Ural Federal University

directed after the first President of Russia B.N.Yeltsin

DOCTORAL PROGRAMS

- Physics and Astronomy
- Biology
- Chemistry
- Mathematics and Mechanics
- Computer and Information Sciences
- Computer Science and Engineering
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### INSTITUTE OF FUNDAMENTAL EDUCATION

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High-quality education has always been of value; today it remains an important asset all over the globe. The level of development of the country is directly dependent on the level of scientific cognition of the nature and the society, as well as on the broad use of scientific achievements in engineering and technology. Thus the need for specialists with experience in research will only grow in the years to come.

We invite all researchers interested in the mysteries of the Universe and the organic and inorganic nature, the development of technology, economic and social spheres of life, to pursue their doctoral studies at Ural Federal University. Being one of the leading Russian universities in terms of research activities, Ural Federal University possesses all necessary facilities for doctoral students to pursue their studies in such fields as Natural Sciences, Mathematics, Engineering, Human Sciences, and Economics. Scientific advisors working with doctoral students have broad experience of working in the leading universities of the world.

Vladimir Kruzhyaev,
UrFU Vice-rector for Research
UrFU Institute of Natural Sciences is comprised of three faculties: Faculty of Biology, Faculty of Physics and Faculty of Chemistry. The key areas of research at the Institute include condensed state physics, physics of magnetic phenomena, molecular physics, stellar astronomy, biology, solid state chemistry, physical chemistry of macromolecules, organic synthesis, ecology. In addition, an important part of the Institute is the Research Institute for Physics and Applied Mathematics, which carries out scientific research in a large number of areas.

The Institute is also involved in environmental research and circumterrestrial space monitoring. The Kourovka Astronomical Observatory, the observatory located farthest to the East in Europe and being one of the most advanced in Russia, is part of the global space monitoring network. The Institute also has a unique biology station located between the rivers Iset and Sysert on the eastern slope of the Mid Urals, on the borderline of the southern taiga subzones and the pre-steppe zone.

The Institute's graduates make up the core of institutes of the Ural Branch of the Russian Academy of Sciences, research laboratories of industrial corporations, and science intensive businesses. Many of the Institute’s graduates work successfully in the hi-tech industries, chemical testing and environmental laboratories, clinical diagnosis and medical genetics centers and laboratories.
UrFU Institute of Natural Sciences offers a wide range of Doctoral Programs in the fields of Physics and Astronomy, Biology and Chemistry. In this brochure you will find a brief description of the Faculties of the INS and its Doctoral Programs, along with the information about the Thesis Advisors.

**We offer:**

- 4 year Doctoral Programs.
- Accommodation in a University dorm.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Free Russian language courses.
- The possibility to defend the Candidate of Science* thesis or an UrFU PhD thesis.

*The first doctoral degree in Russia (Kandidat Nauk). It is gained after 3 to 5 years in a postgraduate school. The qualification requirements include mandatory publications in peer reviewed journals and approval on the Federal government level.

**Entry requirements:**

- Master’s Degree in a field related to the field of Doctoral Studies.
- B2 level of English or Russian.
- Interview.

**For further information, please contact:**
Svetlana Zimnitskaia
s.a.zimnitskaia@urfu.ru
FACULTY OF BIOLOGY
About the Faculty

UrFU Faculty of Biology is one of the leading among Russian universities. One of the things that make the Faculty unique is the access that students and researchers have to the INS Botanical Garden and the INS Biological Station. Students of the Faculty study life in all its forms, physical and chemical mechanisms and global processes in the biosphere, and acquire the practical and analytical skills necessary to manipulate living systems.

Our students graduate with the necessary set of skills to conduct research, to develop scientific, industrial, design, management, organizational and pedagogical activities in organizations working on solving biological and environmental problems; in the biomedical industry and clinical diagnostic laboratories; in the field of biotechnology, phyto landscapes and interiors; in academic research organizations, museums, zoos, nature reserves, national parks.

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<tr>
<th>Department</th>
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<tr>
<td>Department of Botany</td>
<td>Victor Mukhin</td>
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<td><a href="mailto:victor.mukhin@ipae.uran.ru">victor.mukhin@ipae.uran.ru</a></td>
</tr>
<tr>
<td>Department of Zoology</td>
<td>Vladimir Vershinin</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:vol_de_mar@list.ru">vol_de_mar@list.ru</a></td>
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<tr>
<td>Department of Plant Physiology and Biochemistry</td>
<td>Irina Kiseleva</td>
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<td></td>
<td><a href="mailto:irina.Kiseleva@urfu.ru">irina.Kiseleva@urfu.ru</a></td>
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<tr>
<td>Department of Ecology</td>
<td>Vladimir Bolshakov</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:V.N.Bolshakov@urfu.ru">V.N.Bolshakov@urfu.ru</a></td>
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<tr>
<td>Department of Fundamental Medicine</td>
<td>Irina Danilova</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:ig-danilova@yandex.ru">ig-danilova@yandex.ru</a></td>
</tr>
<tr>
<td>Department of Human and Animal Physiology</td>
<td>Boris Yushkov</td>
</tr>
<tr>
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<td><a href="mailto:b.yushkov@iip.uran.ru">b.yushkov@iip.uran.ru</a></td>
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**Botanical Garden**

The INS Botanical Garden is the oldest in Ekaterinburg and is part of the Botanic Gardens Conservation International.

The Garden includes an arboretum which is designed as a landscaped park with the principle of geographical placement of plants. The garden features a collection of rare and endangered plants listed in the Red Book of Russia, the Urals and the Sverdlovsk region. The “Park of Rare Plants” is a landscape exhibition of the “Poaceae” and “Amaranth” families. A collection of subtropical and tropical plants is located in the greenhouses. The park’s collection of cacti and succulents is one of the largest in Russia.

The Botanical Garden is among the largest in Russia in terms of the number of cultivated species in need of protection. In the Main Botanical Garden of the Russian Academy of Sciences (Moscow), there are 320 species; in the Botanical Garden of the Botanical Institute of the Russian Academy of Sciences (St. Petersburg) – 300 species; in the botanical garden of the Moscow State University – 166 species and in the botanical garden of the Ural Branch of the Russian Academy of Sciences (Ekaterinburg) – 130 species.

**Biological Station**

The INS Biological Station is located on the border of the southern taiga subzone and forest areas, in the junction of the rivers Iset and Sysert. The abundance of different types of ecosystems (forest, grassland, water, swamp, steppe slopes, agricultural and ruderal habitats, etc.) provides a unique opportunity to study the biodiversity of the area.

The Biological Station is a good base for training biology and ecology students. It is also the testing ground for the implementation of research projects conducted by undergraduate and graduate students and the staff of the Faculty of Biology. In addition, it is the perfect venue for voluntary environmental actions by INS students and staff.

