

The Institute of Statistical Mathematics

ACTIVITY REPORT

2021.4 – 2023.3

Tokyo, Japan

The Institute of Statistical Mathematics

Activity Report
2021.4 — 2023.3



Tokyo, Japan

October 2023

Center for Engineering and Technical Support

The Institute of Statistical Mathematics

Research Organization of Information and Systems

Inter-University Research Institute Corporation

Contents

Foreword	v
1. Organization	1
2. Departments, Centers and Research Staff	5
3. Research Collaboration	31
4. International Research Exchange	35
Foreign Visitors	39
Colloquia by Foreign Visitors	41
5. Publications	43
Periodicals	43
Technical Reports	44
6. Published Papers and Books	47
7. Tutorial Programs and Consultation	99
8. Software Products	103
Supplement	107
Introduction to the Statistical Science Program ,	
Graduate Institute for Advanced Studies, SOKENDAI	

Foreword

The Institute of Statistical Mathematics (ISM) was established in June 1944, as a research institute directly control of the Ministry of Education. In April 2004, it became a part of the Research Organization of Information and Systems (ROIS). The structure of ISM has changed in response to the needs and circumstances of the society.

Statistical and mathematical sciences do not exist in a vacuum. Since its establishment, the legacy of ISM has been built upon the belief that mathematical analysis of reality and facts paves the way to discovering the truth, which has been the core policy of our research and educational activities.

The Fourth Medium-Term Goals and Plans of National University Corporations and Inter-University Research Institute Corporations began in April 2022.

As a core research institute of statistical and mathematical sciences based on large-scale and complex data, ISM's primary mission is to continuously create world-class level basic research of statistical and mathematical sciences.

On the other hand, as the sole center in Japan for research of statistical and mathematical sciences, we have a responsibility to support requests for joint research with various academic fields, where statistical and mathematical sciences must be applied, to address social problems that must be solved through industry-government-academia collaboration, and to foster experts in statistical and mathematical sciences, where Japan is lagging behind. With limited resources, we will design international joint research activities and promote Network Of Excellence (NOE) Project to expand joint research in priority areas in a top-down manner.

As NOE activities, the following three are considered particularly important: (i) international collaborations led by Research Center for Statistical Machine Learning, (ii) "Creation of data infrastructure for data-driven polymer materials research" project approved under the Program for Promoting Research on the Supercomputer Fugaku, and (iii) "New develop-

ments in space-time earthquake forecasting and monitoring: from long-term to real-time” project, approved under the Seismology TowArd Research innovation with data of Earthquake (STAR-E) Project. The second and third activities are represented by Data Science Center for Creative Design and Manufacturing and Risk Analysis Research Center, respectively.

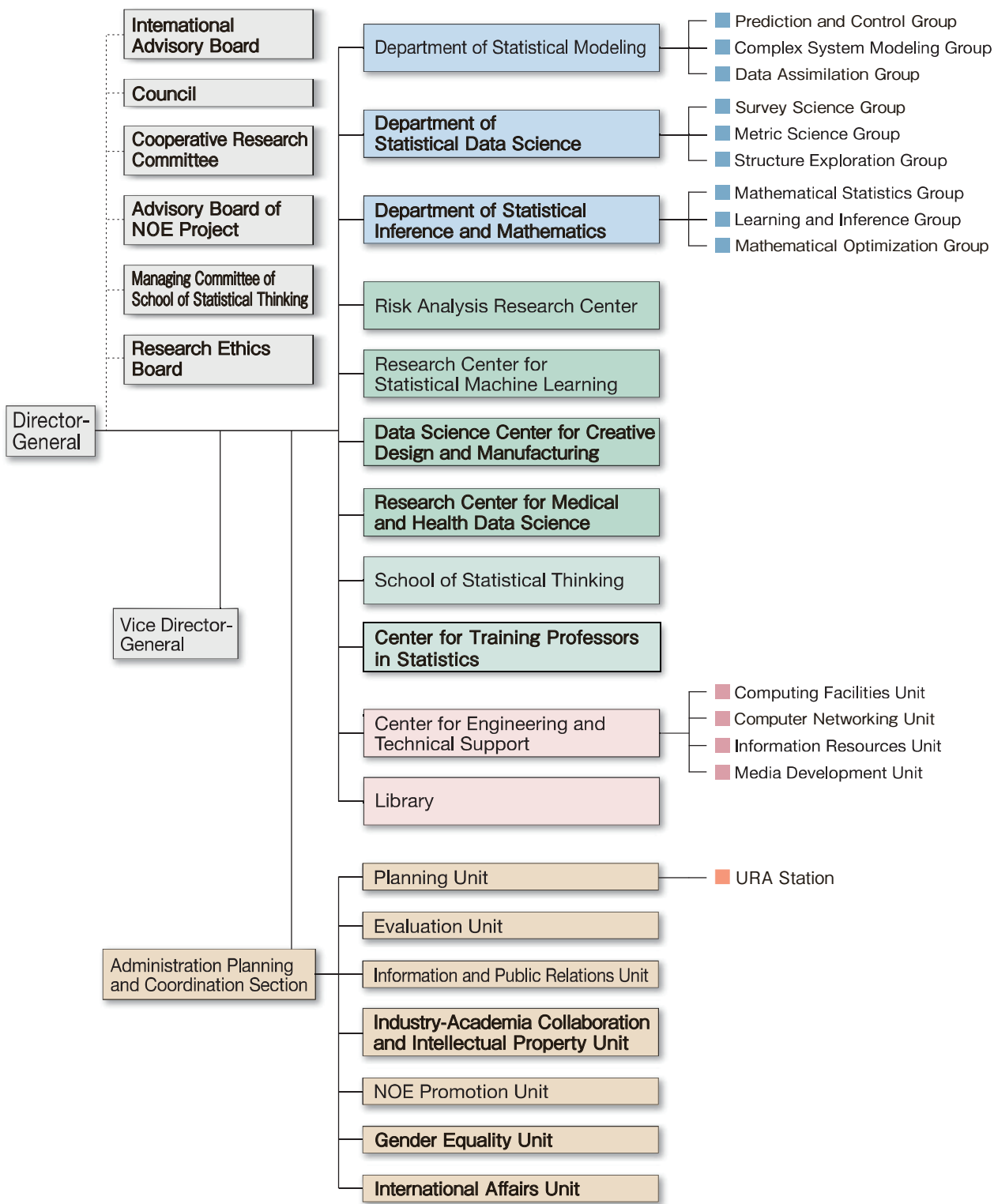
In addition to the various activities of Project for Fostering and Promoting Statistical Thinking at School of Statistical Thinking, we are accelerating the development of graduate level statistical professors and statistical education systems with 29 participating institutions from various academic fields through the “Project for Training Experts in Statistical Sciences” at Center for Training Professors in Statistics.

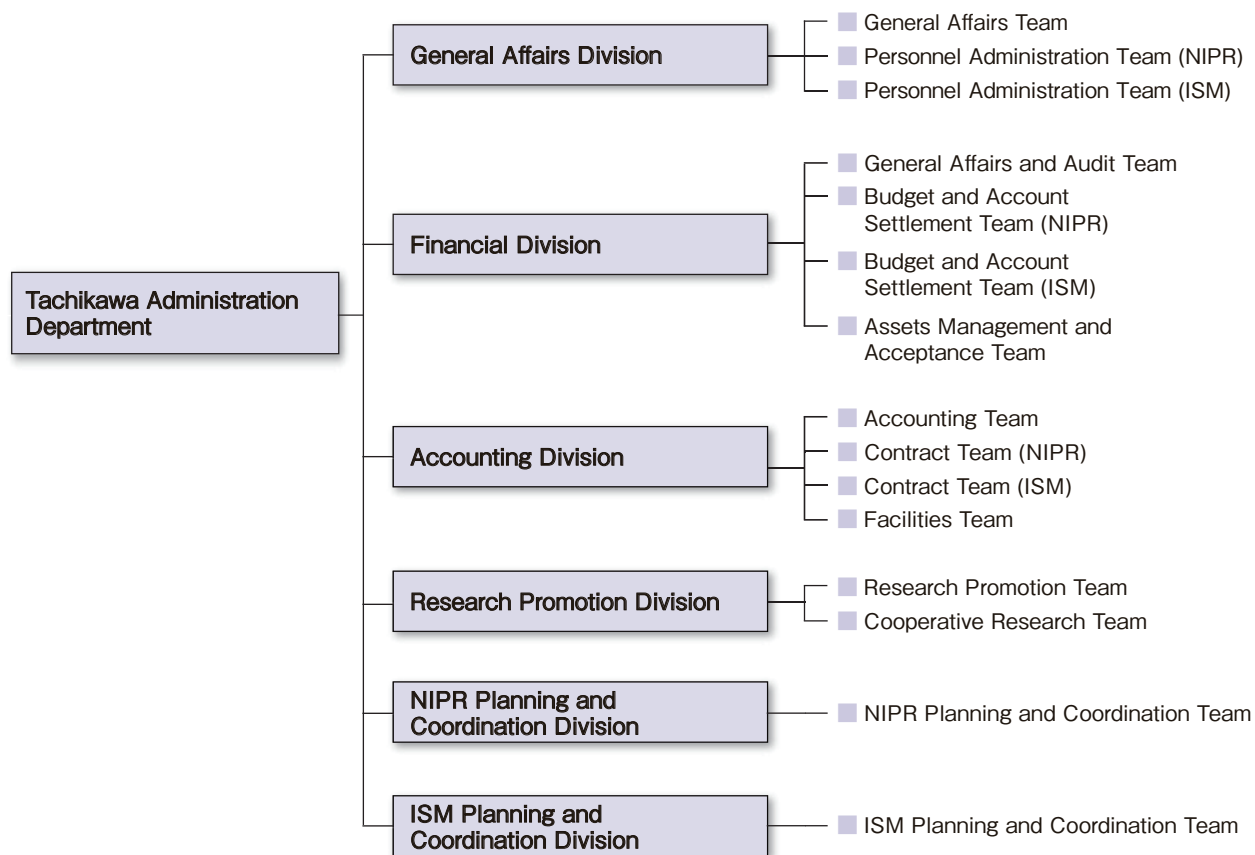
We look forward to your continued understanding and support of our research and educational activities.

