laboratories, Russian Federation Government Decree # 220. In 2010 SkolkovoTech and TPU signed the Memorandum of Understanding, Skolkovo university education and training center was founded on TPU premises. The priority fields for Tomsk have been defined as resource efficiency and energy savings, nuclear engineering, medical engineering. Presently, TPU trains and educates students from 34 far abroad and 8 CIS countries who benefit from TPU unique research facilities, including the nuclear research reactor, the only one in the Asian part of Russia. International mobility academic programmes are run with 33 foreign university-partners. OUR PARTNERS

In science Research: Universität Karlsruhe, Technische Universität Munich, Saarland University [Germany]; Vienna University of Technology [Austria]; Hiroshima University [Japan]; Shenyang Institute of Technology [People’s Republic of China]; Université Paris-Sud 11, University of New Orleans, Université Louis Pasteur Strasbourg, National Polytechnic Institute of Grenoble [France]; Czech Technical University [Czech]; University of Trondheim [Norway]; Ulsan University [Korea] and others. International centers of companies «Microsoft», «Danfoss», «Lapp Group», «Huges», «Woodward, and others.

In industry: GT Semiconductor Materials Co Ltd, Beijing Co Ltd [People’s Republic of China]; Smiths Heimann GmbH, Adensis GmbH Company [Germany], DSO CO 09085 [Singapore], Unodrill AS [Uno] [Norway], UNID Co Ltd. [Korea]

In education [Double Degree programmes]: Technical University of Berlin [Germany]; RWTH Aachen University [Germany]; Technical University of Munich [Germany]; Czech Technical University in Prague [Czech]; University Paris SUD 11 [France]; Heriot-Watt University [Great Britain] Within the of 12 international associations and consortiums [IAU, iNEER, EARMA, EAIE, ENQHEEI, IGIP, SEFI, CESAER, CLUSTER, EUA, T.I.M.E, CDIO] TPU collaborates with the leading universities and organizations of the world.

INTERNATIONAL STUDENTS

TPU possesses sufficient experience in teaching international students. Students from Italy, Spain, France,
Canada, Ghana, Korea, India, Egypt, Vietnam, Colombia, People’s Republic of China, Nigeria, Iran, Germany, Australia, Thailand, Turkey, Brazil, Mongolia, Iraq, Ecuador, Congo, Indonesia study at Tomsk Polytechnic University. TPU offers international students a wide range of programmes in English and Russian: about 220 Bachelor’s (4 years), Master’s (2 years), Engineer’s (5 years) and Doctoral (3 years) programmes, Language courses, and a Pre-university course (1 year).

Education for international students includes academic exchange and joint educational programmes, professional academic programmes of technical, humanitarian, economical and linguistic fields in Russian or English and short-term courses of Russian and English languages.

**HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY**

**Undergraduate Education (four-year programs leading to Bachelor degree)**

**Physics Profiles:**
- Nuclear and Elementary Particle Physics
- Physics of Kinetic Phenomena
- Condensed Matter Physics
- Medical Physics

**Heat-Power Engineering and Heat Engineering**

**Electric Power Industry and Electrical Engineering**

**Nuclear Physics and Technology Profiles:**
- Nuclear Reactors and Power Plants
- Electronics and Automation of Nuclear Plants
- Nuclear Safety and Security

**Power Plant Engineering Profiles:**
- Boiler and Reactor Engineering
- Electric Power Engineering

**High-tech Plasma and Power Plants Profiles:**
- Plasma physics
- Beam and plasma technologies

**Physics and technologies of low temperatures Profiles:**

**Electronics and Nanoelectronics Profiles:**
- Electronics and Microelectronics

**Mechatronics and Robotics Profiles:**
- Robots and Robot Systems

**Information Systems and Technologies**

**Chemical Technology Profiles:**
- Chemical Technology of Inorganic Matters
- Rare, Scattered and Radioactive Elements Technology

**Technosphere Safety Profiles:**
- Environmental Protection from Power Engineering Exposure

**Graduate Education (programs leading to Specialist degree)**

**Applied Geology Profiles:**
- Geology, and Mineral Exploration and Prospecting

**Chemical Technology of Modern Power Engineering Materials**

**Graduate Education (programs leading to Master degree)**

**Nuclear Power Plants: Design, Operation and Engineering Profiles:**
- Management of Nuclear Power Plant
- Nuclear Technical Control and Accounting
The Moscow Power Engineering Institute (MPEI) was founded in 1930 in Moscow at the very beginning of world power engineering development and was widened and enlarged with discovering of new energy sources, solving new scientific and technological problems, implementing of new methods of energy generation, distribution and consumption – MPEI is of the same age as Russian Power Engineering.

Famous by its own traditions, MPEI had trained more than 180 thousand specialists in energetics for Russia and for more than 85 foreign countries. During these years MPEI alumni participated in the creation of the largest hydro-power plants and in launching of the first piloted space ships, had got the prestigious scientific awards and titles, joined the political and business elite of the Russian society.

Combination of “energy” and “non-energy” academic specialties and scientific directions inside the MPEI ensures the widest spectrum and deepness of the problems solved by MPEI graduates. This makes MPEI’s unique property as a leading technical university of Russia training the universal specialists, easily adopted to the job at any positions as the engineers and experts. Now MPEI is the largest educational and scientific centre, one of the main technical universities in Russia in the field of Power Engineering, Electrical Engineering, Radio Engineering and Electronics, Informatics and Computer Science. MPEI is rigged up with educational and scientific laboratories, offices and lecture halls with modern equipment and technical training aids.

Since 1987 MPEI is a member of International Association of Universities (IAU). In 2010 MPEI obtained status of National Research University. MPEI holds one of the leading places in annual official ratings among technical universities of Russia. At the University of Shanghai Cooperation Organization MPEI is a coordinator of the educational field “Energetics”.

MPEI has trained specialists for foreign countries since 1946. At present MPEI trains about 1000 students and post-graduates from 60 countries. The university develops cooperation with more than 60 foreign universities.
MPEI'S HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education (four-year programs leading to Bachelor degree)

**Nuclear Power Engineering and Thermophysics. Profiles:**
- Nuclear Power Plants and Installations
- Thermonuclear Reactors and Plasma Installations
- Thermophysics

**Thermal Power Engineering and Heat Engineering. Profiles:**
- Thermal Power Plants
- Water and Fuel Technology at Thermal and Nuclear Power Plants
- Automation of Technological Processes in Thermal Power Engineering and Heat Engineering
- Power Engineering of Heat Technologies
- Power Supply at Enterprises

**Power Engineering Machinery. Profiles:**
- Boilers, Combustion Chambers, and Steam-Generators of Nuclear Power Plants
- Gas-Turbine, Steam-Turbine Installations and Engines
- Automated Hydraulic and Pneumatic Systems and Aggregates
- Power Engineering Equipment Manufacturing

**Applied Mechanics. Profile:**
- Dynamics and Strength of Machines, Instruments and Equipment

**Mechanical Engineering. Profile:**
- Machines and Technologies of High-Effective Processes of Materials Treatment

**Electrical Power Engineering and Electrical Engineering. Profiles:**
- Electrical Power Plants
- Electrical Power Systems and Networks
- Electrical Power Supply
- High-Voltage Electrical Power Engineering and Electrical Engineering
- Relay Protection and Automation of Electrical Power Systems
- Electromechanics
- Electrical and Electronic Apparatuses
- Electrical Equipment of Enterprises, Organizations, and Institutions

