

Freie Universität  Berlin

Research Profile

Highlights and Priorities at Freie Universität



First-class Research

Freie Universität Berlin is an internationally oriented university in the capital of Germany. Located on the greater Dahlem research campus in the green southwestern part of the city, the university offers outstanding working conditions in an inspiring atmosphere. People from all over the world come together here to perform research, to teach, and to learn. Freie Universität is closely linked with excellent independent research institutions both in Dahlem and other parts of Berlin. The university maintains dense networks with universities around the world – supported by seven liaison offices in Brussels, Cairo, Moscow, New Delhi, New York, Beijing, and São Paulo.

Freie Universität is particularly strong in the humanities and social sciences as well as in the life sciences, natural sciences, and medicine. In the 2013 ranking of the *Times Higher Education* magazine, Freie Universität was listed among the four best German universities. In the same ranking the humanities at Freie Universität were found to be among the best 25 globally. In both rounds of the German national Excellence Initiative, Freie Universität won the status of a German university of excellence. The research profile of Freie Universität Berlin is significantly influenced by a specific concentration of expertise in strategic networks in the form of Clusters of Excellence, graduate schools, numerous Collaborative Research Centers, and Focus Areas, in which researchers work across disciplines to identify and investigate socially relevant issues. These research alliances are funded by the German Research Foundation (DFG).

Research at Freie Universität is advanced by the commitment of researchers in all the university's academic departments. They are responsible for the major projects and research foci – a selection of which are described in this brochure – as well as numerous other initiatives and projects.

Clusters of Excellence

The German Excellence Initiative is a national competition to promote cutting-edge research at universities. Special funding is provided for outstanding collaborative research projects called clusters of excellence, doctoral programs, and development strategies for the university as a whole. In the excellence competition Freie Universität won funding for several Clusters of Excellence and graduate schools as well as its development strategy under the motto “International Network University.” The university thus became one of only eleven German universities of excellence.

Topoi – The Formation and Transformation of Space and Knowledge in Ancient Civilizations

There is no other city in Germany where the cultures of the ancient world are as big a presence as they are in Berlin. The Cluster of Excellence entitled *Topoi* pools the strengths present in Berlin in the study of the ancient world. The researchers within the cluster study the systematic connection between space and knowledge structures in the cultures of the Near East and Mediterranean, from early civilizations to late antiquity and the early medieval period. The Cluster of Excellence *Topoi* is hosted by Freie Universität and Humboldt-Universität in close cooperation with the German Archaeological Institute, the Berlin-Brandenburg Academy of Sciences and Humanities, the Max Planck Institute for the History of Science, and the Stiftung Preussischer Kulturbesitz.

www.topoi.org

NeuroCure

How can damage caused by stroke be prevented? What are the factors that trigger multiple sclerosis? What causes the malformations in the brain that spark epileptic seizures and other events? Research at the *NeuroCure* Cluster of Excellence is devoted to the overriding issue of how the lives of patients with neurological and psychiatric disorders could be improved. The involved researchers are based at Charité – University Medicine Berlin, the medical school operated jointly by Freie Universität and Humboldt-Universität, the Max Delbrück Center for Molecular Medicine, the German Rheumatism Research Centre Berlin, and the Leibniz Institute of Molecular Pharmacology. Basic researchers and clinicians work closely together to quickly utilize research findings for the development of new therapies.

www.neurocure.de/en

UniCat – Unifying Concepts in Catalysis

Scientists at the Cluster of Excellence *UniCat* study the field of catalysis, an area of widespread importance in all segments of the economy. *UniCat* deals specifically with the development of and research on catalysts in order to achieve more efficient uses of natural energy and material resources and the discovery of new “intelligent” enzymes for the production of antibiotics. Scientists working in the fields of chemistry, physics, biology, and process engineering cooperate in 50 research groups – including researchers from four universities: Technische Universität as the host university, Freie Universität, Humboldt-Universität, and Universität Potsdam, as well as from the Fritz Haber Institute of the Max Planck Society and the Max Planck Institute of Colloids and Interfaces.

www.unicat.tu-berlin.de

Focus Areas

One special feature of the broad-based research performed at Freie Universität Berlin is the Focus Areas. Within these research alliances, scholars and scientists from different subjects and units at Freie Universität work together over a longer period on complex research topics related to subjects of great importance to society.