Hiroe Tsubaki
Director-General

October 2023

Organization Diagram (As of April 1, 2023)





Organization

Since its foundation as the one and only national institute for statistical science in Japan, the Institute of Statistical Mathematics (ISM) has continued to exert a prominent influence on the study and research of statistical science. The ever-increasing needs for statistical methods and ideas in various fields of science and technology led ISM to reorganize itself in 1985 as an inter-university research institute that puts a major emphasis on research collaboration with all science disciplines.

In April 2004, ISM began a new chapter as a member of the Research Organization of Information and Systems (ROIS), Inter-University Research Institute Corporation, which includes three other institutes: the National Institute of Polar Research (NIPR), National Institute of Informatics (NII), and National Institute of Genetics (NIG). In October 2009, ISM moved to Tachikawa and started its activities. It shares the new building with NIPR and the National Institute of Japanese Literature (NIJL).

At present, ISM consists of three departments, five centers for research and education, a school, a support center, a planning section, a council, and committees. All ISM activities are guided by the leadership of the director-general and three vice Director-Generals. The Council of ISM implements any necessary recommendations. The Cooperative Research Committee organizes and facilitates collaborative research projects developed between staff at ISM and collaborators in other academic agencies. The Managing Committee of the School of Statistical Thinking, established in 2016, makes suggestions regarding projects of fostering statistical thinking.

Three research departments, the Department of Statistical Modeling, the Department of Statistical Data Science, and the Department of Statistical Inference and Mathematics, form the active core of ISM with its 49

academic staff and carry out research on either statistical theory or its application to other fields of science and industry. The Department of Statistical Modeling and its three groups study statistical modeling aspects in various fields. In the three groups of the Department of Statistical Data Science, efforts are concentrated on data collection and handling. The three groups of the Department of Statistical Inference and Mathematics are specifically concerned with the fundamental aspects of statistics.

The four strategic research centers—Risk Analysis Research Center, Research Center for Statistical Machine Learning, Data Science Center for Creative Design and Manufacturing, and Research Center for Medical and Health Data Science—were established in 2005, 2012, 2017, and 2018, respectively, as main bodies for establishing the Network of Excellence (NOE) and performing project research on specific topics. Risk Analysis Research Center is pursuing a scientific approach to managing uncertainties and risks in society, such as seismology, finance, resources, environmental studies, database development, risk mathematics, and spatiotemporal modeling. Research Center for Statistical Machine Learning aims to support the research community of the field as an activity of the NOE projects and produce influential research works by carrying out various research projects with domestic and international collaborations. Data Science Center for Creative Design and Manufacturing aims to motivate advanced technologies in the field of data science and foster scientific methodologies for creative design and manufacturing. Research Center for Medical and Health Data Science aims to facilitate statistical data science research that covers medical studies, drug developments, health care, and public health. More detailed descriptions of the objectives of each department and center are presented in the next chapter.

School of Statistical Thinking, established in 2012, performs the project of fostering and promoting statistical thinking. As data produced in various fields of the real world become very large and complex, people who can discover important knowledge buried in such data are strongly required. ISM



has provided several tutorial courses and supports to disseminate statistical thinking for a long time. The school integrates and expands such activities and provides a place to learn statistical thinking. In 2017 the school launched the Leading DAT program, and in 2020 online courses.

Center for Training Professors in Statistics was established in 2022. The center established a nationwide consortium of universities and promotes the Project for Training Experts in Statistical Sciences to address the critical shortage of professors in statistics, which form the core of data science. Over the next 5 years, the Center will develop at least 30 university professors in statistics, who will train statistics experts at member universities of the consortium. The Center aims to establish a positive cycle of professional development.

Center for Engineering and Technical Support was established in 2006 to help the activities of the Japanese statistical science community by providing adequate computational and informational resources. The center has 10 technical staff that works on special jobs, including computer systems maintenance, journal editing, and bibliographical services. ISM has a supercomputer system and a library of books and journals, not only in pure statistics but also in fields of specific interest to researchers (e.g., physics, genetics, and social sciences).

ISM also devotes itself to educating young statisticians. As a constituent of the Graduate University for Advanced Studies, SOKENDAI, ISM offers graduate programs leading to a Ph.D. degree in the Statistical Science Program (See Supplement on page 107).

(The number of staff mentioned above refers to the full strength on April 1, 2023.)

Departments, Centers and Research Staff

Department of Statistical Modeling

The Department of Statistical Modeling works on the modeling of phenomenal structures related to numerous factors, and it conducts research on model-based statistical inference methodologies. The department aims to contribute to the development of cross-field modeling intelligence via investigation of the modeling methods for prediction&control, complex structures, and data assimilation.

■ Prediction and Control Group

The Prediction and Control Group works on the development and evaluation of statistical models, which function effectively in terms of predicting and controlling phenomena, decision making, and scientific discoveries. These efforts involve data analysis and modeling related to phenomena that vary across time and space.

— Staff —

Yoshinori KAWASAKI, Prof. (Vice Director-General)

Atsushi YOSHIMOTO, Prof.

Jianchang ZHUANG, Assoc. Prof.

Yumi TAKIZAWA, Assoc. Prof.

Fumikazu MIWAKEICHI, Assoc. Prof.

— Subjects —

- Time series modeling with smoothed prior distribution
- Research on control of multi-agent system
- Discrete optimization model development for ecosystem service evaluation
- Statistical seismology

- Network structure estimation by causal analysis
- Information extraction and prediction from high frequency observation time series
- Development of an eco-adaptive decision support system for resource management
- Biosignal spatiotemporal analysis

■ Complex System Modeling Group

The Complex System Modeling Group conducts studies in order to discover the structures of complex systems, such as nonlinear systems and hierarchical networks, through statistical modeling. For these purpose, the group also considers Monte Carlo simulations, discrete mathematics, and computer science.

— *Staff* —

Tomoko MATSUI, Director, Prof.

Yukito IBA, Prof.

Hideitsu HINO, Prof.

Shinsuke KOYAMA, Assoc. Prof.

Kengo KAMATANI, Assoc. Prof.

Konstantin MARKOV, Visiting Prof. (2022.6.1 -)

— *Subjects* —

- Bayesian modeling and MCMC data analysis
- Modeling and statistical analysis of complex systems using stochastic processes and random fields
- Development of active learning and statistical anomaly detection methods and its application to natural science and industry
- Statistical security analysis of anonymous data
- Development of applications with MCMC and sequential Monte Carlo methods
- Geometric analysis of machine learning and statistical algorithms
- Structural modeling of biological phenomena using graphs
- Research on discrete geometry and its application to extract graph structure from distance data
- Urban intelligence
- Statistical analysis of speech and image data

■ Data Assimilation Group

The Data Assimilation Group works on the development of data assimilation techniques, which are procedures aimed at combining information derived from large amounts of observations and a numerical simulation model. By developing computational algorithms and high-performance parallel computing systems, the group aims to build a next-generation simulation model that can predict the future in real time.

— *Staff* —

Genta UENO, Prof.

Shigeru FUJITA, Project Prof.

Masako KAMIYAMA, Visiting Prof.

Toshikazu KITANO, Visiting Prof.

Tadahiko SATO, Visiting Prof.

Kazuyuki NAKAMURA, Visiting Prof.

Tomoyuki HIGUCHI, Visiting Prof.

Shinya NAKANO, Assoc. Prof.

Hiroshi KATO, Visiting Assoc. Prof.

Masaya SAITO, Visiting Assoc. Prof.

Hiromichi NAGAO, Visiting Assoc. Prof.

Shunichi NOMURA, Visiting Assist. Prof.

Yosuke FUJII, Visiting Assoc. Prof.

