FRIS strives to create knowledge and value that help make our world a better place. To accomplish this mission, we pioneer and pursue interdisciplinary research, and support young researchers through collaboration with the university's graduate schools, institutes, and the Division for Interdisciplinary Advanced Research and Education.

One pillar of FRIS's activities is fostering young researchers recruited through open invitation. We comprehensively evaluate the candidates on the basis of their achievements, interdisciplinary approaches, and potential. Those selected are expected to develop new possibilities by interacting with researchers in other fields, and the professors who mentor them are asked to take a multifaceted view of their research.

Another pillar is providing opportunities for interaction among researchers in various departments of Tohoku University, as a way of planting the seeds of interdisciplinary research driven by creative ideas.

What is interdisciplinary research?

Research transcending the boundaries of established disciplines

Inter means "between, among" and disciplinary refers to familiar, established disciplines such as engineering, medicine, and sciences. Thus, interdisciplinary research is a pursuit of knowledge that bridges different academic fields. A good example is biomedical engineering, which transcends the boundary between medical science and engineering. Such mergers may create new disciplines in their own right, as seen in biochemistry, the fusion of biology and chemistry.

Why is interdisciplinary research required?

To deal with the growing number of challenges that cannot be solved with a single approach

Many of the challenges that need to be addressed are too complex to be tackled by one discipline alone. International concerns such as the environment and food security, the post-Fukushima issues precipitated by the Great East Japan Earthquake, and other such challenges require the combined input of diverse fields related to the human body, organisms, disaster mitigation, resource management, and other facets of life. As the number of these problems grows, the interdisciplinary approach will become even more indispensable to the search for solutions.

How is interdisciplinary research pursued?

It is driven by the diverse perspectives and creative thinking that come from interactions among researchers from different fields.

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Pioneering the future, the interdisciplinary way

Prof. Masaaki Sato, Director
The Advanced Interdisciplinary Research Division (Fris) facilitates faculty members leveraging their own perspective to promote high-level interdisciplinary research in six research domains. Fris faculty members actively utilize not only their own research resources but also various interdisciplinary support programs to build research organizations with researchers at and outside the institute in order to cultivate new academic fields. Fris further promotes cutting-edge interdisciplinary research and contributes to environments that enable faculty in different fields to exchange ideas and information.

3 pillars of interdisciplinary research

- Exploring and supporting new and original interdisciplinary research at Tohoku University.
- Exploring young researchers to achieve these goals, we established Fris as an organization dedicated to developing and running various programs to support interdisciplinary research and education. Three organizational pillars are being constructed and implemented to realize the vision and goals of Fris.

6 research domains

Fris has established six interdisciplinary research domains that have received approval from Tohoku University's advanced interdisciplinary research institute. These domains have a wide range of research fields, which are further divided into 27 research areas. Each domain focuses on specific research themes and conducts research that involves collaboration across disciplines, promoting cutting-edge interdisciplinary research.

1. Life & Environments
2. Materials & Energy
3. Integrated Advanced Science
4. Devices & Technology
5. Life & Environments
6. Nanotechnology & Society

Promoting cutting-edge interdisciplinary research

The aim of promoting cutting-edge interdisciplinary research is to encourage mutual understanding and cooperation among the faculty members, (2) exploring and advancing interdisciplinary research by full-time faculty members, (3) conducting seminars and colloquia for interdisciplinary research.

Fris has established six interdisciplinary research domains. Fris comprises the Managing and Planning Section, the Advanced Basic Science / Interdisciplinary Research Division, and the Creative Interdisciplinary Frontier Research Division. Our activities are founded on three pillars: (1) Exploring and supporting new and original interdisciplinary research at Tohoku University, and (3) Exploring young researchers. To achieve these goals, we established Fris as an organization dedicated to developing and running various programs to support interdisciplinary research and education. Three organizational pillars are being constructed and implemented to realize the vision and goals of Fris.