Applied Mathematics and Informatics. Profiles:
- Mathematical and Software Support for Computing Machines and Computer Networks

Informatics and Computer Engineering. Profiles:
- Computing Machines, Complexes, Systems and Networks
- Automated Systems for Information Processing and Control

Control in Engineering Systems. Profiles:
- Control and Informatics in Engineering Systems

Instrumentation. Profiles:
- Devices and Methods for Quality Control and Diagnostics

Graduate Education (two-year programs leading to Master degree)

**Nuclear Power Engineering and Thermophysics. Profiles:**
- Physical-Engineering Problems of Nuclear Power Engineering
- Applied Plasma Physics and Controllable Thermonuclear Fusion
- Thermophysics and Molecular Physics
Thermal Power Engineering and Heat Engineering. Profiles:
• Technology of Electric and Heat Energy Manufacturing
• Power Engineering Boilers, Hydrodynamics and Furnace Processes
• Technology of Water and Fuel in Power Engineering
• Automated Control Systems for Objects of Thermal and Nuclear Power Plants
• Power Engineering of Heat Technologies

Power Engineering Machinery. Profiles:
• Power Installations on Organic and Nuclear Fuel
• Gas-Turbine, Steam-Turbine Installations and Engines
• Research and Design of Automatic Hydraulic and Pneumatic Systems, Machines and Aggregates
• Power Engineering Equipment Manufacturing

Applied Mechanics. Profile:
• Dynamics and Strength of Machines, Instruments and Equipment

Electrical Power Engineering and Electrical Engineering. Profiles:
• Electrical Power Plants and Substations
• Electrical Systems and Networks, its Modes, Stability, Reliability and Quality of Electrical Energy
• Optimization of Structures, Parameters and Modes of Electrical Supply Systems and Effectiveness Increase of its Functioning
• Engineering and Electrical Physics of High Voltages
• Relay Protection and Automation of Electrical Power Systems
• Electromechanical Energy Conversion and Methods of Investigation
• Electrical Apparatuses for Energy Control and Distribution
• Engineering and Information Support of Construction and Functioning of Supply Sources, Networks and Objects of Electrical Systems of Consumers

Applied Mathematics and Informatics. Profiles:
• Mathematical and Software Support for Computing Machines and Computer Networks

Informatics and Computer Engineering. Profiles:
• Computing Machines, Complexes, Systems and Networks
• Automated Systems for Information Processing and Control

Control in Engineering Systems. Profile:
• Control and Informatics in Engineering Systems

Instrumentation. Profile:
• Devices and Methods for Quality Control and Diagnostics

POST-GRADUATE TRAINING AND PROFESSIONAL TRAINING COURSES COULD BE ORGANIZED ON ANY OF THE ABOVE MENTIONED DIRECTIONS UNDER INDIVIDUAL PROGRAM.
The Moscow State University of Civil Engineering (MGSU) was founded in 1921. Until 1993 it was known under the name of The Moscow Civil Engineering Institute (MISI).

MGSU is one of the civil engineering universities which consists of Russian Nuclear Innovative Consortium (RNIC) - an open association founded to develop a state-of-the-art efficient training system for the nuclear industry and to implement innovative projects by bringing together the scientific, educational and innovative potential of its participants.

Special-purpose program of second high education for specialist of nuclear area was creating at MGSU for civil engineering diploma and future magister program for getting diploma MSTU, MSMU and other kind of polytechnic universities.

National Research University Moscow State University of Civil Engineering (MGSU) is the flagship of the construction science and professional education. It is an advanced center for research and education implementing the most advanced innovative technologies.

The MGSU Diploma is a reliable warranty to obtain a job in the leading State Construction Enterprises and Business Companies in Russia and abroad. The MGSU Diploma in the field of Industrial & Civil Construction is recognized world-wide.

The University includes 8 major Institutes with 18,000 students, more than 60 specialized Departments, 7 branches, and 13 representative offices in different regions of Russia. Over its history, the University has trained more than 110,000 competent structure engineers, specialists and managers in all areas of civil engineering, as well as information technologies. They include more than 10,000 engineers who were involved and are directly involved in building nuclear facilities in Russia and abroad. Over 3,000 PhD got their degrees in the University.

The MGSU has experience in international cooperation with 80 universities and scientific & education centers in 30 countries worldwide.

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Founded in 1921. Total number of students: about 18 000. Total number of higher and postgraduate educational programs: 284 (specialists – 25, bachelor – 30, master – 40, additional vocational education programs – 154, postgraduate education programs – 35)
The university has trained over 3,000 highly competent specialists from 103 world countries. It actively interacts with the European Civil Engineering Education and Training Association (EUCET Association), European Association of Civil Engineering Universities and Faculties (AECEF), the European Association of Engineering Universities (SEFI), the American Society of Civil Engineers (ASCE) and the International Society for Computing in Civil and Building Engineering (ISCCBE).

MGSU is the only Russian Institute of higher education, having the BREEAM license. Training of engineers for nuclear power industry according to the specialization «Building of Nuclear Power Plants» has begun in 1958. Training is carried out at the Institute of Hydraulic Engineering and Power Plant Construction. MGSU have preparatory division for foreign students which consists of following disciplines: Russian languages, mathematics, physics and draftsmanship.

Student’s Campus in Moscow and Moscow region.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education
(four-year programs leading to Bachelor degree)
Construction. Profiles:
• Building of Heat and Atomic Power Stations
• Building of Nuclear Facilities

Graduate Education
(programs leading to Master degree)
Construction. Profiles:
• Special Building Materials for Power Engineering
• Building of Nuclear Facilities

Graduate Education
(six-year programs leading to Specialist degree)
Construction of Unique Buildings and Constructions with specialization. Profiles:
• Building of Heat and Nuclear Energy Constructions

Institute of Continuing Professional Education of MGSU (ICPE MGSU)
The Institute of additional vocational education of MGSU has been realizing programs of additional vocational education for CEOs and specialists of designing and building organizations of the atomic field in various lines of direction:
• Technological solutions for atomic and industrial objects and facilities;
• Development of rationale for radioactive and nuclear defense;
• Preparation of projects of building organization, demolishing and extend of lifespan and conservation;
• Preparation of projects for environmental safety during the construction of atomic power plants;
• Examination of member of structure;
• Organization of the preparation of project documentation;
• Geodesic, preparation, earth and pile work;
• Structure of concrete and reinforced concrete integral structures;
• Matching of package type concrete, reinforced concrete and metal structures. Defense of building structures of conduits and equipment;
• Structure of external networks and internal engineering systems;
• Works on organization of the construction process, reconstruction, capital repair and carrying out of construction oversight at atomic objects;
• Works on hydroisulation, thermal insulation, fireproofing of building structures and equipment;
• Implementation of the system quality management during the construction of atomic objects. Work sequence of the program of quality management for atomic power station;
• Peculiarities of designing, construction and decommissioning of buildings and structures of radioactive objects.
National University of Science and Technology “MISIS” originated as the Department of Metallurgy in the Moscow Academy of Mines, which the Soviet government established in 1918, and in the following decades it went through several transformations before achieving its current designation. In the 20th century, the Moscow Academy of Mines and then the Moscow Steel Institute (founded in 1930) each played a prominent role in the industrialization of Soviet Russia. Today the National University of Science and Technology MISiS is at the forefront in the development of Russia’s innovative, knowledge-based economy, supporting the nation’s ability to successfully compete with other advanced economies as well as to fully integrate into the international community.