Takashi YAMAMOTO, Visiting Assoc. Prof. (2022.4.1-)

— *Subjects* —

- Model integration by particle filtering
- Development of data assimilation system in geosciences
- Development and application of data assimilation based on high-dimensional system models
- Data analysis based on state-space models
- Statistical analysis of ensemble data
- Modeling of non-Gaussian distributions

Department of Statistical Data Science

The Department of Statistical Data Science conducts research on data design methods aimed at managing uncertainty and incompleteness of information, quantitative methods for evidence-based practice, and related data analysis methods. Moreover, the department investigates methods for inferring the latent structures in target phenomena from observation data.

■ Survey Science Group

The Survey Science Group promotes research on the design of statistical surveys, development of statistical analysis methods on survey data, privacy protection in official statistics, and their applications. By exploring complex phenomena in various fields, the group also aims to contribute to practical applications in academia and policy-making through social surveys.

— Staff —

Kazuhiro MINAMI, Director (2022.4.1-), Prof.

Takatoshi IMADA, Visiting Prof.

Toru KIKKAWA, Visiting Prof.

Yoshimichi SATO, Visiting Prof.

Masahiro MIZUTA, Visiting Prof. (-2022.3.31)

Wataru MATSUMOTO, Visiting Prof.

Kazufumi MANABE, Visiting Prof.

Tadahiko MAEDA, Assoc. Prof.

Yoo Sung PARK, Assoc. Prof.

Naoko KATO, Project Assoc. Prof.

Koken OZAKI, Visiting Assoc. Prof.

Taisuke FUJITA, Visiting Assoc. Prof.

Yusuke INAGAKI, Visiting Assoc. Prof. (2021.6.1-2022.3.31), Project Faculty Member (2023.1.1-2023.1.31), Project Assist. Prof. (2023.2.1-)

Kiyohisa SHIBAI, Project Assist. Prof.

Anh LE DUC, Project Assist. Prof.

— Subjects —

- Social research methods and data analysis
- Data science for Behaviormetric study of civilizations
- Theory and applications of latent variable models
- Research on nonsampling errors in surveys

- Analysis of longitudinal and repeated cross-sectional surveys
- Statistical research on the Japanese national character
- Sampling theory and its applications
- Methodology of cross-national comparative survey
- Theory and applications of multilevel modeling
- Organizational behavior based on multilevel analysis
- Theory of small area estimation and its applications

■ Metric Science Group

The Metric Science Group conducts research aimed at identifying and evaluating statistical evidence through the quantification of phenomena that have not been measured thus far as well as through the efficient extraction of information from large databases. The group investigates related methods and develops methods for analyzing the collected data. By working on applied research in various fields of real science, the group aims to advance practical, applied, and statistical mathematical research based on evidence.

— *Staff* —

Satoshi YAMASHITA, Prof. (Vice Director-General)

Koji KANEFUJI, Director (-2022.3.31), Prof.

Shigeyuki MATSUI, Prof.

Ikuko FUNATOGAWA, Assoc. Prof.

Hisashi NOMA, Assoc. Prof.

Nobuo SHIMIZU, Assist. Prof.

— *Subjects* —

- Evaluation methodology for financial statistic models
- Valuation of market risk and credit risk
- Statistical analysis in clinical trials of pharmaceutical drugs
- Design and analysis of clinical studies for personalized medicine
- Methodology of clinical researches for developing predictive medicine
- Methodology of study designs and statistical methods for epidemiologic researches
- Theory of semiparametric inference and its application
- Foundation of meta-analysis and its application
- Design for long-term ecological study
- Missing data analysis

- Symbolic data analysis
- Longitudinal data analysis

■ Structure Exploration Group

The Structure Exploration Group conducts research on statistical science aimed at inferring the latent “structure” behind various target phenomena in biology, physics, and social science based on observational data. The group focuses on machine learning, Bayesian reasoning, experimental design methods, and spatial-temporal analysis methods to investigate micro/meso/macroscopic and spatial-temporal dynamic structures in target phenomena.

— Staff —

Ryo YOSHIDA, Prof.
 Jun ADACHI, Assoc. Prof.
 Kenichiro SHIMATANI, Assoc. Prof.
 Stephen WU, Assoc. Prof.
 Daisuke MURAKAMI, Assist. Prof.
 Yoshihiro HAYASHI, Assist. Prof. (2022.4.1 -)

— Subjects —

- Statistical methods to establish environment standards
- Reliability theory based on life-span models
- Environmental statistics
- Causal data analysis for advanced business modeling
- Statistical causal inference
- Graphical modeling
- Modeling of molecular evolution
- Maximum likelihood inference of molecular phylogeny
- Comparative analysis of genome structure
- Theoretical biology and bioinformatics
- Analysis of educational and psychological assessment data
- Latent variable models for social sciences
- Decoding of algebraic geometric codes
- Methodology for collecting and publishing information relating to statistical science

Department of Statistical Inference and Mathematics

The Department of Statistical Inference and Mathematics carries out research into general statistical theory, statistical learning theory, optimization, and algorithms for statistical inference.

■ Mathematical Statistics Group

The Mathematical Statistics Group is concerned with aspects of statistical inference theory, modeling of uncertain phenomena, stochastic processes and their application to inference, probability and distribution theory, and the related mathematics.

— Staff —

Satoshi KURIKI, Prof.

Yoshiyuki NINOMIYA, Prof.

Shuhei MANO, Prof.

Akimichi TAKEMURA, Visiting Prof.

Nobuaki HOSHINO, Visiting Prof. (-2022.3.31)

Shogo KATO, Assoc. Prof.

Takaaki SHIMURA, Assoc. Prof.

Keisuke YANO, Assoc. Prof.

—Subjects—

- Additive processes
- Algebraic statistics
- Analysis of multivariate data and contingency tables
- Change-point analysis
- Directional statistics
- Extreme value theory
- Heavy-tailed distributions
- Integral-geometric approach to random field theory
- Statistical inference and statistical decisions
- Multiple comparisons
- Statistical inference based on graphical models
- Stochastic modeling of data with combinatorial structures

■ Learning and Inference Group

The Learning and Inference Group develops statistical methodologies to describe the stochastic structure of data mathematically and clarify the potential and the limitations of the data theoretically.

— Staff —

Kenji FUKUMIZU, Prof.
Hironori FUJISAWA, Prof.
Daichi MOCHIIHASHI, Assoc. Prof.
Masayuki HENMI, Assoc. Prof.
Ayaka SAKATA, Assoc. Prof.
Thanh Tam LE, Assist. Prof. (2022.9.1-)

— Subjects —

- Approximate Bayesian method
- Approximation theory on graph
- Bioinformatics
- Genome statistics
- Information geometry
- Nonparametric Bayesian method
- Robust statistics
- Semiparametric inference
- Sparse modeling
- Statistical inference based on positive semidefinite kernel
- Statistical inference for observational studies
- Statistical learning theory
- Statistical methods of topological data analysis
- Statistical natural language processing
- Statistical singular model
- Stochastic inference

■ Mathematical Optimization Group

The Mathematical Optimization Group focuses on mathematical theory and practical applications of optimization and computational algorithms together with underlying numerical or functional analysis and discrete mathematics.

— Staff —

Satoshi ITO, Director, Prof.

Shiro IKEDA, Prof.

Mirai TANAKA, Assoc. Prof.

Bruno Figueira LOURENÇO, Assoc. Prof.

— *Subjects* —

- Algorithms for nonconvex optimization
- Applications of mathematical optimization
- Conic optimization
- Convex optimization in measure spaces
- Mathematics and computational complexity analysis of convex optimization
- Mathematics of clinch and elimination
- Systems design under uncertainty

Risk Analysis Research Center

The Risk Analysis Research Center is pursuing scientific approaches to address the growing uncertainty and risks in our globalized society and economy. In addition, our center is building a network for risk analysis with the goal of contributing to create a reliable and safe society.

■ Data Infrastructure for Risk Analysis

To generate data-centric risk sciences this group will construct data bases for risk analysis by collecting relevant data and their linkages. The project will further investigate the quality management of risk data and provide a secure and efficient data editing environment for researchers, which allows them to safely analyze anonymized information on individuals.

— *Staff* —

Satoshi YAMASHITA, Director, Prof. (Vice-Director General)

Kazuhiro MINAMI, Prof.

Sadaaki MIYAMOTO, Visiting Prof.

Shinsuke ITO, Visiting Prof.

Hitoshi MOTOYAMA, Visiting Prof.

Kazuyuki SUZUKI, Visiting Prof.

Katsutoshi NAGASHIMA, Visiting Prof.

Hiroaki NAGAFUJI, Visiting Prof.

Tetsuya IWASA, Visiting Prof.

Kiyomi SHIRAKAWA, Visiting Prof.

Isao TAKABE, Visiting Assoc. Prof. (-2022. 3.31), Visiting Prof. (2022.4.1-)

Takafumi KUBOTA, Visiting Assoc. Prof.

■ Mathematical Analysis of Risk

To quantify the risk factors such as natural disasters, severe diseases and accidents, we need to formalize their stochastic behaviors, and make statistical inferences based on their tail distributions. As such, we study the extreme value theory, copula model and multiple comparisons from the mathematical and computational viewpoints. To promote the activity of this research community, we organize the annual cooperative research symposiums “Extreme value theory and applications” (since 1994) “Infinitely divisible processes and related topics” (since 1992), and occasional symposiums based on the international MoU including “Risk and Statistics”.