Biodiversity is studied at all levels starting from the genetic level to the whole ecosystems. Research is conducted in order to assess the biological resources of the Ural region; to study symbiotic complexes in the biosphere cycle and homeostasis of Earth’s ecosystems. Various projects involve not only INS scholars, but also colleagues from institutes of the Russian Academy of Sciences and foreign partners.
Department of Human and Animal Physiology
The program is focused on training specialists in effective experimental methods for research activities associated with carrying out fundamental and applied research in the field of physiology of man and animals.

The main research directions are:
1. Mechanisms of regulation of tissue regeneration under the action of the organism to extreme factors.
2. Immunological regulation of physiological functions.
3. Blood regulation mechanisms under the exposure of the human organism to extreme factors.

Research interests:
• The study of the regulation of hematopoiesis and development of the concept of immunological regulation of physiological functions in normal and pathological processes.

Main publications:
BIODIVERSITY AND ECOLOGY OF PLANT AND FUNGI IN A CHANGING WORLD

Department of Botany

The program focuses on training specialists in botany, mycology ecology of plants and fungi, familiar with classical methods of field researches as well as high-tech experimental methods.

Research interests:
• Mycology.
• Botany.
• Ecology.
• Physiology of Fungi.
• Mycogeography.

Main publications:

Dr. Victor Mukhin
Professor
victor.mukhin@ipae.uran.ru
EVOLUTIONARY PATTERNS IN THE DENTITION OF RODENTS. SMALL MAMMALS AS INDIRECT BIOTIC MARKERS FOR CLIMATE DYNAMICS ASSESSMENT. FOSSIL RECORDS AND MOLECULAR PHYLOGEOGRAPHY OF ANIMALS

Department of Ecology
The program includes both theoretical and practical courses in evolutilional morphology of vertebrata, evolutilional ecology, biochronology and biostratigraphy of Quaternary. The students will have the opportunity to conduct research for their PhD thesis and participate in field research in different parts of the Urals and Siberia.

Research interests:
• Evolutionary ecology and morphological evolution of mammals.
• Quaternary biochronology and biostratigraphy.
• Phylogeography.
• Evolutionary studies based on both paleontological and neontological approaches.

Main publications:

Entry requirements:
• Good knowledge of zoology or Quaternary geology and molecular genetics.
PLANT PHYSIOLOGY AND BIOCHEMISTRY

Department of Plant Physiology and Biochemistry
The program includes both theoretical and practical courses in plant molecular physiology and biotechnology. The students will have the opportunity to conduct research for their PhD thesis and participate in laboratory and field studies, as well as field trips.

Research interests:
- Study of sink-source relations in plants, developmental (ontogenetic) and ecological aspects of photosynthesis, plant tolerance, molecular physiology of cereals.

Main publications:

Entry requirements:
- Basic knowledge of molecular plant physiology.
- Skills in molecular genetics and physiological and biochemical methods.
ECOLOGY OF AMPHIBIAN MORPHOGENESIS UNDER EFFECT OF NATURAL AND MAN-TRANSFORMED ENVIRONMENT

Department of Zoology

The main objective of the program is to develop a new methodology based on ecological functional analysis of morphological abnormalities’ formation mechanisms in natural populations of amphibians under the influence of anthropogenic transformation of the environment. The general theoretical significance of this area can be briefly described as evolutionary teratology. This approach allows using the new parameters in the assessment of potential risks to human and animal populations under the effect of pollution and urbanization.

Research interests:
• Population ecology of amphibian, effects of urbanization and anthropogenous transformation of ecosystems, ecological physiology, problems of adaptation, morphogenesis, ontogenetic stability, problems of evolution in natural and man-transformed environment, human ecology.

Main publications:
THE STUDY OF IMMUNOPHYSIOLOGICAL REGENERATION PROCESS. THE ROLE OF IMMUNE CELLS IN THE REGULATION OF THE REGENERATION

Department of Fundamental Medicine

The subjects covered in the program include the study of immunophysiological regeneration process, the role of immune cells in the regulation of the regeneration, the flow cytometry, immunohistochemistry, cell technologies, enzyme-linked immunosorbent assay, western blotting, confocal microscopy.

Research interests:
- The investigation of the mononuclear phagocyte system role in the regeneration of various tissues.

Main publications:
- Modulation of macrophages and response of CD117 (+) cells of different localiza-

Dr. Irina Danilova
Head of Department of Fundamental Medicine,
Head of Laboratory of Morphology and Biochemistry, Institute of Immunology and Physiology of the Ural Branch of the Russian Academy of Science

ig-danilova @yandex.ru
FACULTY OF PHYSICS
About the Faculty

UrFU Faculty of Physics is one of the leading faculties in Russia in this field. It has long-standing close ties with the institutes of the Russian Academy of Sciences, the largest industrial enterprises in the Urals and foreign research centers. Some of the faculty members are also members of the Russian Academy of Sciences and its branch academies.


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<th>Department</th>
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<tr>
<td>Department of General Molecular Physics</td>
<td>Vladimir Chernyak</td>
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<td><a href="mailto:vladimir.chernyak@urfu.ru">vladimir.chernyak@urfu.ru</a></td>
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<tr>
<td>Department of Theoretical Physics</td>
<td>Alexander Moskvin</td>
</tr>
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<td></td>
<td><a href="mailto:alexander.moskvin@urfu.ru">alexander.moskvin@urfu.ru</a></td>
</tr>
<tr>
<td>Department of Low Temperature Physics</td>
<td>Alexey Babushkin</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:Alexey.babushkin@urfu.ru">Alexey.babushkin@urfu.ru</a></td>
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<tr>
<td>Department of Astronomy and Geodesy</td>
<td>Eduard Kuznetsov</td>
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<td><a href="mailto:Eduard.Kuznetsov@urfu.ru">Eduard.Kuznetsov@urfu.ru</a></td>
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<tr>
<td>Department of Condensed Matter Physics</td>
<td>Nikolai Baranov</td>
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<td><a href="mailto:n.v.baranov@urfu.ru">n.v.baranov@urfu.ru</a></td>
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<tr>
<td>Department of Magnetism and Magnetic Nanomaterials</td>
<td>Vladimir Vas’kovskiy</td>
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<td><a href="mailto:vladimir.vaskovskiy@urfu.ru">vladimir.vaskovskiy@urfu.ru</a></td>
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<tr>
<td>Department of Computational Physics</td>
<td>Alexander Germanenenko</td>
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Natalia Zyryanova
Director of the Faculty
N.P.Zyryanova@urfu.ru
Kourovka Astronomical Observatory:

The Kourovka Astronomical Observatory is the easternmost observatory in Europe. It is the only observatory in the range of longitudes from Kazan to Irkutsk. The staff has been actively involved in the implementation of national and international programs to monitor stellar clusters, the Sun, comets, planets and their satellites, stars and star-forming regions and finding planetary systems around other stars. They also perform terrestrial optical observations of X-ray sources in synchronization with space experiments.

