Complex world, simple rules:

The School of Systems Science at Beijing Normal University


Muduo (traditional bell) at BNU

Founded in 1902, Beijing Normal University (BNU) is one of the top 10 universities in China, offering a strong emphasis on the humanities and sciences. The history of systems science studies at BNU began in 1979 with the establishment of the Institute of Nonequilibrium Systems. In 1985, the field of systems theory was founded, sparking a concerted effort by BNU to develop and grow systems science at the university. In the intervening three decades, BNU's systems science program has garnered support from many famous scholars—including world-renowned engineer Hsue-Shen Tsien and Nobel Prize-winning physical chemist Ilya Prigogine—and has grown into an internationally competitive program, providing students with a strong foundation in a broad range of systems-related disciplines.

The School of Systems Science

The School of Systems Science (SSS) was established in 2013, with the aim of creating a globally recognized institution for scientific research and training. The school strives to be a pioneer in building a solid base for systems science in China, while also offering a platform for interdisciplinary research and scientific innovation at BNU.

SSS is committed to discovering the "simple rules" that guide our exploration of this complex world, to expanding the frontiers of systems science research, to cultivating exceptional students and researchers, and to transforming academic progress in systems science into forces for social and economic change, all with the goal of deepening our understanding of nature and society.

"Systems science focuses on tackling the basic scientific problems underlying the nature and evolution of complex systems."

Clockwise, from left: BNU's Jingshi Academic Hall, gate of the Zhuhai campus, and SSS logo and motto.

A broad research base

As a discipline, systems science focuses on tackling the basic scientific problems underlying the nature and evolution of complex systems. As the discipline has developed and matured over the past 30 years, researchers at BNU have attempted to reveal the general rules of complex systems through the study of their evolution. Areas of study include the emergent behavior of complex systems and the intelligent control of the nature and function of these systems. The direction and level of scientific research at SSS is on par with international systems science research and follows similar trends.

The work done at SSS spans an impressively broad range of topics, comprising six primary subfields: 1) fundamental theories of complex systems, 2) social and economic systems, 3) biological ecosystems and the self-organizing behavior of the brain and cognition, 4) multiagent systems and evolutionary algorithms, 5) information technology for artificial intelligence systems, and 6) the science of science. Research coming out of SSS has gained worldwide attention. Its groundbreaking work has aroused widespread interest both in the scientific community and in the public sphere in areas such as network reconstruction and control, the network structure of Chinese characters and related learning systems, the spiking neural network model for understanding working memory, and a parameter-free model for human mobility. It should be noted that SSS is open to the pursuit of other fields of interdisciplinary research in the natural and social sciences beyond the six listed above.

With its drive to enhance our understanding of the richness and complexity of the world around us, SSS aims to train exceptional scientists with a solid academic foundation and strong interdisciplinary skills in systems science. These graduates will become proactive leaders with a strong sense of social responsibility and a comprehensive global vision. The school warmly welcomes applications and cooperation from top researchers from around the world.

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Systems Science at Beijing Normal University (BNU)

——Striving for Excellence

Systems science, as a new scientific field, is a featured top-ranking discipline of Beijing Normal University (BNU), geared to the needs of contemporary scientific progress and social development. In order to achieve the goal of the First-class Discipline Plan, BNU has decided to center around developing the fundamental theories of systems science through interdisciplinary collaboration with other disciplines, such as brain and cognitive neuroscience, global change and earth system science, and social governance, thereby deepening our knowledge of all fields concerned and discovering the underlying laws of complex systems.

The History and Achievements of Systems Science at BNU

Since the early 1980s, there have been four BNU scholars who went to the Free University of Brussels and earned their Ph.D. degrees from Professor Ilya Prigogine, the 1977 Nobel laureate in chemistry and founder of the "Brussels school". Back in China, they introduced self-organization theory into Chinese academia. With the full support of Professor Qian Xuesen(Hsue-shen Tsien), BNU founded the undergraduate program of systems theory in 1985 and initiated the construction of systems science discipline.

In the course of more than 30 years of discipline construction, BNU, by virtue of its unique academic heritage and innovation, has greatly advanced the construction of China's systems science discipline. Having inherited the academic advantages of the "Brussels School", BNU is committed to developing the general concepts and universal methods in complex systems and helps set the direction for the research of the basic theories in complex systems in China. BNU has built the world's first complete framework of systems science talent development and formed a prominent multidisciplinary collaborative research platform, with a great reputation at home and abroad. Its research findings are highly valued by the international academic community, reported and reviewed by such international media as Nature, Science, Science Today, MIT Technology Review, and BBC.