— Staff —

Satoshi KURIKI, Prof.

Yoshiyuki NINOMIYA, Prof.

Rinya TAKAHASHI, Visiting Prof.

Yo SHEENA, Visiting Prof.

Toshinao YOSHIBA, Visiting Prof.

Hisayuki HARA, Visiting Prof.

Masao UEKI, Visiting Prof.

Hirokazu YANAGIHARA, Visiting Prof.

Hiroshi MATSUZOE, Visiting Prof. (2022.4.1-)

Shogo KATO, Vice Director, Assoc. Prof.

Masayuki HENMI, Assoc. Prof.

Takaaki SHIMURA, Assoc. Prof.

Kengo KAMATANI, Assoc. Prof.

Masayuki KUMON, Project Assoc. Prof.

Teppei OGIHARA, Visiting Assoc. Prof.

Xiaoling DOU, Visiting Assoc. Prof.

Noriyoshi SAKUMA, Visiting Assoc. Prof.

Takaaki KOIKE, Project Assist. Prof. (-2022.3.31)

■ Environmental Statistics Project

The impact of human activity on the global environment is increasing. Thus, quantitative methods to accurately take stock of the environmental situation are becoming increasingly important to implement effective measures for the next generation. In this project, we conduct research on statistical analysis methods which form the basis of environmental risk assessments for water, air, and soil, environmental monitoring, setting of environmental standards, and many other activities.

— Staff —

Koji KANEFUJI, Prof.
Tomoko MATSUI, Prof. (-2022.3.31)
Shuhei MANO, Prof.
Mihoko MINAMI, Visiting Prof.
Satoshi TAKIZAWA, Visiting Prof.
Toshihiro HORIGUCHI, Visiting Prof.
Naoki SAKAI, Visiting Prof.
Shunji HASHIMOTO, Visiting Prof.
Takashi KAMEYA, Visiting Prof.
Yoshiki YAMAGATA, Visiting Prof. (-2022.3.31)
Kenichiro SHIMATANI, Assoc. Prof.
Ikuko FUNATOGAWA, Assoc. Prof. (2022.1.1-2022.3.31)
Koyomi NAKAZAWA, Visiting Assoc. Prof. (2022.4.1-)
Daisuke MURAKAMI, Assist. Prof. (-2022.3.31)
Duc Vu TRAN, Project Assist. Prof. (2021.4.1-2022.3.31)

■ Risk Analysis for Resource Management Project

Our research focuses on mathematical modeling for prediction and control of natural and socio-economic resource change within deterministic and stochastic frameworks. Through field survey, we conduct research on sustainable renewable resource management as a socio-economic system. One of our current projects concerns risk evaluation and economic analysis of sustainable forest and ecosystem management.

— Staff —

Atsushi YOSHIMOTO, Prof.
Tetsuji TONDA, Visiting Prof.
Yumi TAKIZAWA Assoc. Prof.

Kenichi KAMO, Visiting Assoc. Prof.
Masashi KONOSHIMA, Visiting Assoc. Prof.
Keisuke FUKUI, Visiting Assoc. Prof.
Shingo OBATA, Project Assist. Prof. (-2022.9.30)

■ The Risk Evaluation, Control and Management of Finance and Insurance
The aims of this project are to develop the methodology of risk evaluation, risk control and risk management, focusing to financial market, credit risk and macro-economic data.

— Staff —

Satoshi YAMASHITA, Director, Prof. (Vice-Director General)
Yoshinori KAWASAKI, Prof. (Vice-Director General)
Naoto KUNITOMO, Visiting Prof. (-2022.3.31)
Hiroshi TSUDA, Visiting Prof.
Toshio HONDA, Visiting Prof.
Tadashi ONO, Visiting Prof.
Hideatsu TSUKAHARA, Visiting Prof.
Satoshi FUJII, Visiting Prof.
Takaaki YOSHINO, Visiting Prof.
Masakazu ANDO, Visiting Prof.
Yasutaka SHIMIZU, Visiting Prof.
Masaaki FUKASAWA, Visiting Prof.
Nakahiro YOSHIDA, Visiting Prof.
Yasushi YOSHIDA, Visiting Prof. (2022.4.1-)
Yuuki RIKIMARU, Project Assoc. Prof.
Seisho SATO, Visiting Assoc. Prof.
Yukihiko OKADA, Visiting Assoc. Prof.
Junichi TAKAHASHI, Visiting Assoc. Prof.
Yuta KOIKE, Visiting Assoc. Prof.
Hideaki NAGAHATA, Project Assist. Prof. (-2022.3.31)
Tadashi NAKANISHI, Project Assist. Prof. (2022.6.1-)

■ Statistical Seismological Research Project

The statistical seismological research group develops statistical models for quantitative analysis of earthquake occurrence and the relation between seismicity and other phenomena from geophysical or geochemical observations, techniques of probabilistic earthquake forecasting, and methods for

evaluating forecasting performance, with applications in earthquake early warning and earthquake insurance. More general types of random events in time and/or space, such as fires, crimes, etc., are also studied, especially, the construction of forecasting models based on our understanding of the mechanisms of these phenomena, as well as their statistical inferences.

— *Staff* —

Aitaro KATO, Visiting Prof. (2021.10.1-)
Jiancang ZHUANG, Assoc. Prof.
Stephen WU, Assoc. Prof.
Keisuke YANO, Assoc. Prof.
Takao KUMAZAWA, Project Assoc. Prof. (2022.4.1-)
Bogdan Dumitru ENESCU, Visiting Assoc. Prof.
Takaki IWATA, Visiting Assoc. Prof.
Kazuyoshi NANJO, Visiting Assoc. Prof.
Shunichi NOMURA, Visiting Assoc. Prof. (2021.10.1-)
Ziyao XIONG, Project Assist. Prof.

■ Spatio-Temporal Statistical Modeling and Applications Project

We conduct research on the evaluation of spatio-temporal characteristics such as spatial correlation and temporal correlation, as well as modeling, factor analysis, and uncertainty assessment, with a focus on geographical phenomena. Based on these findings, we carry out applied researches aimed at addressing a wide range of social issues, relating environment, diseases, and the economy.

— *Staff* —

Tomoko MATSUI, Prof. (2022.4.1-)
Yoshiki YAMAGATA, Visiting Prof. (2022.4.1-)
Ikuko FUNATOGAWA, Assoc. Prof. (2022.4.1-)
Daisuke MURAKAMI, Assist. Prof. (2022.4.1-)
Duc Vu TRAN, Project Assist. Prof. (2022.4.1-)

Research Center for Statistical Machine Learning

The Research Center for Statistical Machine Learning started in January 2012, aiming at taking charge of advancing the “Statistical Machine

Learning NOE”, one of the Network of Excellence Establishing Projects, and at being a central research organization in the field of statistical machine learning. The center is carrying out various research projects in the machine learning, as well as contributing the research community through organizing and supporting workshops and seminars for the developing this research field.

— *Staff* —

Kenji FUKUMIZU, Director, Prof.

Tomoko MATSUI, Vice Director, Prof.

Yoshihiko MIYASATO, Prof. (-2022.3.31) (Vice-Director General (-2022.3.31))

Yukito IBA, Prof. (2021.5.1-)

Satoshi ITO, Prof.

Shiro IKEDA, Prof.

Satoshi KURIKI, Prof.

Shuhei MANO, Prof. (2021.5.1-)

Hironori FUJISAWA, Prof.

Kazuhiro MINAMI, Prof.

Hideitsu HINO, Prof.

Arthur GRETTON, Visiting Prof.

Masataka GOTO, Visiting Prof.

Yuji SHINANO, Visiting Prof. (-2022.3.31)

Takashi TSUCHIYA, Visiting Prof. (-2022.3.31)

Katsuki FUJISAWA, Visiting Prof. (-2022.3.31)

Konstantin MARKOV, Visiting Prof. (2022.2.24-2022.3.25)

Daichi MOCHIIHASHI, Assoc. Prof.

Shinsuke KOYAMA, Assoc. Prof.

Ayaka SAKATA, Assoc. Prof.

Mirai TANAKA, Assoc. Prof.

Masaaki IMAIZUMI, Visiting Assoc. Prof.

Shuichi KAWANO, Visiting Prof.

Kei KOBAYASHI, Visiting Assoc. Prof.

Sayaka SHIOTA, Visiting Assoc. Prof.

Tsutomu TAKEUCHI, Visiting Assoc. Prof.

Eiji MOTOHASHI, Visiting Assoc. Prof. (-2022.3.31, 2022.5.1-)

Makoto YAMADA, Visiting Assoc. Prof.

João Pedro PEDROSO, Visiting Assoc. Prof. (2022.8.1-2023.3.28)

Daisuke MURAKAMI, Assist. Prof.