The international astronomy community has recognized the important role of the Observatory. In honor of Professor K. A. Barkhatova the International Astronomical Union named the minor planet number 5781 Barkhatova, in honor of the director of the observatory P. E. Zakharova – the minor planet number 4780 was named Polina, in honor of Associate Professor N. B. Frolova – the minor planet number 6165 was named Frolova. In 1996, the minor planet number 4964 was named Kourovka. The Observatory is a major observational base for future astronomers.
RELATIONSHIP BETWEEN STRUCTURE AND DEFORMATION/FRACTURE OF ROCK MATERIALS

Departments of Condensed Matter Physics and General and Molecular Physics
This program focuses on the study of hierarchical structure and deformation/fracture behavior of some rock materials.

Research interests:
• Mechanisms of deformation and fracture of materials, rocks and hard tissues.

Main publications:

Dr. Peter Panfilov
Professor
Peter.panfilov@urfu.ru
AMORPHOUS AND NANOSTRUCTURED MAGNETIC MATERIALS

Department of Magnetism and Magnetic Nanomaterials
During this program you will study the relationship between the structural and phase states and the magnetic properties of soft magnetic alloys in the form of rapidly quenched ribbons and thin films.

Research interests:
- Study of the relationship of structural and phase state with magnetic properties of soft magnetic alloys in the form of rapidly quenched ribbons and thin films.

Main publications:

Entry requirements:
- Skills in the field of measurement and the use of equipment for the heat treatment.

Dr. Vasily Kataev
Professor
vakataev@urfu.ru
PHYSICS AND TECHNOLOGIES OF NEW HARD MAGNETIC MATERIALS

Department of Magnetism and Magnetic Nanomaterials
During this program you will focus on the study of the interface of the exchange interaction in composite materials based on ferromagnetic hard magnetic and soft magnetic phase components and aniferromagnetic inclusions.

Research interests:
- Physics and technologies of hard magnetic materials on the base of rare-earth alloys and intermetallic compounds.

Main publications:
- Ismard O., Andreev A., Kuz’min M., Skoursky Y., Gorbunov D., Kudrevatykh N. et al. High magnetic field study of the Tm$_2$Fe$_{17}$ and Tm$_2$Fe$_{17}$D$_{3.2}$ compounds // Physical Review B. 2013. V. 88. P. 174406-1–10. DOI: 10.1103/PhysRevB.88.174406
FUNDAMENTAL AND APPLIED RESEARCH OF HETEROGENEOUS MAGNETIC FILMS

Department of Magnetism and Magnetic Nanomaterials
The program focuses on the development of new functional materials based on volume and layered nanostructuring of magnetic films. Prototyping magnetic sensors will also be part of the program’s objectives.

Research interests:
• Fundamental and applied research of heterogeneous magnetic films.

Main publications:

Dr. Vladimir Vas’kovskiy
Head of Department, Professor
vladimir.vaskovskiy@urfu.ru
MAGNETIC STRUCTURES AND MAGNETIC PHASE TRANSITIONS

Department of Magnetism and Magnetic Nanomaterials
The objective of the program is the study of the structural state and magnetic properties of graphene composites and 3d-transition metals using the methods of neutron diffraction, neutron reflectometry and small-angle neutron scattering.

Research interests:
- Structure state and magnetic properties of composites formed from multilayered graphene and 3d-transitional metals.

Main publications:

Entry requirements:
- Knowledge of background of X-ray, nuclear and magnetic scattering of neutrons.
Department of Magnetism and Magnetic Nanomaterials

The program focuses on the study of the magnetic properties of crystalline, amorphous and nanocrystalline soft magnetic materials subjected to mechanical, thermal and corrosive influences.

Research interests:
- Physical bases of magnetic properties optimization for soft magnetic materials.

Main publications:

Dr. Nadezhda Skulkina
Professor, Department of General and Molecular Physics
nadezhda.skulkina@urfu.ru
PHYSICS OF FERROELECTRICS AND RELATED MATERIALS

Department of Computational Physics
This program focuses on the experimental study of the ferroelectric domain structure, kinetics of the phase transformations and domain engineering, among other topics. The students will have access to modern analytical and technological equipment. The Department staff is very friendly and you will have the opportunity to try over a hundred different types of green tea.

Research interests:
• Experimental study of the ferroelectric domain structure, kinetics of the phase transformations, domain engineering etc.

Main publications:

Entry requirements:
• Experience in experimental research in the field of materials science.
MULTICOMPONENT CHALCOGENIDES WITH ELECTRON-IONIC TRANSFER AT HIGH PRESSURES IN WIDE TEMPERATURE RANGE

Department of Low Temperature Physics
The program focuses on the research of physical properties of multicomponent chalcogenides with electron-ionic transfer. The students will be able to participate in different research projects.

Research interests:
- Experimental solid-state physics, the study of the extreme influence (low temperatures, high-pressures, intense heat fluxes) on physical properties of solids.
- Research of physical properties multicomponent chalcogenides with electron-ionic transfer in wide interval of temperatures and pressure.
- Technique of megabar range pressure in diamond anvil cell.

Main publications:

Entry requirements:
- Experience in experimental research.
DYNAMICAL EVOLUTION OF EXTRASOLAR PLANETARY SYSTEMS

Department of Astronomy and Geodesy
The program’s aim is the construction of semi-analytical theories of motion, the research of long-time dynamical evolution of extrasolar planetary systems and of the orbital evolution stability, as well as the determination of stochastic properties of motion and the application of the obtained results to real extrasolar systems.

Research interests:
• Research of orbital evolution of planets and artificial satellites of the Earth.

Main publications:
• Kuznetsov E. D., Zakharova P. E. Dynamical evolution of space debris on high-elliptical orbits near high-order resonance zones // Advances in Space Research. 2015. DOI: 10.1016/j.asr.2015.03.022

Entry requirements:
• Knowledge in Celestial Mechanics.
• Programming skills in Fortran or C++.
EARLY STAGES OF STELLAR EVOLUTION AND MASERS

Department of Astronomy and Geodesy
The aim of the program is the analysis of observational data obtained with state of the art instruments on the early stages of star formation and/or theoretical modelling.

Research interests:
- Masers, star formation, early stages of stellar evolution, radioastronomy.

Main publications:
- Kardashev et al. (including Sobolev) Review of scientific topics for Millimetrion space observatory // Physics – Uspekhi. 2014. 57 (12). DOI: 10.3367/UFNe.0184.201412c.1319
- Richards et al. (including Sobolev) ALMA sub-mm maser and dust distribution of VY Canis Majoris. DOI: 10.1051/0004-6361/201425024

Dr. Andrey Sobolev
Chief Scientific Researcher
Andrei.Sobolev@urfu.ru
LATE STAGES OF STELLAR EVOLUTION AND MASERS

Department of Astronomy and Geodesy
The program focuses on the analysis of observational data obtained with state of the art instruments on the late type stars.