Life & Environments

The vertebrate nervous system is predominantly composed of neurons and glial cells. During development, neural axons and dendrites extend and choose stereotyped pathways and establish synaptic connections with their targets. We are interested in how neural circuits develop and function in the mammalian brain.

Materials & Energy

Lithium Batteries and Fuel Cells

Electrochemical energy conversion systems is a clean technology for reducing environmental impact. In this domain, we focus on the development of advanced technologies for lithium-ion batteries and fuel cells. Our research includes the development of materials and electrolytes for high-performance batteries, and the development of systems for fuel cell applications.

Advanced Basic Science

Interdisciplinary Frontier Research

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Part of our core mission is to identify seeds of interdisciplinary research not only within FRIS but across Tohoku University, and provide support for their exploration through diverse programs. The achievements of these programs over the past 35 years attest to our leading role in taking on the research challenges that form today’s key areas of academic inquiry.

Exploring Intrauniversity Interdisciplinary Research

How interdisciplinary research evolves

Part of our core mission is to identify seeds of interdisciplinary research not only within FRIS but across Tohoku University, and provide support for their exploration through diverse programs. The achievements of these programs over the past 35 years attest to our leading role in taking on the research challenges that form today’s key areas of academic inquiry.

Support Program for Interdisciplinary Research

This program supports teams of full-time professors at Tohoku University and their research groups to undertake interdisciplinary projects. Researchers can apply directly, or they can propose projects to encourage collaboration with researchers outside Tohoku University. Each project must be an interdisciplinary collaborative project led by a full-time associate or assistant professor of Tohoku University, and bring together researchers from three or more departments.

Program for Creating Interdisciplinary Research

This program supports teams of associate or assistant professor of Tohoku University and their research groups to undertake interdisciplinary projects. Researchers can apply directly, or they can propose projects to encourage collaboration with researchers outside Tohoku University. Each project must be an interdisciplinary collaborative project led by a full-time faculty member of Tohoku University, and bring together researchers from three or more departments.

Program for International Collaborative Research

This program supports projects that involve international collaboration, including projects involving researchers from other universities, research institutions, and industries. Researchers can apply directly, or they can propose projects to encourage collaboration with researchers outside Tohoku University. Each project must involve researchers from at least two institutions.

Program for Key Interdisciplinary Research

FRIS centers this program to support interdisciplinary research that helps Tohoku University to remain a world-class university and to select one or two international centers of excellence in advanced interdisciplinary research that open up new fronts of discovery through active exchange, discussion, and cooperation with the FRIS faculty and other researchers.

Fostering Young Researchers

Support Program for Overseas Collaboration and Publication

The purpose of this program is to train internationally active young researchers and form networks for international interdisciplinary research. We support the long-term expenses of young researchers who engage in collaborative research or overseas research activities, and to foster and engage young researchers for presentations at academic conferences outside Japan.

Shoshi Program

It is difficult for young researchers to develop their skills and secure a foothold in fields of interdisciplinary research where competitive funding is scarce and the potential for achievement is high. The program seeks to uncover and foster young researchers interested in interdisciplinary research, and covers their research expenses.

FRIS selects and supports young researchers who pursue interdisciplinary exploratory research from fresh perspectives through international open competition. Selected candidates are assigned to FRIS as associate or assistant professors of the Creative Interdisciplinary Research Division, and collaborate with members of the university’s graduate schools, institutes, and Division for Interdisciplinary Advanced Research and Education. By supporting promising, outstanding young researchers, FRIS aims to create new academic fields and nurture top-level researchers active on the global stage.

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Information & Systems

- Naoya Onizawa
  Integrated circuits, Computer hardware, Dependable systems

- Daisuke Suzuki
  Integrated circuits, Hardware, Reconfigurable systems

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Humans & Society

- Akira Tsuchiya
  Social psychology and education

Advanced Basic Science

- Yasutomi Ando
  Physics, Condensed matter, Quantum information

- Takanori Inoue
  Social physics, Social justice

- Motoko Kago
  Physics, Condensed matter, Quantum information

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