As in the past, MISIS remains one of Russia’s leading teaching and research educational centers. It provides a first-class professional education for over 10,000 undergraduate and graduate students, and offers extensive opportunities for specialized scientific research with the objective of transferring the University’s ideas, innovations, and technologies to real-life application. MISIS aims to produce and nurture pioneering processes in a variety of fields ranging from its historic expertise in Metallurgy and Materials Science to relatively new directions in Nanotechnology, Biotechnology, Information Technologies and Telecommunications, and Sustainable Development and Energy-Effective Technologies. These technologies are essential for improving the quality of life not only in the Russian Federation but in all countries.

MISIS’s goal is to create energy-effective technologies and environmentally-friendly methods of industrial production, as well as to produce new materials for use in energy-effective technologies.

MISIS places a great emphasis on international education and has well-developed partnerships with approximately 85 Universities, 45 Research & Development Centers in 36 countries. While continuing to nourish these established relationships, the University seeks to add new partners, especially among leading American institutions of Science and Technology. Now we have about 600 international students that study at MISIS.

Preparatory department for international Students: studying Russian language including special terms and phrases.
Universities of Russia

All international students are provided with rooms in the Students’ Residence.

Higher Education Programs for Careers in Nuclear Science and Industry

Undergraduate education (four-year programs leading to Bachelor degree)

Metallurgy. Profiles:
- Metallurgy of Technogenic and Secondary Resources
- Mineral Raw Materials Technology
- Foundry Technology
- Physical Metallurgy of Non-ferrous, Rare-earth, and Noble Metals
- Tube Production Technology
- Pressure Metal and Alloy Treatment
- Physical Metallurgy of Non-ferrous, Rare-earth, and Precious Metals
- Functional Materials and Coatings

Technological Machines and Equipment. Profiles:
- Machines and Equipment in Tube Production
- Engineering of Technological Equipment

Quality Control. Profiles:
- Quality Management
- Standardization and Metrology
- Standardization and Certification

Technosphere Safety. Profiles:
- Environment Protection
- Technology Safety

Physics

Materials Science and Materials Technology. Profiles:
- Materials Science of Functional Materials in Nanoelectronics
- Physical and Chemical Processes and Materials
- Metal Science
- Physical Metal Science
- Materials Science and Technologies of High-temperature Materials and Coatings
- Nanomaterials

Electronics and Nanoelectronics. Profiles:
- Semiconductors in Micro- and Nanoelectronics
- Technology of Micro- and Nanoelectronics
- Materials and Technologies of Magnet Electronics

Nanotechnologies and Microsystems Technology

Automation of Technology Processes and Production Automation

Computer Science and Computer Engineering

Informational Systems and Technologies

Applied Computer Science
- Energy Efficiency and Energy Saving

Applied Mathematics. Profile:
- Algorithms and Methods for High-tech Software

Graduate Education (programs leading to Master degree)

Metallurgy. Profiles:
- Mineral Raw Materials Technology
- Metal Forming
- Innovative Foundry Technologies
- Metallurgy of Non-ferrous and Precious Metals
- Functional and Nanostructured Materials
- Metallurgy of Technogenic and Secondary Resources
- Technology of Rolling Production
- Innovative Pipe Production Technologies
- Liquid-Phase Technologies of Compound Materials

Technological Machinery and Equipment. Profiles:
- In-tube Production
- Machinery, Equipment and Processes Engineering

Physics. Profiles:
- Condensed Matter Physics
- Physics of Nanosystems

Materials Science and Materials Technology. Profiles:
- Materials Science of Functional Materials in Nano-electronics
- Physical and Chemical Processes and Materials
- Metal Science
- Physical Metal Science
- Materials Science and Technologies of High-temperature Materials and Coatings
- Structure Analysis and Materials Diagnostics
- Nanomaterials
- Composed Materials
- Physical Chemistry of Nanosystems
- Functional Nanomaterials
- Magnetic Nanomaterials

**Electronics and Nanoelectronics. Profiles:**
- Semiconductors in Micro- and Nanoelectronics
- Technology of Micro- and Nanoelectronics
- Materials and Technologies of Magnet Electronics

**International Master’s Programs in English**

**Quantum Physics for Advanced Materials Engineering**

**Multicomponent Nanostructured Coatings. Nanofilms**

**Advanced Materials Science**

**Advanced Metallic Materials and Engineering**

Post-Graduate Training and Professional Training Courses could be organized on any of the above mentioned directions under individual.
Nizhny Novgorod State Technical University n.a. R.E. Alekseev is one of the oldest and largest universities in Russia, in 2012 it celebrates its 95th anniversary.

Nowadays students from different parts of Russia and from all over the world choose our university because they are sure in the quality, relevance and solemnity of the knowledge they are given here.

The University comprises 5 institutes and 8 faculties. There are 1365 lecturers, 68 % have academic agree. Over its history NSTU produced over 190 thousand specialists.

Our strategy is to create new educational formats in a range from a distant training system to higher electronic [virtual] systems; coupling of NSTU’s education quality criteria with employer quality requirements. The main activity of NSTU is preparation of highly skilled specialists for science and industry.

Our new hostel, designed for 535 living places (total area is 7200 square meters), is provided with its own library, rooms for self-instruction and a gym. At well-equipped NSTU sport complex various regional and international competitions and festivals are often carried out.

NSTU is active in development international cooperation with educational establishments and major industrial companies (e.g. Thyssen Krupp AG). Since 2005 NSTU collaborates with Nuclear Power Institute of China in the fields of brainpower education and research.

### HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

#### Undergraduate Education
- **Heat Power Engineering and Heat Engineering. Profile:**
  - Heat Power Plants

- **Nuclear Power Engineering and Thermal Physics. Profile:**
  - Nuclear Power Plants and Installations
Engineering and Technological Support for Machinery Productions. Profiles:
- Machine Building Technology
- Metal-Working Machines and Complexes

Electronics and Nanoelectronics. Profile:
- Microelectronics and Solid State Electronics

Design Engineering and Electronic Instrumentation Technology. Profile:
- Information Technologies of Radioelectronic Devices Design

Radio Engineering. Profile:
- Radioelectronic Systems

Information Systems and Technologies

Graduate Education (programs leading to Master degree)
- Heat Power Engineering and Heat Engineering
- Nuclear Power Engineering and Thermal Physics
Nizhny Novgorod State University of Architecture and Civil Engineering (NNGASU) is currently one of the leading universities of the Russian Federation in the field of architecture, construction and environmental engineering providing courses for over 13,000 higher education students, and nearly 5000 students pursuing further education. The number of research fellows and academic staff of the University is about 1000, including 110 professors holding higher level research doctorates (Dr. Sc.), 9 members of two national Academies of Sciences (The Russian Academy of Architecture and Building Sciences and the Russian Academy of Education). NNGASU offers a wide range of university level courses leading to a bachelor’s or a master’s degree, or a qualified specialist diploma through over 40 full-time, part-time, and correspondence education programs. Prospective candidates are offered 32 PhD and 17 Dr. Sc. level postgraduate education programmes. The University also provides a wide range of vocational training and further education.

The University’s structure includes a number of academic units and faculties: the faculties of General Engineering, Civil Engineering, Architecture and Urban Development, Environmental Engineering Systems and Structures; the International Faculty of Economics, Law and Management; the Institute of Economics, Management and Law; the Faculty of Humanities and Arts, The Interdisciplinary Institute
for Advanced Training and Retraining; the Department of Doctoral Studies, the Department of Master’s Degree Studies; the Centre for Pre-University Training and Education of Foreign Nationals (International Students Centre).