Kohei HATTORI, Assist. Prof. (2022.4.1-)
Masato SHIRASAKI, Assoc. Prof. (2022.4.1-)
Akifumi OKUNO, Assist. Prof. (2022.12.1-)
Thanh Tam LE, Assist. Prof. (2023.3.1-)
Sho SAITO, Project Assist. Prof. (-2022. 3.31)
Yoh-ichi MOTOTAKE, Project Assist. Prof. (-2022.12.31)
Toshimitsu ARITAKE, Project Assist. Prof.
Kotaro SAKAMOTO, Project Assist. Prof.
Hideto NAKASHIMA, Project Assist. Prof.

Data Science Center for Creative Design and Manufacturing

The Data Science Center for Creative Design and Manufacturing was established in July 2017, aiming at facilitating strategic applications of data science technologies and the creation of ground-breaking methods for manufacturing. The center has put together diverse technologies of data science, including machine learning, Bayesian modeling and inference, and materials informatics. We will demonstrate the next generation of manufacturing technologies through industry-academia collaboration.

— Staff —

Ryo YOSHIDA, Director, Prof.
Hironori FUJISAWA, Vice Director, Prof.
Kenji FUKUMIZU, Prof.
Hideitsu HINO, Prof.
Junichiro SHIOMI, Visiting Prof.
Junko MORIKAWA, Visiting Prof.
Shinya NAKANO, Assoc. Prof.
Daichi MOCHIIHASHI, Assoc. Prof. (-2021.4.30)
Stephen WU, Assoc. Prof.
Masaaki TAKADA, Visiting Assoc. Prof.
Yoshihiro HAYASHI, Project Assist. Prof. (-2022.3.31), Assist. Prof. (2022.6.1-)
Chang LIU, Project Assist. Prof.
Yuta AOKI, Project Assist. Prof.

Research Center for Medical and Health Data Science

Research Center for Medical and Health Data Science promotes statistical mathematics and data science research for medicine, drug discovery, health care, and public health in industry, academia, and government. Methodologies of basic mathematics and computer science, artificial intelligence, machine learning, and data analysis, will provide scientific foundations for various research areas in basic, clinical, and social medicine, as well as in the latest medical science fields. The goal is to create foundations for new data science to meet the diverse needs of research. We will also promote nationwide network construction and highly specialized statistical education to strengthen the medical research environment.

— Staff —

Satoshi YAMASHITA, Prof. (Vice Director-General)
Shigeyuki MATSUI, Director, Prof.
Shinto EGUCHI, Project Prof.
Manabu AKAZAWA, Visiting Prof.
Yoichi ITO, Visiting Prof.
Senichiro KIKUCHI, Visiting Prof.
Ken KIYONO, Visiting Prof.
Atsushi GOTO, Visiting Prof.
Toshiya SATO, Visiting Prof.
Kunihiko TAKAHASHI, Visiting Prof.
Masataka TAGURI, Visiting Prof.
Hisateru TACHIMORI, Visiting Prof.
Satoshi TERAMUKAI, Visiting Prof.
Nobuaki NISHIYAMA, Visiting Prof.
Satoshi HATTORI, Visiting Prof.
Michiko WATANABE, Visiting Prof.
Hisashi NOMA, Vice Director (2022.2.1-), Assoc. Prof.
Ikuko FUNATOGAWA, Vice Director (-2021.12.31), Assoc. Prof. (-2021.12.31)
Masayuki HENMI, Assoc. Prof.
Fumikazu MIWAKEICHI, Assoc. Prof.
Mayumi OKA, Project Assoc. Prof.
Ryoichi KIMURA, Visiting Assoc. Prof.
Yasunori SATO, Visiting Assoc. Prof.
Kazushi MARUO, Visiting Assoc. Prof.

Shonosuke SUGASAWA, Visiting Assoc. Prof.

Kengo NAGASHIMA, Visiting Assoc. Prof.

Chieko ISHIGURO, Visiting Assoc. Prof. (2021.7.1-)

Takeshi EMURA, Visiting Assoc. Prof. (2022.4.1-)

URA (University Research Administrator)

ISM assigned URA in the Administration Planning and Coordination Section for promoting and strengthening joint research in mathematical statistics.

— Roles of URA —

- Promotion for research collaborations and interchanges with universities and research institutions
- Support for design and planning of ISM research strategy
- Support for IR (Institutional Research) of universities and research institutions
- Support for industry-academia collaboration and intellectual property of ISM
- Support for gender equity of ISM
- Promotion for utilizations of ISM supercomputer systems
- Pre-awards and post-awards
- Public-relations and outreach

School of Statistical Thinking

The School of Statistical Thinking was established as a center for the planning and implementation of various programs for professional development and education and training in statistical thinking. In the setting of a joint research facility, the school is working to develop professionals (specialists with broad knowledge and skills, modelers, research coordinators, etc.) equipped with the statistical thinking ability to meet the demands of the “big data era”, in which large-scale data sets are utilized for modeling, research coordination, and other applications.

— *Staff* —

Yoshinori KAWASAKI, Prof. (Vice Director-General)
Yukito IBA, Vice Director, Prof.
Satoshi KURIKI, Director, Prof.
Yoshiyuki NINOMIYA, Prof.
Hideitsu HINO, Prof.
Shiro IKEDA, Prof.
Hironori FUJISAWA, Prof.
Kazuhiro MINAMI, Prof.
Masato CHINO, Project Prof. (-2021.12.31)
Hiroko NAKANISHI, Project Prof. (-2021.12.31, 2022.4.1-)
Kazuo MUROTA, Project Prof. (-2021.12.31)
Manabu IWASAKI, Project Prof. (-2021.12.31)
Kunio TANABE, Project Prof. (-2022.3.31)
Yasunori SAWAMURA, Project Prof. (2021.8.1-2021.12.31)
Naoto KUNITOMO, Project Prof. (2021.9.1-2021.12.31)
Hideki ORIGASA, Project Prof. (2021.11.1-2021.12.31)
Kunio SHIMIZU, Adjunct Prof.
Nobuhisa KASHIWAGI, Adjunct Prof.
Toshifumi IKEMORI, Adjunct Prof.
Kenichiro SHIMATANI, Assoc. Prof.
Masayuki HENMI, Assoc. Prof.
Keisuke YANO, Assoc. Prof.
Ayaka SAKATA, Assoc. Prof. (2022.4.1-)
Masayoshi TAKAYANAGI, Project Assoc. Prof. (2021.10.1-2022.3.31)
Osamu KOMORI, Visiting Assoc. Prof.
Kei TAKAHASHI, Visiting Assoc. Prof. (2021.6.1-)
Masayuki YOKOYAMA, Visiting Prof. (2022.4.1-)
Akifumi OKUNO, Assist. Prof.
Kohei HATTORI, Assist. Prof.
Masato SHIRASAKI, Assist. Prof.
Kei NOBA, Assist. Prof.
Ryota YUASA, Assist. Prof. (2022.4.1-)
Kazuhei KIKUCHI, Project Assist. Prof. (-2022.11.30)

— *Activities* —

- Open lecture for public: Free and introductory lecture concerning statistical science, once a year in -2022 June, 2023 May

- Tutorial courses: Pay courses for various topics in statistical science, about 10 times a year
- Graduate school linkage program: Courses and/or guidances at collaborative graduate schools
- Special collaboration with research students: Guidance given in ISM to graduate students belonging to other universities
- Summer graduate Seminar: Free open lecture for graduate students, once a year in summer
- Open-type professional development program: Support for research meetings and workshops for promoting statistical thinking
- Statistical mathematics seminar: Seminars on new research results by researchers in ISM, once a week on Wednesday afternoon
- Research collaboration start-up: Advises and supports given by researchers in ISM for problems of various fields concerning statistical mathematics
- Researcher exchange promotion program: Support to university researchers who use sabbatical system and study at ISM
- Statistical training for school teachers: Training for school teachers to increase their leadership of statistical thinking

Center for Training Professors in Statistics

The Institute of Statistical Mathematics has established the nationwide consortium of universities and research institutes, and promotes the Project for Training Experts in Statistical Sciences to address the critical shortage of professors in statistics, which form the core of data science. In January 2022, the Center for Training Professors in Statistics was established as an official internal organization to ensure smooth operation of the consortium. The goal of the project is to establish a virtuous cycle of professional development in the field of statistics. This project strives to develop at least 30 professors in statistics over the 5-year project period and to train approximately 500 experts in statistical sciences over a 10-year period, including the project period.

— *Staff* —

Yoshinori KAWASAKI, Prof.

Satoshi YAMASHITA, Prof.

Kazuhiro MINAMI, Prof. (2023.4.1-)
Masato CHINO, Director, Project Prof.
Hiroko NAKANISHI, Project Prof.
Kazuo MUROTA, Project Prof.
Manabu IWASAKI, Project Prof.
Yasunori SAWAMURA, Project Prof.
Naoto KUNITOMO, Project Prof.
Hideki ORIGASA, Project Prof.
Naoki KAMIYA, Project Prof. (2022.4.1-)
Masakazu JIMBO, Project Prof. (2022.4.1-)
Kunio TANABE, Project Prof. (2022.4.1-)
Masahiro MIZUTA, Project Prof. (2022.4.1-)
Shotaro AKAHO, Project Prof. (2023.3.1-)
Masayoshi TAKAYANAGI, Project Assoc. Prof.
Ryota YUASA, Assist. Prof. (2022.4.1-)

Center for Engineering and Technical Support

The Center for Engineering and Technical Support assists academics and their collaborators in many ways: managing computer systems and networks, editing and publishing journals, maintaining the library, and managing tutorial programs.