Dr. Junichi Nakashima
Professor
Nakashima.Junichi@urfu.ru

Research interests:
- Masers, late stages of stellar evolution, radioastronomy.

Main publications:
  DOI: 10.1088/0004-637X/759/1/61
  DOI: 10.1088/0004-637X/728/2/76
  P. 490–499.
  DOI: 10.1088/0004-6256/140/2/490
MODEL THEORETICAL APPROACHES TO STRONGLY CORRELATED ELECTRON SYSTEMS

Department of Theoretical Physics
The fields studied in this program are (pseudo)spin algebra, atoms in crystals; exchange interactions; (pseudo)spin Hamiltonians; Bose-Hubbard models; phase diagrams; topological defects; the Monte-Carlo technique and computer modeling.

Research interests:

Condensed matter theory – model theoretical approaches to strongly correlated electron systems:
- (Pseudo)spin algebra.
- (Pseudo)spin Hamiltonians.
- Bose-Hubbard models.
- Atoms in crystals.
- Microscopic theory of magnetic, optical and resonance properties of 3d compounds.
- Exchange interactions.

Main publications:
- Moskvin A.S. et al., Direct evidence of the non-Zhang-Rice Cu3+ centers in La2Li0.5Cu0.5O4 // Phys. Rev. 2012. B 86, 241107(R). DOI: 10.1103/PhysRevB.86.241107
MODELING THE CALCIUM DYNAMICS IN CARDIAC CELLS

Department of Theoretical Physics
The fields studied in this program are molecular and cell biophysics; electron-conformational theory of proteins; ion dynamics in cells and computer modeling of calcium dynamics.

Research interests:

**Biophysics – Modeling the calcium dynamics in cardiac cells:**
- Molecular and cell biophysics.
- Ion dynamics in cells.
- Computer modeling of calcium dynamics.

Main publications:
SEMICONDUCTOR PHYSICS

Department of Computational Physics
The program involves studying the physical properties of semiconductor materials and semiconductor-based composite structures. The research activity relates to studying the energy spectra and electron transport in HgCdTe-based heterostructures.

Research interests:
- Energy spectrum and transport in semiconductor A3B5, A2B6 heterostructures with two-dimensional electron and hole gas.

Main publications:

Entry requirements:
- Preferably experimental physicist.

Dr. Alexander Germanenko
Head of Department
alexander.germanenko@urfu.ru
MAGNETISM OF CHIRAL HELIMAGNETS

Department of Theoretical Physics
The program’s aim is to study magnetic properties of monoaxial chiral helimagnets and to carry out theoretical analysis of their functionality in spintronics applications.

Research interests:
- Magnetism of low-dimensional magnetic systems, chiral helimagnets, renormalization group.

Main publications:

Dr. Alexander Ovchinnikov
Professor
alexander.ovchinnikov@urfu.ru
CONDENSED MATTER PHYSICS.
PHYSICS OF MAGNETIC PHENOMENA

Department of Condensed Matter Physics
This program focuses on the synthesis of transition metal chalcogenides with layered structure and experimental study of their crystal structure and physical properties. The students will have the opportunity to participate in different research projects.

Research interests:
- Crystal structure, phase transitions, transport and magnetic properties of the rare-earth and transition metals compounds.

Main publications:

Entry requirements:
- Master’s Degree in Condensed Matter Physics or Physics of Magnetic Phenomena.

Dr. Nikolai Baranov
Head of Department, Professor
n.v.baranov@urfu.ru
THERMOPHYSICS AND THEORETICAL THERMOTECHNICS

**Department of General and Molecular Physics**

The program will focus on the following topics: the kinetic theory of motion of rarefied single-component gases and gas mixtures in capillaries under the influence of pressure, temperature and concentration gradients, as well as resonant optical radiation; kinetic theory of motion of fine aerosols in inhomogeneous gases. During the program we will be using analytical and numerical methods for solving the Boltzmann equation.

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**Research interests:**
- Kinetic theory of transport processes in the rarefied gases: capillary gas flows, evaporation and condensation, aerosols motion, etc.

**Main publications:**
  DOI: 10.1007/s10955-010-0001-1
  DOI: 10.1063/1.4894200

**Entry requirements:**
- Basic knowledge of hydrodynamics and kinetic theory of gases.
- Basic knowledge of numerical methods for solving differential equations.

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Dr. Vladimir Chernyak  
Head of Department  
vladimir.chernyak@urfu.ru
THERMODYNAMIC AND KINETIC PROPERTIES
OF SEMICONDUCTORS WITH IMPURITIES
OF TRANSITION ELEMENTS

Department of Theoretical Physics

The program focuses on theoretical studies of thermodynamic and kinetic properties of semiconductors with impurities of transition elements (spin polarization, temperature and concentration dependencies of heat capacity, magnetic susceptibility, elastic modulus, anomalous Hall effect, conductivity).

Research interests:

- Thermodynamic and kinetic properties of metals and semiconductors with electron-electron interaction taken into account.
- Low-temperature magnetic quantum oscillation effects in a quantizing magnetic field.
- Quantum waves in metals and semiconductors.

Main publications:


Dr. Evgeny Pamyatnykh
Professor
Evgeny.Pamyatnykh@urfu.ru
ISOTOPIC FEATURES OF ATMOSPHERIC WATER CYCLE IN ARCTIC

Department of General and Molecular Physics
The focus of this program is remote sensing and in situ measurements of water vapor isotopes in the atmosphere of the Arctic and the sub-Arctic. In addition, the analysis of the obtained time series data will be carried out and the data with outputs of isotope general circulation model ECHAM-iso will be compared.

Research interests:
• Climate and environmental physics.
• Remote sensing of trace gases in the atmosphere using high-resolution satellite and ground-based spectrometers in infrared.
• Satellite data validation using ground-based observation.
• Water vapor isotopes monitoring in boundary layer of the atmosphere.
• Water isotopes measurements in atmospheric precipitation.

Main publications:
• Gribanov K., Jouzel J., Bastrikov V., Bonne J. L., Breon F. M., Butzin M., Cattani O., Masson-Delmotte V., Rokotyan N., Werner M., Zakharov V. Developing a western Siberia reference site for tropospheric water vapour isotopologue observations obtained by different techniques (in situ and remote sensing) // Atmospheric Chemistry and Physics. 2014. 14 (12). P. 5943–5957. DOI: 10.5194/acp-14-5943-2014

Dr. Vyacheslav Zakharov
Head of Laboratory, Professor
v.zakharov@remotesensing.ru
CONDENSED MATTER PHYSICS.
PHYSICS AND NANOSTRUCTURE TECHNOLOGY

Laboratory of Electron microscopy and Department of Low Temperature Physics

Research interests:
- Formation, growth and transformations of thin films and crystals.
- Transmission electron microscopy of novel aperiodic, transrotational crystals and nanostructures formed in amorphous films.