The University has been conducting pre-university training and university level courses for foreign nationals since 1992. The International Students Centre was established at the University in 1998. The Center incorporates the Department of Russian as a Foreign Language and the Department of General Scientific Disciplines.

Today 60 foreign nationals undergo pre-university training at NNGASU. There are 129 undergraduate and graduate students from 36 countries at the university, including 32 citizens of the CIS countries.

The main subject areas of pre-university training are “Construction”, “Architecture”, and “Economics.”

Pre-university training disciplines:
Russian as Foreign Language, Russian Language for Special Purposes, Country Studies, Natural Sciences, Mathematics, Computer Science, Physics, Chemistry, Artistic Drawing, Technical Drawing, Social Science

All foreign students who wish to live in a dormitory, are accommodated in the dormitories of the University.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Programs leading to Bachelor and Master degree Construction. Profiles:
- Industrial and Civil Construction

Heat-Power Engineering and Heat Engineering. Profile:
- Industrial Heat-Power Engineering

Architecture. Profiles:
- Architectural Design;
- Urban Development;
- Restoration Design

Graduate Education (programs leading to Specialist degree)
Unique Buildings and Structures Construction. Profiles:
- High-Rise Buildings and Long-Span Structures Construction
- Hydraulic Structures of Increased Responsibility Construction
Penza State University was founded in 1943. Having a long history the University trains bachelors, specialists and masters in many fields of science. The University has sufficient material resources, high qualified teaching staff, and international student population. There are 5 institutes, 12 departments, 16 scientific and educational centers, post-graduate and doctoral studies, 12 thesis Councils, an information-publishing center. PSU embraces the following facilities: 2 campuses, 18 study buildings, 7 dormitories, 2 stadiums, 2 student camps outside the city of Penza and three branches in other towns of Penza region. The university educates more than 22000 students in 160 educational programs, including 700 students from 29 foreign countries. The lectures are delivered by 1340 experienced high-qualified professional, including 182 doctors of sciences, 793 candidates of sciences. Educational process, actual scientific researches and programs of further training and retraining of faculty members are being organized with the help of research and development departments of the University: Centre of technology transfer, Penza branch of the Institute of structured macrokinetics and problems of material science of the Russian Academy of Sciences, Centre of Computer design “Delkam-Penza”, Information-computing Centre, Penza regional center of supercomputer calculations and telecommunication databases of multiple access, Information-publishing center, Centre of modern business technologies, Interdisciplinary center “Industry of micro- and nanosystems”, Research technical center “Nanotechnologies in fiber optic systems” and others. Scientific research is carried out within a framework of 10 fields of science (technical, physical and mathematical, historical, economic, philosophic, legal, pedagogical, natural, medical, sociological) in 14 scientific directions, corresponding to priority directions of the science and technique development of the Russian Federation and Penza region in
particular and according to the specialist training profile of Penza State University.
The university offers preparatory courses for international students according to the following profiles: biomedical (subjects: biology, physics, chemistry, mathematics, informatics, Russian history, Russian language), humanitarian (subjects: literature, Russian history, social studies, Russian language, culturology), engineering (subjects: mathematics, Russian language, physics, chemistry, Russian history, basic geometry), economic (subjects: Russian language, mathematics, economics, informatics, social studies, Russian history), philological (subjects: Russian language, literature, foreign language, country-specific studies, philology).
In order to accommodate foreign student there are two dormitories in Penza State University campus.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education (four-year programs leading to Bachelor degree)
Software Engineering

Information Security
Electronics and Nanoelectronics
Design Engineering and Electronic Instrumentation Technology
Control in Engineering Systems
Engineering
Engineering and Technological support for Machinery Production
Computer Science and Computer Engineering
Applied Computer Science (in Economics)
Applied mathematics
Material Science and Technology of Materials
Standardization and Metrology

Physics

Graduate Education (programs leading to Master degree)
Physics

Additional training program:
Quality improvement technologies in nuclear, transport and space systems
During its 70-year-long history, the university has trained more than 60,000 highly qualified specialists. The university has joined the best twenty classical universities of the general Russian Universities’ rating of 2009 and has won the first place on the Internationalization criterion and the 3rd place in sphere of graduates’ employment assistance.

The university now comprises 85 chairs and 16 faculties, more than 40 international, regional and university innovation centers, training and production facilities, Publishing house, Scientific library (one of the largest libraries in the European North of Russia which funds total more than one million four hundred thousand books), Botanic garden, swimming-pool “Onega”.

During the recent 3 years PetrSU has won 7 federal contests on federal funding for higher education in Russia, with the total value of over 700 million roubles. Nowadays teaching staff of PetrSU is more than 1000 people: among them there are over 500 PhD holders, 100 doctors of science and 70 professors, 4 associates of the State Academies of the Russian Federation. More than 16,000 undergraduate and graduate students study there. Every year more than 4000 students take training, re-training and professional development.

PetrSU has a high status of large research center in the field of programming, information technologies, plasma research, microelectronics, mathematics, physics, medicine, biology, history, philology, political and social sciences, law, economy, problems of timber, building and agroindustrial complexes, etc. Annually more than 300 scientific, educational and economic agreement projects financed by the Federal Agency of Education, Ministry of Education and Science of the Russian Federation, Russian Foundation for the Humanities, Russian Federal Property Foundation, other Russian and foreign foundations and programs, organizations and enterprises are implemented in PetrSU. Apart from this from 60 to 70 international, All-Russia and regional conferences and seminars are held in PetrSU annually, and dozens of scientific monographs, textbooks and manuals are published.

PetrSU is a recognized leader among the institutions of higher education of the Northwest Federal District of the
RF in the sphere of international cooperation development. The university has 35 international agreements in force with foreign institutes of higher education, research organizations and research-and-production companies of Finland, Canada, the USA, the Great Britain, Italy. Annually PetrSU implements about 30 international projects carried out at the financial support of various international funds, programs and organizations. Bilateral agreements with foreign partner universities on student exchange have been supported for more than 15 years. The most active are exchange programs with universities of Helsinki, Oulu, Joensuu, Tampere, Kuopio, Lappeenranta, Evle on which annually students of both parties undergo training and work on probation.

Preparatory Department for foreign students:
Russian language course for foreigners
Numerical Methods in Engineering Applications
Quantum and Optical Electronics

There are dormitories where students both Russian and foreign students. New dormitory for foreign students is being built at the moment.

**HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY**

**Undergraduate Education**
(four-year programs leading to Bachelor degree)
- Technical Physics
- Information Systems and Technologies
- Physics
- Construction
- Instrument Engineering (Information and Measurement Equipment and Technologies)
- Ecology and Environmental Management
- Electronics and Nanoelectronics

**Heat-Power Engineering and Heat Engineering**
**Electrical Power Industry and Electrical Engineering**
**Applied Mathematics and Computer Science**
**Computer Science and Computer Engineering**
**Technological Machines and Equipment**

**Graduate Education**
(programs leading to Master degree)
- Computer Science and Computer Engineering
- Information Systems and Technologies
- Instrument Engineering (Information and Measurement Equipment and Technologies
- Applied Mathematics and Computer Science
- Radiotechnics
- Construction
- Heat-Power Engineering and Heat Engineering
- Technical Physics
- Technological Machines and Equipment
- Physics
- Ecology and Environmental Management
- Electronics and Nanoelectronics
- Electrical Power Industry and Electrical Engineering

**Additional educational program:**
- Patent Specialist (a specialist in the area of intellectual property protection)
- Personnel Management and Staff Records Management
- Conducting Energy Audits in Order to Improve Energy Efficiency and Conservation
- Energy Conservation and Energy Efficiency
- Creating Multimedia Electronic Educational Resources in Media Presentations
- 1C: Accounting
- Building and Construction
- Cisco Networking Academy Program
- Graphics and Media Technologies
The Russian State Geological Prospecting University is the world’s only institution of high education specializing in the field of geological prospecting and exploration.