Center for Area Studies

With increasing globalization there is an increase in interdependence between different cultures and thus the need to understand regional structures and cultural transfer processes. The *Center for Area Studies* brings together all aspects of the regional expertise across the humanities and social sciences at Freie Universität Berlin. Researchers explore cross-cultural and transregional phenomena and processes. Several interdisciplinary research alliances are based at the Center for Area Studies, including the “Transformative Power of Europe Kolleg-Forschergruppe,” the Collaborative Research Center “Governance in Areas of Limited Statehood,” and the *desiguALdades.net*, which is an interdisciplinary, international, and multi-institutional research network on social inequalities in Latin America. The *Center for Area Studies* also serves as a forum to promote knowledge transfer in the social and political fields.

www.fu-berlin.de/cas

Dahlem Humanities Center

The *Dahlem Humanities Center* pools the full breadth of the humanities research conducted at Freie Universität Berlin, which is unique among German universities in pursuing such a broad spectrum of topics. It creates an interdisciplinary research framework to accommodate this wealth of disciplines and activities: the study of the outward manifestations, principles, and functions of cultural dynamics. The *Dahlem Humanities Center* cooperates closely with independent research institutions and cultural institutions in the Berlin-Brandenburg region. It is internationally oriented, working together with outstanding American, European, and Asian universities.

www.fu-berlin.de/dhc

Disease in Human Aging

In the Focus Area “Disease in Human Aging – Dynamics at the Level of Molecules, Individuals, and Society,” age-related disease processes are investigated by natural and social scientists, humanities scholars, and medical researchers using an interdisciplinary approach. The involved researchers aim to gain a fundamental understanding of the origin and development of acute and chronic diseases over the lifespan of individuals. Furthermore, researchers examine the consequences for the patients and their families and friends, and ultimately, for society. The main emphasis is placed on four common disease groups: tumors, heart diseases and angiopathy, degenerative musculoskeletal diseases, and cognitive disorders and depression.

www.fu-berlin.de/dynage

Dahlem Centre of Plant Sciences

For more than one hundred years various disciplines devoted to the study of plants and their sustainable use have been based in Dahlem. The *Dahlem Centre of Plant Sciences* continues in this tradition, combining the expertise of the scientists in the various subjects and relying on the unique regional density of relevant institutions to conduct outstanding plant research. The facilities include the Botanic Garden of Freie Universität and the Botanical Museum whose collections are among the largest and most important worldwide. The goal of the Dahlem Centre of Plant Sciences is to gain a broader understanding of the diverse aspects of plant life.

www.dcps.fu-berlin.de

Functional Materials at the Nanoscale

Within this Focus Area researchers explore the properties of nanoscale systems. The nanometer scale ranges from individual molecules to structures up to 100 nanometers in size (a nanometer is one billionth of a meter). Nanoscale systems include nanotubes, nanoparticles, macromolecules, proteins, and supramolecular systems. Within the research alliance scientists from the fields of biochemistry, biophysics, chemistry, pharmacy, physics, and cell biology work together. The goal is to understand the properties of nanostructures in order to develop components for individualized use in a variety of applications. Several institutes of the Max Planck Society, the Fraunhofer Society, the Leibniz Society, and the Helmholtz Society are partners of the Focus Area.

www.nanoscale.fu-berlin.de

Collaborative Research Centers

Collaborative Research Centers (CRC) facilitate innovative and sophisticated research projects. Established at universities for a period of up to 12 years, they are financed with funds from the German Research Foundation (DFG). Within the CRCs researchers from different disciplines work together in subprojects, very often with the involvement of researchers at other universities or independent research institutions. Freie Universität Berlin currently hosts ten CRCs – which are described below – and participates in nine others. Nine CRCs are based at Charité – University Medicine Berlin, the medical school operated jointly by Freie Universität and Humboldt-Universität.