— Staff —

Genta UENO, Director, Prof.
Kazuhiro MINAMI, Vice Director, Prof.

■ Computing Facility Unit

The Computing Facilities Unit is in charge of managing computer facilities and scientific software.

■ Computer Networking Unit

The Computer Networking Unit is responsible for computer networking and its infrastructure, and network security.

■ Information Resources Unit

The Information Resources Unit is responsible for maintaining a library

and an electronic repository, and is in charge of planning statistical tutorial programs open to the public.

■ Media Development Unit

The Media Development Unit is in charge of publishing and editing of research results and PR brochures.

Project Researchers

Project researchers is the all-inclusive term for post-doctoral researchers participating in specific projects. To name a few, ISM NOE (Network Of Excellence) projects, ROIS-DS (Joint Support-Center for Data Science Research) projects, government-commissioned projects, and the projects funded by independent agencies like JST.

Aoki, Yuta	Kusaba, Minoru	Petrillo, Giuseppe
Aritake, Toshimitsu	Le Duc, Anh	Rikimaru, Yuuki
Chino, Masato	Liu, Chang	Saito, Sho
Eguchi, Shinto	Maruyama, Yutaka	Sakamoto, Kotaro
Fujita, Shigeru	Miyasato, Yoshihiko	Sawamura, Yasunori
Fukasawa, Atsushi	Mizuta, Masahiro	Shibai, Kiyohisa
Hamada, Hiroka	Mototake, Yoh-ichi	Shimono, Toshiyuki
Hayashi, Yoshihiro	Murota, Kazuo	Takahashi, Aiko
Hirokawa, Tomohito	Nagahata, Hideaki	Takayanagi, Masayoshi
Inagaki, Yusuke	Nakanishi, Hiroko	Tanabe, Kunio
Iwasaki, Manabu	Nakanishi, Tadashi	Tanaka, Yasuhiro
Jimbo, Masakazu	Nakashima, Hideto	Tran, Vu Duc
Kamiya, Naoki	Noguchi, Yoh	Wu, Pengzhou
Kato, Naoko	Obata, Shingo	Xiong, Ziyao
Kikuchi, Kazuhei	Ogata, Yosihiko	Yamada, Hironao
Koike, Takaaki	Ohkubo, Yusaku	Zhang, Qi
Kumazawa, Takao	Oka, Mayumi	Zheng, Ning
Kumon, Masayuki	Origasa, Hideki	
Kunitomo, Naoto	Peng, Hong	

Visiting Professors

To push forward the frontiers of interaction between statistics and other fields of science, the Institute provides positions for visiting professors.

Each of the Institute's three departments and five centers have invited foreign and Japanese professors from universities and institutes as shown in the list below.

— Foreign Visiting Professors —

Peters, Gareth William	(U.S.A.)	2022.	7.22–2022.	8.22
Jimenez-Sobrino, Juan Carlos	(Cuba)	2022.	10.10–2022.	12.11
Myrvoll, Tor Andre	(Norway)	2022.	10.24–2022.	11. 4
Septier, Francois Jean Michel	(France)	2023.	1.28–2023.	3. 1
Spodarev, Evgeny	(Germany)	2023.	1.31–2023.	3.31
Shevchenko, Pavel	(Australia)	2023.	3. 1–2023.	3.31

— Japanese Visiting Professors —

Akazawa, Manabu	2021. 4. 1-2023. 3.31	Imaizumi, Masaaki	2021. 4. 1-2023. 3.31
Ando, Masakazu	2021. 4. 1-2023. 3.31	Ito, Shinsuke	2021. 4. 1-2023. 3.31
Dou, Xiaoling	2021. 4. 1-2023. 3.31	Ito, Yoichi	2021. 4. 1-2023. 3.31
Enescu, Bogdan Dumitru	2021. 4. 1-2023. 3.31	Iwasa, Tetsuya	2021. 4. 1-2023. 3.31
Fujii, Satoshi	2021. 4. 1-2023. 3.31	Iwata, Takaki	2021. 4. 1-2023. 3.31
Fujii, Yosuke	2021. 4. 1-2023. 3.31	Kameya, Takashi	2021. 4. 1-2023. 3.31
Fujisawa, Katsuki	2021. 4. 1-2022. 3.31	Kamiyama, Masako	2021. 4. 1-2023. 3.31
Fujita, Taisuke	2021. 4. 1-2023. 3.31	Kamo, Kenichi	2021. 4. 1-2023. 3.31
Fukasawa, Masaaki	2021. 4. 1-2023. 3.31	Kato, Hiroshi	2021. 4. 1-2023. 3.31
Fukui, Keisuke	2021. 4. 1-2023. 3.31	Kawano, Shuichi	2021. 4. 1-2023. 3.31
Goto, Atsushi	2021. 4. 1-2023. 3.31	Kikkawa, Toru	2021. 4. 1-2023. 3.31
Goto, Masataka	2021. 4. 1-2023. 3.31	Kikuchi, Senichiro	2021. 4. 1-2023. 3.31
Gretton, Arthur	2021. 4. 1-2023. 3.31	Kimura, Ryoichi	2021. 4. 1-2023. 3.31
Hara, Hisayuki	2021. 4. 1-2023. 3.31	Kitano, Toshikazu	2021. 4. 1-2023. 3.31
Hashimoto, Shunji	2021. 4. 1-2023. 3.31	Kiyono, Ken	2021. 4. 1-2023. 3.31
Hattori, Satoshi	2021. 4. 1-2023. 3.31	Kobayashi, Kei	2021. 4. 1-2023. 3.31
Higuchi, Tomoyuki	2021. 4. 1-2023. 3.31	Koike, Yuta	2021. 4. 1-2023. 3.31
Honda, Toshio	2021. 4. 1-2023. 3.31	Komori, Osamu	2021. 4. 1-2023. 3.31
Horiguchi, Toshihiro	2021. 4. 1-2023. 3.31	Konoshima, Masashi	2021. 4. 1-2023. 3.31
Hoshino, Nobuaki	2021. 4. 1-2022. 3.31	Kubota, Takafumi	2021. 4. 1-2023. 3.31
Imada, Takatoshi	2021. 4. 1-2023. 3.31	Kunitomo, Naoto	2021. 4. 1-2022. 3.31