Opportunities and Challenges in Systems Science

The 21st century is a century of complexity. The development of science and technology has ushered us into the era of researching and regulating complexity. The importance of systems science in the future academic framework has gained the consensus of the international academic community. In the National Plan for the Development of Science and Technology, the Chinese government has made it a point to "the giant open system and complex systems" as a frontier research topic. "Complex systems, disaster formation and predictive control" are listed as basic research areas as required by the national strategies. Driven by the development of information technology, the core issues that arise in many disciplines, such as social economy, biological ecology, resources, environment, and education, tend to be systematic and complex. Social and economic development also brings about overall and complex problems. To solve these problems, systems science is urgently needed.

Contents and Objectives of Systems Science Discipline Construction at BNU

As the core discipline of the First-Class Discipline Plan, systems science is expected to spearhead the improvement of BNU's discipline construction, meet the demands of the new era for the development of science and technology, and achieve the goal of the national development strategy.

i. Cultivate high-quality compound talents who understand the basic concepts and master the analytical methods in systems science, so that BNU will become a crucial base for talent training of all levels in systems science.

ii. Strengthen the research on the basic theories of systems science, discover the universal laws underlying complex adaptive systems, and improve the concepts, theories and methods of systems science. To meet the needs of major national strategies, BNU will conduct interdisciplinary research to solve key issues in science, technology and the national economy. Breakthroughs are expected to be made in the areas of group decision making, brain and cognitive neuroscience, global change, and social governance.

iii. Create a social service platform of systems science, establish a national-level consulting service center based on big data analysis, develop a social service training framework of systems science, disseminate the idea of systems science, and demonstrate the discernible value of systems science.

iv. Build a platform for international exchange and cooperation in systems science, expand the international academic influence of systems science as a discipline, establish the "BNU International Science Center for Mathematics and Complex Systems" and become an important international base for talent training and scientific research in systems science.

Building a first-class team on systems science research is not only one of the goals of discipline construction, but also the basis for achieving its many other goals. BNU will attach equal importance to cultivating the most promising talents and hiring the most qualified experts. We cordially welcome job applicants and visiting scholars with expertise in systems science and related areas.

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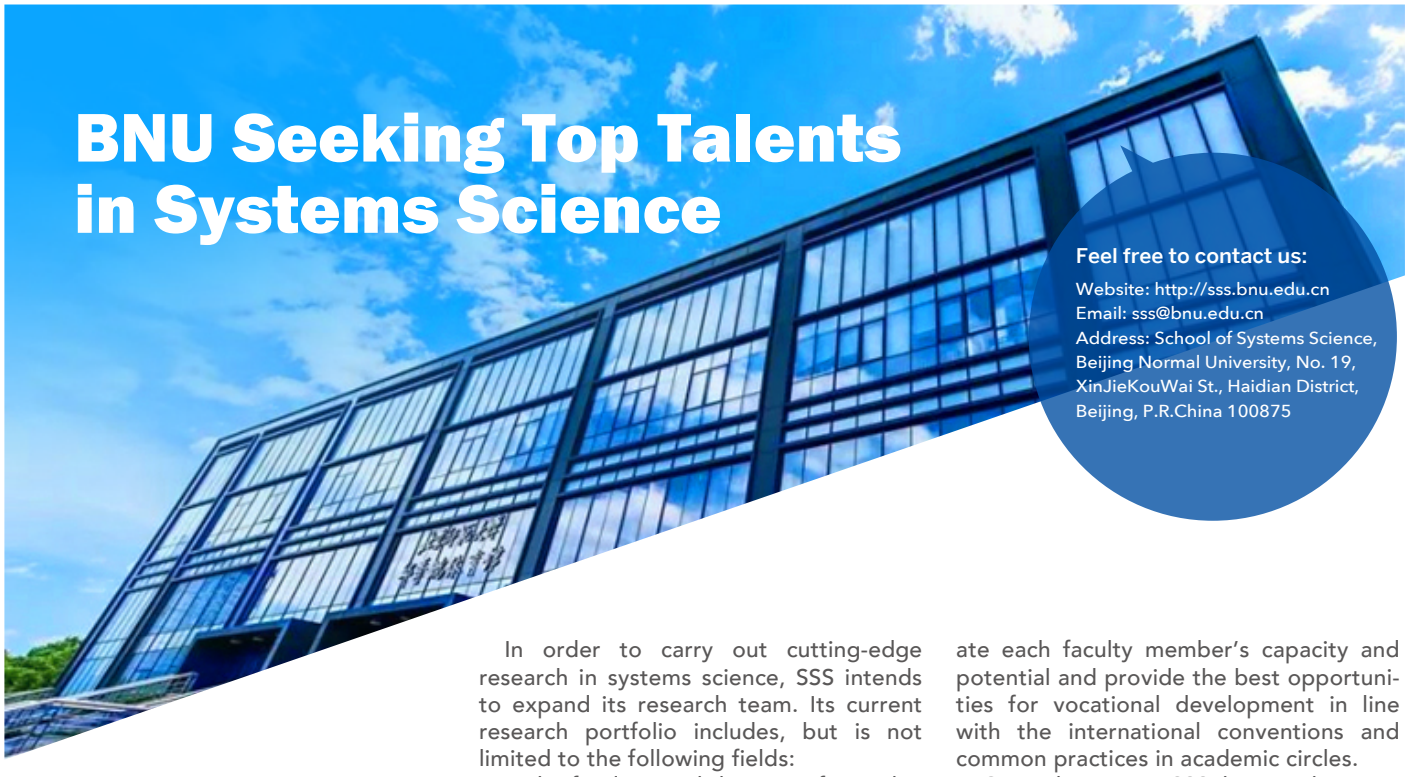
BNU Seeking Top Talents in Systems Science