Collaborative Research Centers in the Humanities and Social Sciences

Aesthetic Experience and the Dissolution of Artistic Limits

The overall objective of the Collaborative Research Center is to analyze two tendencies that can be observed in the art of recent decades: the increasing interconnectedness of the arts themselves and the destabilization of the boundary between art and non-art. Scholars conduct research on the concept of aesthetic experience, the status of art and the aesthetic in the recent past and present, with comparative recourse to classical modernism and earlier epochs, and the relationship of the arts to one another. Scholars from Freie Universität, Universität Potsdam, and the Max Planck Institute for the History of Science work together in this CRC.

www.sfb626.de/en

Epistemology in Movement – Transfer of Knowledge from the Ancient World to the Early Modern Period

In the Collaborative Research Center scholars research the process of knowledge transition in European and non-European cultures before the modern era. Knowledge transfer in these cultures often took place over such extended periods of time or through the differentiation of already existing knowledge that it could not be described with the instruments of traditional history of science approaches, which focus on indicators of progress and within narratives of rupture. In this CRC Freie Universität is cooperating with Humboldt-Universität and the Max Planck Institute for the History of Science.

www.sfb-episteme.de/en

Governance in Areas of Limited Statehood: New Modes of Governance?

Researchers at the Collaborative Research Center analyze governance – the diverse forms and modes of ruling – in areas in which state authority is limited. How are public goods provided when states do not effectively exercise a monopoly on the use of force? How are binding rules determined and enforced when states lack basic capabilities? By studying governance in colonial contexts, historical projects also aim to identify potential postcolonial sources of contemporary governance problems. The partners in this CRC are the Hertie School of Governance, the German Institute for International and Security Affairs, the Social Science Research Center Berlin, and Universität Potsdam.

www.sfb-governance.de/en

Collaborative Research Centers in the Natural and Life Sciences

Organismic Reactions to Stress: Character and Memory

The Collaborative Research Center combines environmental science with molecular biology and biochemistry. The target organisms are currently bacteria, fungi, and plants. The scientists work to gain a better understanding of the molecular, biochemical, and physiological mechanisms that play a role in the character of stress reactions and the memory of stress events, for example, exposure to cold or plants being overcome by vermin. Furthermore, the scientists aim to gain knowledge of how stability and the predictability of environmental conditions influence the stress reactions of organisms. Researchers from Universität Potsdam and the Max Planck Institute for Molecular Plant Physiology are also involved.

www.sfb973.de

Nutrition and Intestinal Microbiota – Host Interactions in the Pig

The scientific aim of the Collaborative Research Center is to understand how nutritional factors influence the functioning of the intestines in the pig. This question is addressed by using a multitude of analytical, molecular biological, and bioinformatic methods. Research efforts are focused on feed additives, and in particular, on mechanistic studies on the effects of probiotics as well as the trace mineral zinc. The participating institutions are Freie Universität Berlin, the medical school Charité – University Medicine Berlin, Humboldt-Universität, the German Institute of Human Nutrition Potsdam-Rehbrücke, and the German Federal Institute for Risk Assessment

www.sfb852.de/en

Nanocarriers: Architecture, Transport, and Targeted Administration of Active Agents for Therapeutic Applications

The Collaborative Research Center focuses on exploring new ways of treating inflammatory skin diseases by using drug-loaded nano-sized carrier systems, the so-called nanocarriers. For a successful topical, i.e., local, therapy, the absorption of drugs is significant. The research objective is to efficiently concentrate these substances at the target location while simultaneously minimizing the side effects on the whole organism. The participating partners are Charité – University Medicine Berlin, the joint medical school of Freie Universität and Humboldt-Universität, the Helmholtz-Zentrum Geesthacht in Teltow – Institute of Biomaterial Science, and the University of Potsdam.