Manabe, Kazufumi	2021. 4. 1-2023. 3.31	Tachimori, Hisateru	2021. 4. 1-2023. 3.31
Maruo, Kazushi	2021. 4. 1-2023. 3.31	Taguri, Masataka	2021. 4. 1-2023. 3.31
Matsumoto, Wataru	2021. 4. 1-2023. 3.31	Takabe, Isao	2021. 4. 1-2023. 3.31
Minami, Mihoko	2021. 4. 1-2023. 3.31	Takada, Masaaki	2021. 4. 1-2023. 3.31
Miyamoto, Sadaaki	2021. 4. 1-2023. 3.31	Takahashi, Junichi	2021. 4. 1-2023. 3.31
Mizuta, Masahiro	2021. 4. 1-2022. 3.31	Takahashi, Kunihiro	2021. 4. 1-2023. 3.31
Morikawa, Junko	2021. 4. 1-2023. 3.31	Takahashi, Rinya	2021. 4. 1-2023. 3.31
Motohashi, Eiji	2021. 4. 1-2022. 3.31	Takemura, Akimichi	2021. 4. 1-2023. 3.31
Ibid.	2022. 5. 1-2023. 3.31	Takeuchi, Tsutomu	2021. 4. 1-2023. 3.31
Motoyama, Hitoshi	2021. 4. 1-2023. 3.31	Takizawa, Satoshi	2021. 4. 1-2023. 3.31
Nagafuji, Hiroaki	2021. 4. 1-2023. 3.31	Teramukai, Satoshi	2021. 4. 1-2023. 3.31
Nagao, Hiromichi	2021. 4. 1-2023. 3.31	Tonda, Tetsuji	2021. 4. 1-2023. 3.31
Nagashima, Katsutoshi	2021. 4. 1-2023. 3.31	Tsuchiya, Takashi	2021. 4. 1-2022. 3.31
Nagashima, Kengo	2021. 4. 1-2023. 3.31	Tsuda, Hiroshi	2021. 4. 1-2023. 3.31
Nakamura, Kazuyuki	2021. 4. 1-2023. 3.31	Tsukahara, Hideatsu	2021. 4. 1-2023. 3.31
Nanjo, Kazuyoshi	2021. 4. 1-2023. 3.31	Ueki, Masao	2021. 4. 1-2023. 3.31
Nishiyama, Nobuaki	2021. 4. 1-2023. 3.31	Watanabe, Michiko	2021. 4. 1-2023. 3.31
Nomura, Shunichi	2021. 4. 1-2023. 3.31	Yamada, Makoto	2021. 4. 1-2023. 3.31
Ogihara, Teppei	2021. 4. 1-2023. 3.31	Yamagata, Yoshiki	2021. 4. 1-2023. 3.31
Okada, Yukihiro	2021. 4. 1-2023. 3.31	Yanagihara, Hirokazu	2021. 4. 1-2023. 3.31
Ono, Tadashi	2021. 4. 1-2023. 3.31	Yoshida, Toshinao	2021. 4. 1-2023. 3.31
Ozaki, Koken	2021. 4. 1-2023. 3.31	Yoshida, Nakahiro	2021. 4. 1-2023. 3.31
Saito, Masaya	2021. 4. 1-2023. 3.31	Yoshino, Takaaki	2021. 4. 1-2023. 3.31
Sakai, Naoki	2021. 4. 1-2023. 3.31	Inagaki, Yusuke	2021. 6. 1-2023. 3.31
Sakuma, Noriyoshi	2021. 4. 1-2023. 3.31	Takahashi, Kei	2021. 6. 1-2023. 3.31
Sato, Seisho	2021. 4. 1-2023. 3.31	Ishiguro, Chieko	2021. 7. 1-2023. 3.31
Sato, Tadahiko	2021. 4. 1-2023. 3.31	Kato, Aitaro	2021.10. 1-2023. 3.31
Sato, Toshiya	2021. 4. 1-2023. 3.31	Markov, Konstantin	2022. 2.24-2022. 3.25
Sato, Yasunori	2021. 4. 1-2023. 3.31	Ibid.	2022. 6. 1-2023. 3.31
Sato, Yoshimichi	2021. 4. 1-2023. 3.31	Emura, Takeshi	2022. 4. 1-2023. 3.31
Sheena, Yo	2021. 4. 1-2023. 3.31	Matsuzoe, Hiroshi	2022. 4. 1-2023. 3.31
Shimizu, Yasutaka	2021. 4. 1-2023. 3.31	Nakazawa, Koyomi	2022. 4. 1-2023. 3.31
Shinano, Yuji	2021. 4. 1-2022. 3.31	Yamamoto, Takashi	2022. 4. 1-2023. 3.31
Shiomi, Junichiro	2021. 4. 1-2023. 3.31	Yokoyama, Masayuki	2022. 4. 1-2023. 3.31
Shiota, Sayaka	2021. 4. 1-2023. 3.31	Yoshida, Yasushi	2022. 4. 1-2023. 3.31
Shirakawa, Kiyomi	2021. 4. 1-2023. 3.31	Pedroso, João Pedro	2022. 8. 1-2023. 3.28
Sugasawa, Shonosuke	2021. 4. 1-2023. 3.31	Miwa, Tetsuhisa	2022.10.13-2023. 3.31
Suzuki, Kazuyuki	2021. 4. 1-2023. 3.31		

Visiting Research Fellows

In addition to visiting professors, the Institute provides research fellowships to researchers in Japan and abroad, from companies as well as from universities. The Institute also provides support for those who are appointed as staff of programs by the Japan Society for the Promotion of Science (JSPS). A list follows showing research fellows received during the period April 2021 to March 2023.

(The list does not show all of the visiting fellows from abroad. Foreign visiting research fellows are listed under “Foreign Visitors” on page 39.)

— Japanese visiting research fellows —

Baba, Yasumasa	Kawamura, Yumi	Saito, Taiga
Fatima Jenina Tolentino Arellano	Kieu, Que Anh	Sano, Natsuki
Fukaya, Keiichi	Koike, Takaaki	Sato, Hiroyuki
Funatogawa, Takashi	Kojima, Masahiro	Sato, Kikue
Goto, Shinichiro	Kumazawa, Takao	Shiiba, Hiroyuki
Harada, Kazuharu	Lei, Xinglin	Shimizu, Kunio
Hashimoto, Taishi	Markov, Konstantin	Shimono, Toshiyuki
Hayamizu, Momoko	Maruyama, Naomasa	Tajima, Yusuke
Ikemori, Toshifumi	Matsu'ura, Mitsuhiro	Takahashi, Takenori
Imamura, Takeshi	Matsushima, Hiroyasu	Takai, Tsutomu
Imoto, Tomoaki	Murase, Hironori	Tamura, Naomi
Inagaki, Yusuke	Murata, Yasuaki	Tanoue, Yuta
Ishibashi, Hideaki	Nagahata, Hideaki	Tsuchida, Jun
Ishibashi, Ken	Nagai, Kazue	Tsuda, Yuto
Ishibe, Takeo	Nakamura, Rie	Uehara, Yuma
Ishigaki, Toshihiro	Nakamura, Takashi	Uryu, Hirotaka
Jarl Tynan Aggarao Collado	Nakano, Junji	Watanabe, Hayafumi
Jiang, Jiaming	Nakano, Yoshio	Yamamoto, Takashi
Kabata, Yutaro	Nguyen, Minh Le	Yanagimoto, Takemi
Kaibuchi, Hibiki	Nishida, Shu	Zamengo, Massimiliano
Kamiya, Naoki	Nishikawa, Tomoaki	Zhang, Junchao
Kano, Masayuki	Ogata, Yosihiko	Zhao, Yu
Kashiwagi, Nobuhisa	Okita, Daisuke	
Kawamori, Ai	Okuda, Yusuke	

— *Students from graduate school* —

Mikiya, Yuki	Song, Xiaolin	Arellano, Fatima Jenina Tolentino
Ichikawa, Masakazu	Alamri, Sarah Saleh	Kotani, Yudai
Nishioka, Akatsuki		

Professor Emeritus

Baba, Yasumasa	Matsunawa, Tadashi	Suzuki, Giitiro
Eguchi, Shinto	Miyasato, Yoshihiko	Suzuki, Tatsuzo
Hasegawa, Masami	Murakami, Masakatsu	Tamura, Yoshiyasu
Higuchi, Tomoyuki	Nakamura, Takashi	Tanabe, Kunio
Hirano, Katsuomi	Nakano, Junji	Tanemura, Masaharu
Ishiguro, Makio	Ogata, Yosihiko	Tsubaki, Hiroe
Itoh, Yoshiaki	Ohsumi, Noboru	Yanagimoto, Takemi
Kashiwagi, Nobuhisa	Sakamoto, Yoshiyuki	Yoshino, Ryoza
Kitagawa, Genshiro	Shimizu, Ryoichi	

Research Collaboration

The Institute runs a unique system to promote collaborative research activities between statisticians and scientists in related fields, such as the social sciences, the humanities, life sciences, earth and space sciences and engineering. The system was initiated in 1985 with a special intention, based on past experience of the Institute. Since the genesis of the Institute, one of the basic principles has been to attach greater importance to applications (applied science). The principle came from the appreciation that innovative methodologies and theories of statistics are frequently developed in an effort to solve real life problems.

In the past decades the Institute has maintained research collaborations with universities, governmental organizations, private companies and various organizations domestically as well as internationally. This period produced a lot of useful works, both in theory and application. This tradition of open collaboration with scientists outside the Institute has created a progressive and liberal academic atmosphere which, we believe, has contributed to developing new interdisciplinary research fields in related sciences.

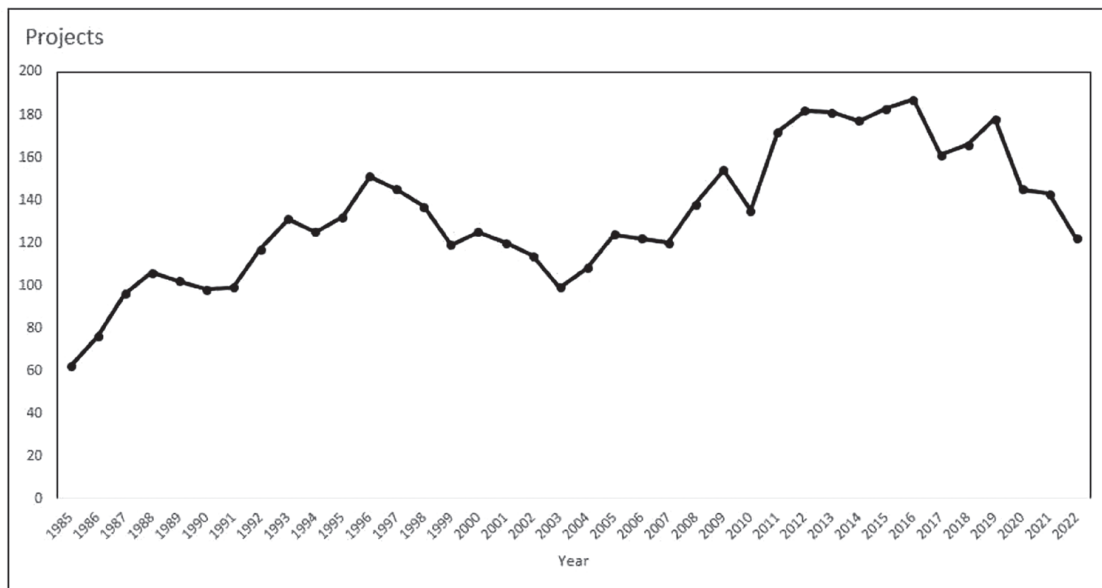
These cooperative research activities were maintained through various research fields at different levels and with various types of collaboration, long before the Institute was reorganized into an inter-university research institute. Many remarkable results have been produced through collaborative research in the last decades. To our regret, however, when joint work is organized by researchers at the individual level, the fruit of the collaborative research tends to be received by the general public as a successful contribution to the science that addressed the problem. Without acknowledgment the true contributions by our statisticians are not credited or noticed. Obviously this tendency comes from the inherently abstract nature of statistics. The statistician's contribution, although essential, is not as easy to explain to the general public as explaining the problem itself in applied science. Accordingly, it seemed that the value and the *raison d'être* of the statisticians and the Institute was not appreciated as much as other scien-

tists and research institutes in the applied sciences.