Main publications:

Entry requirements:
- University education: Physics, Materials Science, Nanoscience & Technology, Chemistry.

Dr. Vladimir Kolosov
Head of Laboratory of Electron Microscopy, PhD, Prof. of Low-temperature Physics Dept.
kolosov@urfu.ru
FACULTY OF CHEMISTRY
About the Faculty

UrFU Faculty of Chemistry gives its students the necessary skills and knowledge to work in the fields of research, education or industry after graduation. The available degrees are Chemistry; Fundamental and Applied Chemistry; Chemistry, Physics and Mechanics of Materials.

During their studies the students are allowed to choose one of the following specialization profiles: “Organic Chemistry”, “Inorganic Chemistry”, “Analytical Chemistry”, “Solid State Chemistry”, “Macromolecular Compounds”, “Physical Chemistry”, and “Environmental Chemistry, Chemical Expertise and Environmental Safety”.

Anna Guseva
Director of the Faculty
Anna.Guseva@urfu.ru

Department | Head of Department
---|---
Department of Inorganic Chemistry | Irina Animitsa
irina.animitsa@urfu.ru
Department of Organic Chemistry | Vyacheslav Sosnovskikh
vy.sosnovskikh@urfu.ru
Department of Analytical Chemistry | Ludmila Neudachina
Ludmila.Neudachina@urfu.ru
Department of High Molecular Compounds | Sergey Vshivkov
sergey.vshivkov@urfu.ru
Department of Physical Chemistry | Vladimir Cherepanov
v.a.cherepanov@urfu.ru
The Departments of the Faculty of Chemistry are equipped with modern instruments and devices, such as:

- X-ray diffractometers for structural investigations: EQUINOX 3000, Enel; XRD 7000S, Shimadzu both equipped with high temperature cameras;

- Instruments for thermodynamic and thermal analysis measurements: DynTherm LP-ST, Rubotherm; Simultaneous Thermal Analyzer STA 409 PC Luxx, Netzsch; Thermogravimetric Analyzer PYRIS I TGA, Perkin Elmer; Calve calorimeter, Seteram;

- Apparatus for the thermomechanical properties measurements: Dilatometer DIL402C, Netzsch; thermomechanical analyzer TMA 202/1/G, Netzsch;

MAGNETIC POLYMERIC COMPOSITES AND FERROGELS

Department of Polymers

The program focuses on the thermodynamic study of the enthalpy of interfacial interaction between magnetic metal and metal oxide nanoparticles with polymer matrices in composites and ferrogels, analysis of magnetic properties, magnetostriction, relaxation.

Research interests:
- Thermodynamics of multicomponent polymer systems, polymer solutions, gels, composites and nanocomposites.
- Thermodynamic modeling of molecular interactions.
- Polyelectrolyte gels.
- Stabilization and stability of colloid suspensions of nanoparticles.
- Composite materials based on metal and metal oxide nanoparticles including magnetic nanoparticles.

Main publications:

Entry requirements:
- Knowledge of chemistry and physics of polymers and colloids.

Dr. Alexander Safronov
Professor
Alexander.Safronov@urfu.ru
PHYSICAL CHEMISTRY OF OXIDE SYSTEMS: THERMODYNAMICS, STRUCTURE, PROPERTIES

Department of Physical Chemistry

The program includes an immersed study of the physicochemical basis of preparation, research and application of solid oxide materials by both experimental and theoretical approaches.

Research interests:

• Research of complex oxides perspective for the various applications as electrode, catalytic, membrane or sensor materials: thermodynamic stability, phase equilibria, crystal and defect structure, oxygen nonstoichiometry, functional electro-transport properties.

Main publications:


Entry requirements:

• Good experimental skills: synthesis of solid materials, organization of physico-chemical experiment.

• Basic knowledge of crystal chemistry, chemical thermodynamics, chemical kinetics, electrochemistry.

• Thoroughness, reliability, efficiency.
FUNDAMENTAL PRINCIPLES OF CHEMICAL DESIGN FOR NOVEL MULTIFUNCTIONAL MATERIALS ON THE BASIS OF PEROVSKITE-LIKE OXIDES

Department of Physical Chemistry
The aim of the program is the comprehensive study of real (crystal and defect) structure and related properties of advanced complex oxide materials.

Research interests:
- Study of target properties of advanced complex oxide materials in relation with their crystal and defect structure.

Main publications:
- Zuev A. Yu., Sereda V. V., Tsvetkov D. S. Defect structure and defect-induced expansion of doped perovskite La0.7Sr0.3Co0.9Fe0.1O3-δ // International Journal of Hydrogen Energy. 2014. V. 39. P. 21553–21560. DOI: 10.1016/j.ijhydene.2014.09.115

Entry requirements:
- Basic knowledge in Physical Chemistry and elementary knowledge in Solid State Chemistry.
- Elementary skills in oxide materials preparation.
HETEROCYCLIC CHEMISTRY

Department of Organic Chemistry
The program focuses on the syntheses of heterocycles on the basis of CF3-containing synthons.

Research interests:
- Synthesis and reactivity of CF3-synthons on the basis of oxygen-containing heterocycles and nitroalkenes.

Main publications:

Entry requirements:
- Deep knowledge of organic chemistry.
PROTON CONDUCTING OXIDE CERAMIC MATERIALS FOR APPLICATIONS IN MEDIUM TEMPERATURE ELECTROCHEMICAL DEVICES

Department of Inorganic Chemistry
The program focuses on the synthesis, crystal and local structure, thermal and electrical properties, chemical stability of the high-temperature proton conductors with perovskite structure.

Research interests:
- Materials science; inorganic materials chemistry, solid-state electrochemistry, ionics.
- Advanced ceramic materials, mainly oxides; their defect structure, diffusivity, electrical properties and electrochemistry at high temperatures.
- Hydrogen defects.
- Solid electrolytes (oxygen ion and proton conductors).

Main publications:
- Tarasova N., Animitsa I. Novel proton-conducting oxyfluorides Ba_{4-0.5x}In_{2}Zr_{2}O_{11-x}F_{x} with perovskite structure // Solid State Ionics. 2014. 264. P. 69–75. DOI: 10.1016/j.ssi.2014.06.021.

Entry requirements:
- Knowledge of synthesis of complex oxides by solid state route, impedance spectroscopy, Rietveld refinement.
INSTITUTE OF MATHEMATICS
AND COMPUTER SCIENCE
Mathematics is an eternally young science, which over the last decade has gained new impetus for development through the widespread introduction of computer technologies in various spheres of human activity. A high quality education in mathematics and computer science is appreciated all over the world, and the demand for top-level of specialists grows every year.

We invite all researchers interested in mathematics, mathematical and computer modeling, and theoretical computer science to pursue their doctoral studies in the Institute of Mathematics and Computer Science, Ural Federal University.