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Beijing Normal University (BNU), as a venerable and dynamic institution, has a long-held tradition of partnering with leading academic institutions from around the world. Noted for its culturally rich and diverse environment, BNU endeavors to become a leader of higher education in China, Asia and even the world.

The School of Systems Science (SSS) at BNU advocates interdisciplinary research in systems science through collaboration with other disciplines in natural, social, technical and economic sciences inside and outside BNU. Having such a uniquely collaborative environment together with outstanding research facilities, SSS aspires to excel internationally in the field of Systems Science.

In 2018, SSS will establish an International Science Center for Complex Systems on the Zhuhai campus of BNU in southern China. This center aims at the frontiers of scientific research and technical innovation, specifically in the formation mechanism of human decision making behavior and its neural mechanism, together with data analysis of human behavior and artificial intelligence (including swarm intelligence). By mobilizing its top experts to lead key research projects in cooperation with talents around the world, this science center is expected to become an international platform for systems science development as well as an interface between academia, industry and governmental authorities.

In order to carry out cutting-edge research in systems science, SSS intends to expand its research team. Its current research portfolio includes, but is not limited to the following fields:

i. The fundamental theories of complex system.

ii. Social and economic system.

iii. The life ecosystem and the self-organizing behavior of brain and cognition.

iv. Multi-agent system and evolutionary algorithm.

v. Information technology of artificial intelligence systems.

vi. The science of science.

I Think the Next Century Will Be the Century of Complexity.

––Stephen Hawking, 2000.

SSS sincerely welcomes famous scholars, academic leaders, promising young scholars and postdocs in interdisciplinary areas of systems science. The applicant is expected to have a doctoral degree in relevant orientation, a solid research foundation and outstanding research findings in the above-mentioned fields, with great potential for being an excellent teacher and tutor, at the same time an excellent team player in interdisciplinary collaboration.

BNU will place each successful applicant in a proper position according to his/her academic background, research interests and teaching plan, and provide him/her with competitive salary, sufficient start-up fund, necessary laboratory and office space, and other reasonable supports. During the employment, BNU will evaluate each faculty member's capacity and potential and provide the best opportunities for vocational development in line with the international conventions and common practices in academic circles.

Over the years, SSS has made great contributions to the sustainable development of systems science in and outside China. Faced with the complex social and technological challenges, SSS will resume its effort to solve scientific problems in nature and society. By integrating many different yet relevant disciplines and building the international advanced research center of complex systems, SSS strives to cultivate high-level interdisciplinary talents so as to generate new knowledge, new minds, and new technologies that will promote the creation of a shared future for mankind. In time, SSS will become a crucial education and innovation incubator for big data, artificial intelligence, future brain and intellectual education.

SSS cordially welcomes job applicants and visiting scholars with expertise in systems science and related areas. The school also welcomes research and education collaboration from China and the rest of world.