During more than 90 years of its existence MGRI-RGGRU has trained over 30000 Specialists-Engineers, 1500 Doctors of Science and 400 Senior Doctors of Science. Among the graduates there are more than 1300 international students. Over 400 world-class professors and associated professors perform their research work and lecturership at MGRI-RGGRU today. More than 5000 students from 82 countries study at the University at the present time. Unique teaching staff together with the modern equipment and high level of information enable to organize the educational process in accordance with the advanced educational technologies and standards.

MGRI-RGGRU trains Engineers (Specialists), Bachelors and Masters of Science in almost all areas of geological prospecting, mining and oil-and-gas sectors and plays a leading role in the determination of the strategy for improving of higher geological education as well as in the solution of the key problems of geology, mining and management of mineral resources. Graduates of the University have a reputation of high-level specialists; they work in many countries and are in demand by the leading Russian and foreign companies.

MGRI-RGGRU is a major educational, research and innovative center with a wide spectrum of research and project works - from the most complicated problems of prospecting, exploration and exploitation of mineral raw materials to its processing. A special attention is given to the works on the economic and ecological assessment of consequences of anthropogenic impact on the environment and works on creation of a harmonious Human and Nature interaction concept.

The Russian State Geological Prospecting University is among 70 leading research Universities of Russia and has strong partnerships with many research centers, industrial and manufacturing enterprises and organizations.

MGRI-RGGRU has an official state accreditation and a license to perform educational activity. Person, who have successfully completed their studies at the University, receive a state-accredited diploma. In the course of edu-
cational process students get studentships. Students are provided with discount transport cards. Persons from out of Moscow are accommodated in the student dormitories. Students can use University’s library, museums, cultural and sport complexes. MGRI-RGGRU has established the favored conditions for obtaining a modern and competitive higher education, performing research, sport and creative work and all-around intellectual, cultural and physical development. The fundamental theoretical education is combined with the practical trainings at the largest leading industry companies in Russia as well as outside. The unique teaching system guarantees getting a highly rare, well-paid specialty in demand at the job market, possibility of career growth and fast adaptation of graduates to the modern economical conditions and production tendencies.

Preparatory Department for foreign students: Russian, Physics, Mathematics

There is a comfortable 14-storey Student community with kitchens at every floor

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

**Undergraduate Education**
(four-year programs leading to Bachelor degree)
Ecology and Management of Natural Resources

**Graduate Education**
(programs leading to Specialist degree)
Mining
Technologies of Geological Exploring
Applied Geology
Physics processes of Mining or Oil-and-Gas Production

Additional education programs:
Geophysics, Geophysical Methods of Mineral Prospecting
Geology, Exploration and Prospecting of Minerals, Mineralogy
Technology and Engineering of Geological Prospecting
Geotechnology (underground, open, building and construction);
Geomechanics, Rock Destruction, Mine Aerogasdynamics
and Mountain Thermal Physics
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www.spbstu.ru

Founded in 1899. Total number of students: 30 000, incl. 2900 foreign students. Total number of higher (bachelor, master) and postgraduate education programs 38 Bachelor degree programs, 188 Master degree programs, PhD – 90 scientific majors, DSc – 90 scientific majors

St. Petersburg State Polytechnical University was founded in 1899. Recently SPbSPU became «National Research University», also known in Russia and abroad as Polytechnical Institute — a recognized Russian and world-wide leader in the field of higher engineering and economic education. Currently it also remains at the leading positions in the rating of Russian engineering higher educational institutions. Nowadays SPbSPU develops as a new type research university, which integrates multidisciplinary R&D activities and advanced technologies for rising national economics competitiveness.
At the present time in Polytechnical University there are more than 30 000 students and postgraduates, over 2900 are foreign citizens from 96 countries who annually study at different SPbSPU programs. The University is carrying out education in the following areas: engineering, physics, economics, humanities and information technologies. The University trains specialists in 33 Bachelor degree programs and 188 Master degree programs, 90 PhD and Doctorate programs. In addition, in SPbSPU there are a number of non-degree and international educational programs.
The University is proud of its longstanding traditions of international cooperation with many foreign educational institutions, research organizations and industrial companies in the field of education and science. Among the University partners there are more than 290 universities, 120 research institutions and industrial companies from over 41 countries.
The University Foundation’s aim is to train international students for further education in Russian universities. The university foundation course puts particular emphasis on developing international and cross-cultural competencies through Russian language acquisition. It is a full-time course preparing students to enter SPbSPU as well as other Russian universities. The Program caters specifically for international students. It assists students in all aspects of living and studying in Russia.

The following 4 University foundation courses are available:

- **Science/Engineering**: General/Academic Russian, Russian for special purposes, i.e. science/engineering, Mathematics and Information Science, Physics, Chemistry, Technical drawing, Electives
- **Economics/Industrial/Management**: General/Academic Russian, Russian for special purposes, i.e. economics/management, Economics, Mathematics and information Science, Geography, Electives
- **Natural Science**: General/Academic Russian, Russian for special purposes, i.e. natural sciences, Mathematics and Information Science, Chemistry, Physics, Electives
- **Humanities/Liberal Arts**: General/Academic Russian, Russian for special purposes, Russian art and literature, Russian literature, Geography, History, Electives

International complex of SPbSPU makes great efforts to create a comfortable living conditions in St. Petersburg for students.

Foreign students and Russian students studying in SPbSPU, trainees, postgraduates and doctoral students from other cities studying in IIEP SPbSPU, live in 2 flat type dormitories of campus for foreign students. Hostels are located near the metro station “Academitcheskaya”. Students, trainees, postgraduate students and doctoral candidates live 2-3 persons in a room. In campus dormitories for foreign students conditions for comfortable living, studying, sports and leisure, medical care, security measures are created.

**HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY**

**Undergraduate Education**  
(four-year programs leading to Bachelor degree)
- Heat-Power Engineering and Heat Engineering
- Electric Power Industry and Electrical Engineering
- Power-Plant Engineering
- Electronics and Nanoelectronics
- Infocommunication Technologies and Communication Systems
- Technosphere Safety
- Software and Administration of Information Systems
- System Analysis and Control
- Control in Engineering Systems
- Software Engineering
- Computer Science and Computer Engineering
- Physics
- Technical Physics

**Graduate Education**  
(programs leading to Master degree)

**Physics. Profiles:**
- Medical Nuclear Physics
- Solid-State Physics
- Physics of Low-Dimension Structures

**Technical Physics. Profiles:**
- Thermal and Molecular Physics
- Medical and Bioengineering Physics
- Physical Aspects of Analytical Device Construction
- Physical Material Science
- Semiconductor Physics Techniques