The Institute of Mathematics and Computer Science is a leader in research among the UrFU Institutes in terms of the numbers of research projects and publications in world-class journals. The Institute offers a stimulating environment and the necessary infrastructure for the successful completion of doctoral programs. The thesis advisors involved with the doctoral programs are leading researchers in their fields and have broad experience of working in the best universities in Russia and all over the world.

Magaz Asanov,
Director of the IMCS
The Institute of Mathematics and Computer Science (IMCS) is one of the leading organizations in Russia in the field of pure mathematics, applied mathematics, and theoretical computer science. The key areas of research in the IMCS include extremal problems in the theory of functions and operators, stochastic differential-operator problems, ill-posed problems, numerical methods for functional differential equations, mathematical modeling in physiology and medicine, mathematical and computer modeling of complex fluids, structural and algorithmic problems for semigroups, groups, lattices and rings, finite automata, combinatorics of words, graph theory and machine learning.

The Institute has at its disposal a next-generation, high-performance IT equipment, as well as an access to the computing resources of the Institute of Mathematics and Mechanics, Ural Branch of the Russian Academy of Sciences.

Many of the Institute’s PhD graduates find employment in the Institutes of the Russian Academy of Sciences, research laboratories of industrial corporations, and other science-intensive businesses. Also, the graduates work successfully in high-tech industries, including some of the World’s largest computer companies such as Yandex, Google and Microsoft.
The IMCS offers a wide range of Doctoral Programs in the fields of:
- Mathematics and Mechanics.
- Computer and Information Sciences.
- Computer Science and Engineering.

In this brochure you will find a brief description of the Doctoral Programs, alongside with information about the thesis advisors.

**We offer:**
- 3 or 4 year Doctoral Programs resulting in the defense of either a Candidate of Science thesis or a UrFU PhD thesis.
- Accommodation in a University dormitory.
- The possibility to take additional employment as a researcher in the group of your thesis advisor.
- Russian language courses.

**Entry requirements:**
- Master’s Degree in a field related to the field of Doctoral Studies.
- Intermediate level of English or Russian (B2).
- Interview.

**For further information, please contact:**
Ekaterina Elfimova
Ekaterina.Elfimova@urfu.ru
Department of Mathematical Analysis and Function Theory
The fields studied in this program include extremal problems for differentiable functions, approximation of unbounded operators by bounded ones on sets of functions of one and many variables, various properties of polynomials and entire functions, in particular, inequalities for norms of derivatives, positive definite functions and their application in extremal problems for spherical codes.

Research interests:
- Extremal problems for polynomials and entire functions.
- Approximation of unbounded operators by bounded ones.
- Positive definite functions and their application in extremal problems for spherical codes.

Main publications:

Entry requirements:
- Basic knowledge of real and complex analysis.
INEQUALITIES FOR POLYNOMIALS AND ENTIRE FUNCTIONS

Department of Mathematical Analysis and Function Theory
This program focuses on the study of some linear operators (differentiation, interpolation and others) on the sets of polynomials and entire functions in different norm spaces, obtaining generalizations of classical inequalities of Bernstein, Markov, Szego.

Research interests:
• Approximation theory, extremal problems for polynomials and entire functions, modulus of smoothness, wavelets.

Main publications:

Entry requirements:
• Basic knowledge of real and complex analysis.

Dr. Polina Glazyrina
Associate Professor
polina.glazyrina@urfu.ru
RESEARCH OF PROPERTIES OF TOPOLOGIES OF FUNCTION SPACES

Department of Mathematical Analysis and Function Theory

The set $C(X, Y)$ of all continuous mappings from the Tychonov space $X$ to the uniform space $Y$ has a number of natural topologies like the set-open topology, the uniform convergence topology, the graph topology, but when the space $Y$ has a complementary structure, the set $C(X, Y)$ has interesting and important topologies defined with the use of the $Y$-space structure. One of the interesting problems is to study the uniform, fine and graph topologies on $C(X, Y)$ where the space $Y$ is a metric space, or, moreover, the $Y$ space is a normed linear space.

Research interests:
- General topology.
- Function analysis.

Main publications:

Entry requirements:
- Basic knowledge of general topology and function analysis.
REGULARIZED SOLUTIONS OF STOCHASTIC DIFFERENTIAL-OPERATOR PROBLEMS

Department of Mathematical Analysis and Function Theory
The program is devoted to study of problems for infinite dimensional stochastic equations. The huge interest to the problems is related to the important role of chance factors in the processes surrounding us, especially, in physics, biology, and financial mathematics. Models that give an accurate description of these processes lead to stochastic equations in finite and infinite dimensional spaces.

The program is focused on training specialists in mathematical methods for solving of stochastic problems taking in consideration different random perturbations.

Research interests:
• Investigations of the Cauchy problems for stochastic equations in Hilbert spaces.
• Application of semigroup, regularization, and generalized function methods for solving well-posed and ill-posed stochastic problems.
• Study of interrelations between stochastic problems and PDEs for probabilistic characteristics.

Main publications:
  DOI: 10.1007/s10958-008-0012-5
  DOI: 10.1070/SM2011v202n11ABEH004199

Entry requirements:
• Basic knowledge of functional analysis and probability theory (within the scope of the successfully completed undergraduate program).

Dr. Irina V. Melnikova
Professor,
Honored Scientist of the Russian Federation
Irina.Melnikova@urfu.ru
THEORY OF REGULARIZATION OF ILL-POSED PROBLEMS AND STABLE METHODS OF THEIR SOLUTION

Department of Computational Mathematics

It is commonly known that the ill-posed problems cannot be solved by the traditional methods of computational mathematics. It is necessary to develop special regularizing algorithms for the stable solution of such problems. The program is focused on the studies of the regularization theory (convergence theorems, error estimates), stable numerical methods of solution, and applying regularizing algorithms in solving the inverse ill-posed problems arising in various fields of natural sciences.

Research interests:
- Special iterative methods for solving inverse problems taking into account all a priori information on the desired solution.
- Reconstruction of solutions with various types of singularities for linear operator equations.
- Applications of regularizing algorithms to inverse problems arising in natural sciences.

Main publications:
  DOI: 10.7868/S0869565215150086
  DOI: 10.1016/j.amc.2013.12.104
  DOI: 10.1134/S1064562414010116

Entry requirements:
- Basic knowledge of functional analysis and computational mathematics.

Dr. Vladimir Vasin
Professor
vasin@imm.uran.ru
NUMERICAL METHODS FOR THE SOLUTION OF THE FUNCTIONAL DIFFERENTIAL EQUATIONS

Department of Computational Mathematics
Many mathematical models in various scientific fields can be described by differential equations (ordinary or partial) and have the effect of heredity. As far as these objects are difficult for analytical research, the relevant problem is the development of effective numerical methods, the verification of their stability and convergence, the development and testing of the corresponding software.

Research interests:
- Theory of the positional control of systems with delay.