www.sfb1112.de/en

Scaffolding of Membranes: Molecular Mechanisms and Cellular Functions

The Collaborative Research Center investigates the spatially and temporally controlled assembly of protein scaffolds in membranes central to various cell processes. The scientists aim to discover how protein complexes scaffold membranes and control cellular functions such as cell fusion, synaptic signal transmission, or cell differentiation. The participating institutions are the German Institute of Nutrition in Potsdam-Rehbrücke, the Max Delbrück Center for Molecular Medicine in Berlin-Buch, and Charité – University Medicine Berlin, the joint medical school of Freie Universität and Humboldt-Universität.

www.sfb958.de

Elementary Processes in Molecular Switches at Surfaces

Molecular switches are important in many biological processes such as human vision. The increasing miniaturization of electronic components opens up the possibility of using molecules as building blocks for a future molecular nanotechnology. Within this Collaborative Research Center researchers are nanoscopically designing and investigating small switches on a molecular basis. Like an electric switch they can be reversibly switched back and forth between multiple states through fields, streams, or forces. This is based, for example, on spatial changes in structure or changes in the optical or electrical properties of the molecules. The scientists in the CRC are investigating the physical and chemical foundations of such molecular switching processes. Of particular interest are molecular switches in contact with solid surfaces, which are essential for well-defined molecular geometries. Besides Freie Universität Berlin, the participating institutions are Humboldt-Universität zu Berlin, Technische Universität Berlin, Universität Potsdam, the Fritz Haber Institute of the Max Planck Society, and the Paul Drude Institute for Solid State Electronics.

www.physik.fu-berlin.de/sfb658

Protonation Dynamics in Protein Function

In this Collaborative Research Center physicists, chemists, and biologists investigate the role played by the movement of hydrogen ions (protons) in the functional mechanism of proteins, i.e., in biological macromolecules, which are composed of amino acids. The main focus of their fundamental biophysical research is on so-called protonation dynamics. This includes both the relocation of protons to the macromolecular level, which leads to changes in the state of charge of proteins, and the local displacement of

the protons in networks of hydrogen chemical bonds. The aim is to investigate the extent to which these dynamics can control the mode of action of proteins. Over the long term, this research could be useful in the technological implementation of novel approaches in, for example, renewable energy generation (light-driven water oxidation, oxygen reduction) or the development of new tools in medical sciences (knowledge-based customization of channel rhodopsins for application in neurosciences). The cooperation partners are Freie Universität and Humboldt-Universität along with their joint medical school Charité – University Medicine Berlin, Technische Universität Berlin, and the Leibniz Institute of Molecular Pharmacology.

www.sfb1078.de

Multivalency as Chemical Organization and Action Principle: New Architectures, Functions, and Applications

The goal of the Collaborative Research Center is to explore the fundamental understanding of multiple interactions between large molecules and living cells or viruses. The development of new multivalent molecules is of great importance, for instance, for the inhibition of inflammation and the prevention of viral infections, and for the production of functional molecular architectures, for example, on surfaces. Chemists, biologists, medical researchers, and mathematicians from Freie Universität and Humboldt-Universität along with their joint medical school Charité – University Medicine Berlin, Technische Universität Berlin, the Zuse Institute Berlin, the Leibniz Institute for Molecular Pharmacology, and the Max Planck Institute of Colloids and Interfaces are cooperating in this CRC.

www.sfb765.de

Freie Universität Berlin
www.fu-berlin.de/en
www.international.fu-berlin.de

Research at Freie Universität Berlin
www.fu-berlin.de/en/forschung

Freie Universität Berlin in the German Excellence Initiative
www.fu-berlin.de/en/inu

Focus Areas of Freie Universität Berlin
www.fu-berlin.de/en/inu/research/focus-areas

Collaborative Research Centers
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