**Mechanics and Mathematical Modeling. Profiles:**
- Mechanics of Deformable Solids

**Heat-Power Engineering and Heat Engineering. Profiles:**
- Technology of Electrical and Thermal Energy Production

**Electric Power Industry and Electrical Engineering. Profiles:**
- Design and Construction of Power Industry Objects and Renewable Hydroenergy Sources Installations
- Electrical Drives Control Systems
- Electrical Power Plants, Stations and Substations
• Electrical Systems, Power Grids, Electricity Transmission, Modes, Stability and Reliability
• Power Systems Automation
• High-Voltage Engineering and Physics
• Developing Power Supply Systems Optimization
• Electrical Instrumentation for Control and Energy Distribution
• Electromechanical Energy Converters, Design and Production
• Research and Processes Simulation of Electromechanical Energy Converters
• Electromagnetic Compatibility and Energy-Saving
• Adaptive Electrodynamics Models
• Plasma, Laser and Particle-Beam Processes and Installations with Power Supply and Control Systems
• Electrical Equipment Systems for Enterprises, Organizations and Establishments
• Electrical Isolation Physics and Technology
• Physics and Technology of Cables and Wires

**Power-Plant Engineering. Profiles:**
• Reciprocating and Combined Engines
• Technology and Ecology of Organic Fuel Combustion
• Steam and Gas Turbines
• Hydraulic Machines and Hydro Pneumatic Aggregates
• Hydraulic and Pneumatic Drives Systems

**Applied Mechanics. Profiles:**
• Dynamics and Strength of Machines
• Computational Mechanics and Computer Engineering
• Physics of Strength and Plasticity of Materials
• Mathematic Modeling of Mechanical Systems (by English)

**Electronics and Nanoelectronics. Profile:**
• Micro and Nanoelectronics

**Construction. Profiles:**
• River Hydraulic Engineering Constructions
• Engineering Systems for Buildings and Structures
• Theory and Computer Simulation Techniques in Structural Calculations
• Design, Construction Engineering, Management and Expert Examination of Real Estate in Power Engineering and Hydraulic Construction

**Technosphere Safety. Profiles:**
• Environmental Engineering
• Management of Technosphere Safe Development

**Software and Administration of Information Systems. Profile:**
• Software and Administration of Information Systems

**System Analysis and Control. Profile:**
• Theory and Mathematical Methods of Systems Analysis and Control in Engineering Systems

**Control in Engineering Systems. Profiles:**
• Automation of Technological Processes and Productions
• Intelligent Computer Control System

**Computer Science and Computer Engineering. Profiles:**
• Intelligent Systems and Technology (by English)
• Intelligent Computer Networks
• Distributed Intelligent Systems
• Technology Development of Program Systems
• Design Technology of System and Applied Software

Post-Graduate Education and professional training courses could be organized on any of the above mentioned directions under individual program.
Saint-Petersburg State University (SPbU) – the oldest higher education institution in Russia that retains its leadership position in higher education in our days. Situated in the heart of St. Petersburg, the capital of pre-Soviet Russia and the third largest city in Europe, SPbU is fully integrated into its unique cultural environment that includes more than four thousand architectural monuments, world famous museums, theatres and contemporary art projects. Natural Sciences Faculties are located in close proximity to Peterhof palaces and parks that are along with the city center are a UNESCO World Heritage Site. Nowadays, Peterhof has a rapidly developing high-tech cluster that includes a variety of industries that manufacture light-emitting diode, radio electronics, biotechnology and nanotechnology products.

SPbU was founded in 1724 by Peter the Great’s decree as the first in Russia secular higher education institution that adhered to the classical tradition of European universities. Being a part of the Academy of Sciences, Saint-Petersburg University has focused on fundamental research from the very beginning, at the same preparing professionals capable of contributing to the Russia’s economic development and political reforms. In autumn 2009, SPbU, along with Moscow State University, was granted a special and unique status that entitles it to establish its own educational standards. SPbU is the first university in Russia that awards its own diplomas. In the nearest future, it will start conferring its own academic degrees.
Today there are over 30,000 students, 13,000 employees and almost 6,000 teachers (including 4,500 holders of doctoral degrees and over 40 academicians of state academies) representing more than 300 academic departments at St. Petersburg University.

At present, the University is housed in more than 400 buildings located in St. Petersburg, Leningrad Oblast and other regions of Russia. The main building is the famous Twelve Collegia in the Vasilyevsky Island.

SPbU ranks third in the city for its library collection of books and is one of the largest in-house publishers of both academic works and fiction. University provides places in dormitories to students from other cities and towns. The dormitories comprise 20 buildings located at the Petrodvorets Educational and Research Complex (PTRC) and the Vasilyevsky Island Educational and Research Complex (VITRC).

All of that proves that SPbU is widely regarded as a most prominent Russian center of research and education. It is also rightfully called one of the best higher education institutions in Europe.

University Development Program and Research Focus
The SPbU Development Program up to 2020, which has been approved by the Russian Government, stimulates five priority academic fields for conducting research and development:

- Nanotechnology and Materials Science
- Biomedicine and Human Health
- Ecology and Sustainable Use of Natural Resources
- Information Systems and Technology
- Human Resource Management and Technologies

For the first 3 years, the funding of 5 billion rubles has been assigned to develop scientific and educational fields of the Program. Currently the university is devoting a great deal of time and effort towards creating interdisciplinary resource centers, where all SPbU students, teachers, and scientists will be able to conduct research.

The university is one of the largest international educational and scientific centers. SPbU has over 300 international cooperation and partnership agreements with foreign universities in more than 60 countries (USA, Germany, France, Finland, Japan, China, Republic of Korea and others).

Currently, Saint-Petersburg State University is a member of international scientific and academic organizations and associations and used to take part in educational and scientific programs and exhibitions all around the world. In collaboration with foreign universities implemented 19 educational programs, several of them in English.

Saint-Petersburg University participates in a number of significant international Academic Mobility & Students Exchange Programs, among them: Erasmus Mundus External Cooperation Window, Finnish-Russian Cross Border University, Finnish-Russian student exchange Program, Santander University, Campus Europe.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education
(four-year programs leading to Bachelor degree)

- Fundamentals of Computer Science and Information Technology
- Applied Mathematics and Computer Science
- Software and Administration of Information Systems
- Applied Mathematics and Physics
- Physics
- Chemistry
- Chemistry, Physics and Mechanics of Materials
- Ecology and Environmental Management
- Applied Computer Science
- Software Engineering

Graduate Education
(programs leading to Master degree)

- Fundamentals of Computer Science and Information Technology
- Applied Mathematics and Computer Science
- Applied Mathematics and Physics
- Physics
- Chemistry
- Chemistry, Physics and Mechanics of Materials
- Ecology and Environmental Management
- Applied Computer Science

Graduate Education
(programs leading to Master degree)

- Fundamental and Applied Chemistry
SGTU is one of the largest technical universities in Russia. Training of students is conducted in bachelor’s degree programs (4 years at a full-time form), master’s degree programs (2 years at a full-time form) and in specialist training programs (5-6 years at a full-time form) in different cities - Saratov, Engels, Balakovo. Programs of the primary professional, secondary professional and higher professional education are realized in this university. In SGTU there is a possibility of receiving second higher education parallel to the main educational program. SGTU represents the uniform educational scientific-industrial complex including 92 chairs, 16 faculties, institutes, the educational-scientific and educational-research centers.