Main publications:
  DOI: 10.1016/j.amc.2014.12.149
  DOI: 10.1155/2015/510875
  DOI: 10.1134/S008154381305012X

Entry requirements:
- Basic knowledge of numerical methods.

Dr. Vladimir Pimenov
Head of Department, Professor
v.g.pimenov@urfu.ru
Research interests:
- Mathematical modeling in physiology and medicine. Personalized models in cardiology.
- Software developing for complex systems, finite element methods, parallel computing.
- Image analysis in medical researches.

Main publications:

Entry Requirements:
- Basic knowledge of dynamic systems, basic skills in numerical calculations, and programming (within the scope of the successfully completed undergraduate program).
COMBINATORIAL OPTIMIZATION
AND MACHINE LEARNING

Department of Mathematical Economics
The main object of the program is studying the problems being on the border between two closely related fields of modern theoretical computer science: ‘Combinatorial Optimization’ and ‘Machine Learning’.
The main topics are computational complexity and polynomial time approximation of combinatorial problems, design and implementation of learning algorithms of high generalization ability.

Research interests:
- Combinatorial optimization: complexity, polynomial time approximation algorithms with performance guarantees, approximation schemes, thresholds, etc.

Last year publications:

Entry requirements:
- Master degree in applied mathematics or computer science.
- The experience of independent research in the sphere of computational complexity of algorithms and/or theory of algorithmic (machine) learning.

Dr. Michael Khachay
Professor
mkhachay@imm.uran.ru
THEORETICAL STUDIES AND MATHEMATICAL MODELING OF SOFT MAGNETIC MATERIALS

Department of Mathematical Physics
The program is focused on studying the properties and the mechanical behavior of the new type of materials for advanced industrial and medical and biological technologies - compositions of nano- and micro-sized magnetic particles in the polymeric environment. The goal of the theoretical studies of this issue is the development of mathematical models that allow predicting the properties and the behavior of these systems basing on the information about the characteristics, the form and the concentration of particles in the composite environment, as well as about the characteristics of the matrix containing them. The program is aimed at training specialists being aware of theoretical and computer methods of the description of the complex composite environments and materials.

Research interests:
• Theoretical study of phase transitions and non equilibrium phenomena in complex fluids and soft matters – polymers, colloids, magnetic colloids and compositions of these material.

Main publications:

Entry Requirements:
• Basic knowledge of thermodynamics and statistical physics.
• Skills in numerical methods of solutions of differential and non-linear equations.

Dr. Andrey Zubarev
Professor
A.J.Zubarev@urfu.ru
COMBINATORICS AND ALGORITHMICS OF WORDS AND RELATED OBJECTS

Department of Algebra and Discrete Mathematics
The program focuses on the structural, numerical, and algorithmic properties of sequences of symbols and related properties of trees and graphs.

Research interests:
• Combinatorics of words; automata and formal languages; stringology; graph theory.

Main publications:
• *Kosolobov D., Rubinchik M., Shur A. M.* Pal^k is Linear Recognizable Online. SOFSEM 2015: Theory and Practice of Computer Science, 289–301. DOI: 10.1007/978-3-662-46078-8_24

Entry requirements:
• A sufficient background in discrete mathematics and theoretical computer science: algorithms and complexity, automata and formal languages, graphs, combinatorics, discrete probability.
• Programming skills are highly desirable.

Dr. Arseny Shur  
Professor  
arseny.shur@urfu.ru
LATTICES OF SEMIGROUP VARIETIES

Department of Algebra and Discrete Mathematics
The program allows joining the world-leading team in the area of semigroup varieties, learning the main achievements at first hand, and attacking a number of challenging open problems.
The main research directions are:
• Monoid varieties with modular subvariety lattices.
• Special elements in the lattice of monoid varieties.
• The lattice of semiring varieties

Research interests:
• Lattices of semigroup varieties.

Main publications:
  DOI: 10.3103/S1066369X09030013
  DOI: 10.1007/s00233-012-9377-3
  DOI: 10.1007/s00233-011-9291-0

Entry requirements:
• Basic knowledge of the semigroup theory and the universal algebra.

Dr. Boris Vernikov
Senior Researcher, Vice-Head of Department
bvernikov@gmail.com
THE FINITE BASIS PROBLEM FOR SEMIGROUPS

Department of Algebra and Discrete Mathematics
The program focuses on one of the major open problems on the edge between the semigroup theory and the universal algebra: Tarski’s problem for finite semigroups. This fundamental problem reveals surprising connections to the modern computer science, in particular, to the complexity theory. PhD students willing to enroll in this program will work within a very international network of algebraists and computer scientists. The main research directions are:
• Computational complexity of deciding the finite basis property for finite semigroups.
• The finite basis problem for “graph-generated” semigroups, e.g., Hecke-Kiselman monoids.
• Relatively inherently non-finitely based J-trivial and R-trivial semigroups.

Research interests:
• Finite basis problem, Lattices of semigroup and ring varieties, Computational complexity.

Main publications:
  HTTP://csseminar.imkn.urfu.ru/MATHJAP_revisited.pdf
  DOI: 10.4171/JEMS/323
  DOI: 10.1016/j.jalgebra.2012.06.021

Entry requirements:
• Basic knowledge of semigroup theory, universal algebra, and computational complexity.
SYNCHRONIZING AUTOMATA AND THE ČERNÝ’S CONJECTURE

Department of Algebra and Discrete Mathematics
The program is related to a longstanding conjecture in the theory of finite automata: the Černý’s conjecture. It deals with so-called synchronizing automata that are of both theoretical interest and practical value. The automata research team at Ural Federal University is very active and maintains many international contacts. The main research directions are:
• Connections between synchronizing automata and the theory of nonnegative matrices.
• New upper and lower bounds for the reset threshold within some important classes of synchronizing automata.
• Road coloring games.

Research interests:
• Synchronizing automata, Formal Languages, Computational complexity.

Main publications:
  DOI: 10.1007/978-3-540-88282-4_4
• Ananichev D. S., Gusev V. V., Volkov M. V. Primitive digraphs with large exponents and slowly synchronizing automata // J. Math. Sci. 2013. 192, no. 3. 263–278.
  DOI: 10.1007/s10958-013-1392-8
  DOI: 10.1142/S0129054113400170.
  DOI: 10.1016/j.tcs.2009.03.021

Entry Requirements:
• Knowledge of some basics of automata theory, formal languages, and computational complexity. Programming skills will be an advantage.
STATISTICAL MECHANICS OF MAGNETIC FLUIDS

Department of Mathematical Physics
The program is focused on the theoretical description of the properties of magnetic fluids with the help of both the mathematical methods of statistical mechanics and the computer simulations.

Research interests:
- Statistical mechanics of magnetic fluids and dipolar fluids.
- Magnetic properties and structural transformations.

Main publications:

Entry Requirements:
- Basic knowledge of thermodynamics and statistical physics.
- Skills in numerical methods of computer simulations.

Dr. Alexey Ivanov
Professor
Alexey.Ivanov@urfu.ru
INSTITUTE OF FUNDAMENTAL EDUCATION
Institute of Fundamental Education is the institute established for solving the main task of Ural Federal University: achievement of the world-level quality in the area of fundamental training in Mathematics, Foreign Languages, IT, Engineering; these are the fields of knowledge that form the basis for developing thinking and professional skills.

Today the Institute of Fundamental Education provides high-quality training in 6 directions of training:

- Linguistics.
- Information Systems & Technology.
- Fundamental Informatics and Information Technologies.
- Applied Informatics.
- Technosphere Safety.
- Fire Safety.

Ilya Obabkov,
Director of the IFE
The educational programs of the Department of Information Systems & Technology and the Department of Intellectual Information Technologies are aimed at training of IT specialists in the area of software engineering. These specialists are highly qualified professionals in the implementation of systematic, regulated and quantified approaches for problem solving of designing, development, exploitation, software maintenance.

Department of Foreign Languages and Translation is the university leader in the sphere of language training. The Department trains specialists with the necessary competences for professional intercultural communication and subsequent scientific activities, also qualified for working with international companies and universities.

Departments of Physics, General Chemistry, Engineering Graphics, Structural and Analytical Mechanics have strong and modern laboratory facilities. In these departments, the students study engineering and technical disciplines. Providing high-quality training in these fields is one of the main directions of the Institute’s activity. Besides, among the main tasks of the Department of Physics there are training of specialists in the area of condensed matter physics and conducting of joint scientific survey on priority scientific direction “Nanomaterials industry”. In the Department, there is the Regional Scientific-Methodical Centre “Modern Physics Workshop” which develops and implements new laboratory and demonstrative equipment, and modern information technology in education process.
UrFU Institute of Fundamental Education offers a range of Doctoral Programs in the fields of Physics and Engineering. In this brochure you will find a brief description of these Programs, alongside with the information about the thesis advisors.

**We offer:**
- 4 year Doctoral Programs.
- Accommodation in a University dormitory.
- The possibility to be employed as a researcher in the group of your thesis advisor.
- Free Russian language courses.
- The possibility to defend the Candidate of Science* theses or an UrFU PhD thesis.

*The first doctoral degree in Russia (Kandidat Nauk). It is gained after 3 to 5 years in a post-graduate school. The qualification requirements include mandatory publications in peer reviewed journals and approval on the Federal government level.

**Entry requirements:**
- Master’s Degree in a field related to the field of Doctoral Studies.
- B2 level of English or Russian.
- Interview.

**For further information, please contact:**
Nikolai Khlebnikov
NA.Khlebnikov@urfu.ru
THEORY OF STRONGLY CORRELATED D-, F-METALS AND COMPOUNDS

Department of Physics
The fields studied in this program are the Hubbard model; fluctuation theory; magnetic phase diagrams; superconductivity and magnetism; modeling of electronic structure; modeling of electronic and lattice properties.

Research interests:
- Condensed matter theory, strongly correlated electron systems, magnetism and superconductivity; chirality magnetism; lattice and spin anharmonism.

Main publications:
  DOI: 10.1103/PhysRevB.76.075119
  DOI: 10.1134/S0021364014110095
  DOI: 10.1088/0953-8984/22/49/495501
  DOI: 10.1016/j.physb.2014.09.028
- **Povzner A. A. et al.** Non-equilibrium phase transition into ferromagnetic semiconductor nanofilms in an electric field // JMMM. 2015. 373, 169–172. 
  DOI: 10.1016/j.jmmm.2014.01.064
  DOI: 10.1007/s10948-014-2791-x
MODELING THE DYNAMICAL PROCESS AT NON-EQUILIBRIUM PHASE TRANSITION IN MAGNETIC SEMICONDUCTORS

Department of Physics
The fields studied in this program are planar metallic and semiconductor nanosystems; magnetic and electronic phase transitions in electrical and magnetic fields; order-disorder transition; generator self-excited oscillations of spin-polarized currents and voltages.

Research interests:
- Condensed matter physics, phase transitions, magnetic semiconductor, colossal magnetoresistance effect, autooscillations current and voltage, magnetic nanofilms.

Main publications:
- Povzner A. A. et al. Non-equilibrium phase transition into ferromagnetic semiconductor nanofilms in an electric field // JMMM. 2015. 373, 169–172. DOI: 10.1016/j.jmmm.2014.01.064

Dr. Alexander Povzner
Head of the Department of Physics, Professor
a.a.povzner@urfu.ru
THE ANISOTROPY OF PROPERTIES OF TEXTURED MATERIALS

Department of Theoretical Mechanics
The fields studied in this program are Mathematical models of material structures, new architectural solutions in the simulation of real engineering structures kinematic methods; modeling of the properties (conductivity, elasticity, plasticity) of anisotropic materials (metals, alloys, composites).

Research interests:
• The problem of averaging of physical and mechanical properties of micro-inhomogeneous environment.

Main publications:
  HTTP://www.scopus.com/inward/record.url?eid=2-s2.0-0033233813&partnerID=40&md5=a72273a8cda93b1669ca59d2029f204a

Dr. Svetlana Berestova
Professor
s.a.berestova@urfu.ru
THE MECHANICS OF ANISOTROPIC INHOMOGENEOUS MATERIALS

Department of Theoretical Mechanics
The fields studied in this program are Mathematical models of material structures, new architectural solutions in the simulation of real engineering structures kinematic methods; modeling of the properties (conductivity, elasticity, plasticity) of anisotropic materials (metals, alloys, composites).

Research interests:
- Separation of geometrical and physical parameters in the description of the properties (conductivity, elasticity, plasticity) of anisotropic materials (metals, alloys, composites).
- Computer geometry. Shaping.
- Mathematical models of material structures, new architectural solutions in the simulation of real engineering structures kinematic methods.

Main publications:
- Zhilin S. S., Misyura N. E., Mityushov E. A. Application of mathematical modeling in the architectural design of tall buildings // Academic Gazette UralNIIproekt RAASN. 2014. V. 1. 2. P. 39–43. The mechanics of anisotropic inhomogeneous materials. DOI: 10.1007/s10948-014-2791-x
Ural Federal University named after the First President of Russia B.N. Yeltsin
19, Mira str.
620002, Ekaterinburg

Vladimir Kruzhaev
Vice-Rector for Research
19, Mira str., room GUK-21
620002, Ekaterinburg, Russia
phone: +7 (343) 375-48-90
v.v.kruzhaev@urfu.ru

Department of Information and Analytical Systems and International Projects
4, Turgenev str., room 262
620000, Ekaterinburg, Russia
phone: +7 (343) 350-30-77
science.projects@urfu.ru

@Ural_Federal
UrFUnews
ural_federal
http://www.linkedin.com/company/ural-federal-university
http://www.youtube.com/user/stvTVIST