SGTU has modern technical base for carrying out occupations. 10 buildings are located in the territory of the university campus in which audiences, educational and scientific laboratories, display classes, club, a gym, library with fund about 2 million copies of books, periodic information publications in Russian and foreign languages are placed. The best graduates of the university who have shown special tendencies to research activity, enter to postgraduate study for preparation of PhD. Finishing link of system of preparation of scientists of the highest qualification are the doctoral studies of SGTU. Its organization became possible in many respects thanks to vigorous scientific activity of university from the very first days of its basis and up to now. One of priority activities of SGTU is development of the international cooperation. The university purpose is activization of scientific cooperation with foreign colleagues, strengthening of business connections of university with the foreign and international companies and the organizations, expansion of a range and volume of educational services, activization of processes of an exchange by students and teachers. SGTU has bilateral agreements on cooperation with many foreign universities and the organizations of the neighboring countries, and also Europe, the USA, South East Asia. The Saratov State Technical University is included traditionally into group of leaders on number of the foreign citizens who are trained in Russian universities. Annually the number of foreign students of SGTU makes more than 200 people. Generally the contingent of foreign students is made by citizens of CIS and Baltic countries: Kazakhstan, Belarus, Ukraine, Uzbekistan, Turk-
Higher Education Programs for Careers in Nuclear Science and Industry

Undergraduate Education (four-year programs leading to Bachelor degree)
Heat-Power Engineering and Heat Engineering. Profiles:
- Industrial Heat-Power Engineering
- Power supply of the enterprises
- Thermal power plants

Electric Power Industry and Electrical Engineering. Profiles:
- Power Supply
- Electrotechnological Equipments and Systems

Materials Science and Technology of Materials. Profile:
- Materials Science and Technology of New Materials

Engineering. Profile:
- Equipment and Technology of Welding Production

Technological Machines and Equipment. Profile:
- Design of Technical and Technological Complexes

Instrument Making

Infocommunication Technologies and Communication Systems. Profile:
- Management and Informatics in Technical Systems

Management in Technical Systems

Technology Processes and Productions Automation

Mechatronics and Robotics. Profile:
- Management of Robotic Systems

Computer Science and Computer Engineering.
- The Software of Computers and the Automated Systems

Information Systems and Technologies

Software Engineering. Profile:
- Development of Software Systems

Graduate Education (programs leading to Master degree)
Heat-Power Engineering and Heat Engineering. Profiles:
- Industrial Heat-Power Engineering
- Power systems and complexes
- Production Technology of Thermal and Electric Energy

Electric Power Industry and Electrical Engineering. Profiles:
- Power Supply
- Electrothermal Processes and Equipments with Power Supplies and Managements

Materials Science and Technology of Materials. Profile:
- Materials Science and Technology of New Materials

Engineering
- Machines and Technologies of Highly Effective Processes of Processing of Materials
- Equipment and Technology of Welding Production

Technological Machines and Equipment

Instrument Making

Infocommunication Technologies and Communication Systems. Profile:
- Management and Informatics in Technical Systems

Management in Technical Systems

Technology Processes and Productions Automation

Computer Science and Computer Engineering. Profiles:
- Automated Systems of Information Processing and Management

Information Systems and Technologies

Graduate Education (programs leading to Specialist degree)
Information Security of the Automatic Systems. Profiles:
- Creation of the Automatic Systems in the Protected Execution
Nuclear Power Plants: Design, Operation and Engineering
• Design and Operation of Nuclear Power Plants

Design of Technological Machines and Complexes. Profile:
• Design of Technological Machines and Complexes

Radio-Electronic Systems and Complexes. Profiles:
• Radio-Electronic Systems of Information Transfer

Additional educational program
Physical and Chemical Bases of Materials Science
Control and Diagnosing Difficult Technical and technological Objects. Automated Design.
South-Ural State University (SUSU) was formed in 1943 as Chelyabinsk Institute of Mechanics and Machine-Building. It got its current name in 1997. The university is one of Russia’s top ten universities as rated by the Russian Federation Ministry for Education and Science. The university includes 37 departments, as well as 14 branch departments in different cities of Russia. It has a staff of more than 5,000, including over 350 professors, with the annual number of graduates amounting to more than 8,000. Over its 70-year history the university has trained more than 200 thousand specialists.

The university is implementing extensive research programs. It has the Radioelectronic and Digital Systems Research Institute, the Institute for Chemical Problems of Industrial Ecology of the Russian Federation Academy for Natural Sciences and 10 laboratories of the university and academy levels functioning on its basis. There are more than 50 scientific schools formed and acting within the university. SUSU has the largest scientific library among the universities in the region. The university also includes a unique missile and space technology center with a rich collection of ballistic missiles, as well as the Chelyabinsk Region’s first technopark “SUSU-Polyot”.

In March 2007 SUSU won the contest of the best innovative higher education programs in the framework of the “Education” national project.

There are Pre-study courses for foreign citizens at the Institute of International Education in SUSU.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY:

**Applied Mathematics and Computer Science**

Information Security. Profile:
- Complex Protection of Informatization Objects

**Heat Power Engineering and Heat Engineering. Profile:**
- Industrial Heat Power Engineering

**Electric Power Industry and Electrical Engineering. Profiles:**
- Relay Protection and Automation of Electrical Engineering Systems
• Electric Power Stations
• Electrical Engineering Systems and Networks
• Electromechanics

Applied Mechanics. Profile:
• Dynamics and Robustness of Machinery;

Engineering and Technological Support for Machinery Production. Profiles:
• Technology, Equipment and Automation of Machinery Production
• Technology of Machine-Building;

Radio Engineering

Control in Engineering Systems. Profile:
• Automation and Control;

Technology Processes and Production Automation

Computer Science and Computer Engineering. Profile:
• Computers, Computer Systems and Networks;

Applied Mathematics

Construction. Profiles:
• Civil Engineering
• Heat-Gas Supply and Ventilation;

Technosphere Safety. Profile:
• Safety of Vital Activities in Technological Sphere
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Faculty staff of the university comprises over 1 000 people, including 125 professors and PhD's. Over 20 foreign universities act as partners of the Technical University and annually it accepts more than 200 foreign students. In total, the university has trained over 3 000 graduates originating from European, Asian and African countries. Most of the university’s departments include research laboratories and sectors. Some departments have branches within academic and research institutions as well as in major enterprises.

The Institute has a Preparatory Department for foreign students: Mathematics, Russian, Social Science, Chemistry, Physics and Computer Science.

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education
(four-year programs leading to Bachelor degree)
Technosphere Safety. Profile:
• Radiation and Electromagnetic Safety

Graduate Education
(programs leading to Specialist degree)
Chemical Technology of Modern Power Engineering Materials. Profiles:
• Coolant Technology and Radioecology of Nuclear Power Installations
• Chemical Technology of Materials of Nuclear Fuel Cycle
• Radiation Chemistry and Radiation Material Science
• Nuclear and Radiation Safety of the Objects of Use of Nuclear Energy

Additional education programs
Radiation Safety and Monitoring
Decontamination of Materials and Equipment
Restoration of Radioactively Contaminated Sites
TRANSBAIKAL STATE UNIVERSITY

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e-mail: umo@chita.ru
www.zabgu.ru

Founded in 1966. Total number of students: over 15 000. Total number of programs of higher and postgraduate education:

The university’s scientific staff members are involved in the development and implementation of three federal scientific and technical programs: environmentally friendly mining; energy-saving and metallurgical complexes, and civil engineering. The university’s scientists collaborate with counterparts in the USA, Great Britain, China, Japan, France, Denmark, Germany, Sweden and other countries. The university has student exchange contracts with higher education establishments in China, Mongolia and the Republic of Korea.

Preparatory Department for foreign students has on the basis of the University, where they can study the Russian language and get acquainted with the culture of Russia. At the end of the courses of the Russian language, you can pass the exam.

The hostel is available

HIGHER EDUCATION PROGRAMS FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY

Undergraduate Education (four-year programs leading to Bachelor degree)

Electric Power Industry and Electrical Engineering. Profiles:

• Management in the Electric Power Industry and Electrical Engineering
• Power Supply
• Electric Power Systems and Networks
Operation of Transport and Technological Machines and Complexes. Profiles:
- Service of the Transport and Transport-Technological Machines and Equipment (Construction, Road and Municipal Machines)
- Automobile and Automobile Economy

Transport Process Technology. Profiles:
- Organization of Transportation and Management in Road Transport
- Traffic Organization and Safety

Technology Processes and Production Automation

Chemistry

Computer Science and Computer Engineering. Profiles:
- Computing Machines, Complexes, Systems and Networks
- Software of Computer Engineering and Automated Systems

Graduate Education (programs leading to Master degree)
Heat-Power Engineering and Heat Engineering

Infocommunication Technologies and Communication Systems

Graduate Education (programs leading to Specialist degree)
Terrestrial Transport and Technological Facilities. Profile:
- Hoisting-and-Transport, Building, Road Facilities and Equipment

Postgraduate education programs:
Enrichment of Minerals
Geology, Exploration and Prospecting of Minerals, Minerageny
Engineering Geology, Geocryology and Soil Science
Geophysics, Geophysical Methods of Searches of Minerals
Geotechnology (Underground, opened, building)
URAL FEDERAL UNIVERSITY NAMED AFTER THE FIRST PRESIDENT OF RUSSIA BORIS YELTSIN

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Founded in 1920.
The total number of students: over 50 000. The total number of higher education programs is 357

Ural Federal University is the largest federal university in Russia, the oldest university of the Urals, that combines the fundamental character of education with practical applicability of knowledge. The university is fairly considered as the leader of higher professional education in the Urals Region and one of the education leaders of Russia. Ural Federal University (UrFU) is one of the strongest scientific centers of Russia, carrying out research in the field of natural, technical and humanitarian sciences. Since 2008 the Ural Federal University has been carrying the name of Boris Yeltsin.

At 16 profile institutes of the University more than 50,000 students are studying, including more than 25,000 full-day students.

The study process at the University is maintained by the highly-qualified team of professors and teaching staff consisting more than of 4400 people, 28 of them are full members and corresponding members of the RAS, 732 are Doctors of Science, professors, 2 234 are PhDs, assistant professors. As for invited lectors UrFU is often visited by leading Russian and foreign scientists, experienced practical professionals, politicians and cultural workers.

The Ural University is the core of a research cluster that also includes scientific institutes of the Ural Branch of Russian Academy of Sciences, specialized laboratories, and hi-tech industry companies.

The research complex of UrFU includes tens of scientific centers, innovation infrastructure, Scientific library (collection of publications is more than 3 million items), number of museums and specialized collections.

Ural Power Engineering Institute of the Ural Federal University (UralENIN) trains high-class specialists more than in 40 programs of higher and post-graduate education. The institute possesses unique equipment, in particular, special training simulators, enabling to simulate emergency and extraordinary situations at working gas-compressor stations of gas pipelines and emergency and extraordinary situations at working nuclear reactors, including fast neutron reactors.

11 scientific and educational-scientific laboratories are working, more than 50 specialized test benches and installations for scientific and educational work. Among the teaching staff of UralENIN there are 53 professors, Doctors of Science, 200 associate professors, PhD’s. Active scientific ties with the
institutes of the RAS are supported, with its Ural and Siberian branches, national academies of science of Ukraine and Belarus. Interaction is organized with the Technical University of Freiberg (Germany), with energy sector organizations of China, Mongolia. High class professors and teaching staff, newest equipment installed in scientific and research laboratories, as well as modern lecture rooms ensure preparation of ready specialists for enterprises at a new high level of quality. Ural Power Engineering Institute of today is more than three thousand students, studying at 14 departments which graduate specialists in different areas of professional training in the field of energy and energy engineering. Institute of Physics and Technology of the Ural Federal University (PhysTech) graduates high-class specialist in 78 programs of higher and post-graduate education. Unique methods of education and international standards of teaching enable to fully conform to the demand of nuclear industry. High class professors and teaching staff, newest equipment installed in scientific and research laboratories, as well as modern lecture rooms ensure preparation of ready specialists for enterprises at a new high level of quality. Being oriented in the first place at preparation of specialists for enterprises of nuclear sector, the Institute actively takes part in the research of related fields: energy, communication, electronics and microelectronics, space, instrument making, medicine, nanomaterials and nanotechnologies. In the nearest time on the basis of PhysTech new laboratories will be launched, equipped with unique modern accelerating machines. Institute of Physics and Technology of today is more than 1,500 students, studying at 13 departments, which graduate specialists in different areas of professional training in the field of physical and chemical, physical and technical and information technologies, social and humanitarian communications, quality management of innovation products and technologies. Students of the Institute have access to the vast experience of the professors and teaching staff, as well as possibilities of specialized laboratories, such as the laboratory of electronic devices, computer technologies, nuclear laboratory, hydrometallurgical processes and electrochemistry of ionic melts, functional and constructional composites and coatings and others. As for today PhysTech annually carries out a significant volume of basic and applied research, student science is developing, a developed system of student self-government exists.

Preparatory Department for foreign students exists on the basis of the University

**HIGHER EDUCATION PROGRAMS OF THE URAL POWER ENGINEERING INSTITUTE OF URFU FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY:**

**Undergraduate Education**
(four-year programs leading to Bachelor degree)
Heat Power Engineering and Heat Engineering
Power-Plant Engineering
Electric Power Industry and Electric Engineering

**Graduate Education**
(programs leading to Master degree)
Heat Power Engineering and Heat Engineering
Power-Plant Engineering
Electric Power Industry and Electric Engineering

**Graduate Education**
(programs leading to Specialist degree)
Nuclear Power Plants: Design, Operation and Engineering

**Additional Education programs:**
Physical and technological features of nuclear power plants with fast neutron reactors,
Organization of assembling and disassembling of nuclear power plants and radiation equipment,
Maintenance and repair of heat-mechanic and electro technical equipment of nuclear power plants

**HIGHER EDUCATION PROGRAMS OF PHYSYTECH OF URFU FOR CAREERS IN NUCLEAR SCIENCE AND INDUSTRY:**

**Undergraduate education**
(four-year programs leading to Bachelor degree)
Chemical Technology
Nuclear Physics and Technology
Material Science and Materials Technology
Electronics and Nanoelectronics

**Graduate Education**
(programs leading to Master degree)
Chemical Technology
Material Science and Materials Technology
Electronics and Nanoelectronics

**Graduate Education**
*(programs leading to Specialist degree)*
Chemical Technology of Modern Power Engineering
Materials
Physics of kinetics
Technology of Isotope Separation and Nuclear Fuel
Nuclear reactors and Power Installations
Nuclear Reactors and Materials
Electronics and Automatics of Physical Installations
Radiation safety for Human and Environment
Physics of Atomic Nucleus and Particles
Physical Electronics
Devices and Methods of Quality Control and Diagnostics

**Additional education programs:**
Providing radiation and environmental safety in handling radioactive wastes
Organizing work with use radioactive materials and other sources of ionic radiation
Analytical control of nuclear materials