Our cooperative research system was initiated on the basis of two understandings. First, this kind of collaborative research activity is beneficial to both statistics and other related sciences. Secondly, statisticians working in such circumstances need recognition, support and encouragement. We hope that the present system will play a vital role to bring “Win-Win” benefits to both statisticians and applied scientists in the related field.

Since 1985 the system has been run by the Cooperative Research Committee, half of whose members are scientists from outside the Institute. Cooperative research projects between statisticians and scientists in related scientific fields are called for each year. More than a hundred projects in applied sciences and statistics are supported each year (see the figure below). In 1998, in order to enlarge the area of collaboration, the Institute relaxed a condition of application for projects which had stipulated that at least one member of the research project should belong to the Institute. The system of cooperation is also open to projects that are planned and accomplished through international cooperation.

Our cooperative research projects are classified into several categories: cooperative user registration, general cooperative research “Type 1”, general cooperative research “Type 2”, subject-oriented cooperative research, and cooperative research symposium.



Number of collaborative research projects

Cooperative Research Reports

(Reports, in Japanese and English, on the achievements emerging from collaborative research projects in the Institute.)

- No.452:* Maruyama, N., Development and Popularization of Dynamic Geometry Software GeoGebra(7). (February 2022)
- No.453:* Tsuchiya, T., Optimization: Modeling and Algorithms 33. (March 2022)
- No.454:* Saigo, T., Extreme Value Theory and Applications(19). (March 2022)
- No.455:* Shimura, T., Infinitely divisible processes and related topics (26). (March 2022)
- No.456:* Ishikawa, S., A Statistical Analysis of Language Data and Learning Data. (March 2022)
- No.457:* Suenaga, K., Research on best practice in teaching statistics Vol. 14. (March 2022)
- No.458:* Ishikawa, Y., Statistical Analyses of Discourse Markers Used in Engineering Research Papers. (March 2022)
- No.459:* Fujieda, M., Supporting academic activities in English with ESP corpora. (March 2022)
- No.461:* Tsuchiya, T., Optimization: Modeling and Algorithms 34. (March 2023)
- No.462:* Saigo, T., Extreme Value Theory and Applications(20). (March 2023)
- No.463:* Shimura, T., Infinitely divisible processes and related topics (27). (March 2023)
- No.464:* Ishikawa, Y., Quantitative Analyses of Metadiscourse Units in Abstracts of Engineering Research Papers. (March 2023)
- No.465:* Ishikawa, S., An integrative Analysis of Language, Learning, and Statistics. (March 2023)
- No.466:* Suenaga, K., Research on best practice in teaching statistics Vol. 15. (March 2023)
- No.468:* Maruyama, N., Development and Popularization of Dynamic Geometry Software GeoGebra(8). (March 2023)

※No.451, 460, 467 are missing numbers.

International Research Exchange

Historically, statistical science has developed in response to the need for statistical ideas and methods to be exploited in other fields of science and industry. Therefore the Institute has established a systematic way to promote cross-disciplinary research projects either at a domestic or an international scale (see the previous chapter).

The Institute has also pushed forward research collaboration with a wide variety of foreign institutions including universities and governmental agencies.

Since 1988, the Institute has entered into special relationship with the following institutes to conduct programs on academic exchange and facilitate joint research projects;

- The Statistical Research Division of the U.S. Bureau of the Census, U.S.A., 1988-
- Stichting Mathematisch Centrum, Netherlands, 1989-
- Institute for Statistics and Econometrics, Humboldt University of Berlin, Germany, 2004-
- The Steklov Mathematical Institute, Russia, 2005-
- Central South University, China, 2005-
- Soongsil University, Korea, 2006-
- Department of Statistics, University of Warwick, U.K., 2007-
- The Indian Statistical Institute, India, 2007-
- Institute of Statistical Science, Academia Sinica, Taiwan, 2008-
- Department of Empirical Inference, Max Planck Institute for Biological Cybernetics, Germany, 2010-
- Department of Communication Systems, SINTEF Information and Communication Technology, Norway, 2012-
- Centre for Computational Statistics and Machine Learning, University College London, U.K., 2012-
- Department of Electronics and Telecommunications, Norwegian Uni-

- versity of Science and Technology, Norway, 2012-
- Department of Probability and Mathematical Statistics, Charles University in Prague, Czech Republic, 2012-
- The Department of Ecoinformatics, Biometrics and Forest Growth of the Georg-August University of Goettingen, Germany, 2012-
- The Korean Statistical Society, Korea, 2013-
- Toyota Technological Institute at Chicago, U.S.A., 2014-
- Mathematical Sciences Institute Australian National University, Australia, 2014-
- Risklab ETH Zurich, Switzerland, 2015-
- Institut de Recherche en Composants logiciel et matériel pour l'Information et la Communication Avancée (IRICICA), France, 2015-
- Centre de Recherche en Informatique, Signal et Automatique de Lille (CRISTAL), France, 2015-
- University College London (UCL) Big Data Institute, U.K., 2015-
- The Institute of Forestry, Pokhara of Tribhuvan University, Nepal, 2015-
- The Institute of Forest and Wildlife Research and Development of the Forestry Administration of Cambodia, Cambodia, 2015-
- Forest Inventory and Planning Institute, Vietnam, 2015-
- The University of Porto, Portugal, 2016-
- Zuse Institute Berlin, Germany, 2016-
- National University of Laos, Laos, 2017-
- Institute of Geophysics China Earthquake Administration, China, 2017-
- Hong Kong Baptist University, Hong Kong, 2017-
- Universidade de Évora, Portugal, 2017-
- The Korean Association for Survey Research, Korea, 2018-
- The Jean Golding Institute for data-intensive research, University of Bristol, U.K., 2019-
- Survey Research Center, Sungkyunkwan University, Korea, 2019-
- University of Lampung, Indonesia, 2019-
- Department of Earth and Space Sciences, Southern University of Science and Technology, China, 2019-
- Université Bretagne Sud, France, 2019-
- North Carolina State University, U.S.A., 2019-
- Singapore-ETH Centre, Singapore, 2020-
- Department of Actuarial Studies and Business Analytics, Macquarie

- University, Australia, 2020-
- EURECOM, France, 2021-
- The University of Texas at Dallas, School of Economic, Political and Policy Sciences, U.S.A., 2022-
- Universität Ulm, Germany, 2023-
- Laboratoire de Mathématiques Blaise Pascal, University of Clermont Auvergne, France, 2023-
- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale (OGS), Italy, 2023-

The Institute has also been active in organizing international conferences and workshops. In April 2021-March 2023, 18 international symposia were held under the auspices of the institute;

- 5th ZIB-RIKEN-IMI-ISM MODAL Workshop on Optimization, Data Analysis and HPC in AI, September 27-30, 2021
- Second International UG Workshop 2021, October 1, 2021
- Workshop on Continuous Optimization and Related Topics, November 27-28, 2021
- Joint International Symposium on Sustainable Forest Ecosystem Management (SFEM) by Taiwan, Japan and Korea - SFEM 2021 -, November 28-29, 2021
- The ISI-ISM-ISSAS Joint Conference 2022, January 13-15, 2022
- ISM Symposium on Environmental Statistics 2022, January 27, 2022
- The Workshop on Functional Inference and Machine Intelligence, March 29-31, 2022
- Joint International Symposium on Sustainable Forest Ecosystem Management, September 1-2, 2022
- The 6th RIKEN-IMI-ISM-NUS-ZIB-MODAL-NHR Workshop on Advances in Classical and Quantum Algorithms for Optimization and Machine Learning, September 16-22, 2022
- Risk and Statistics: 3rd Tohoku-ISM-UUlm Joint Workshop, October 12-14, 2022
- Mathematical optimization and statistical theories using geometric methods, October 20-21, 2022
- International Workshop on Statistical Mathematics with R software in Vietnam, October 25-26, 2022
- International Workshop on Continuous Optimization, December 3-4,

2022

- International Workshop on Statistical Mathematics with R software in Cambodia, December 21-22, 2022
- International Workshop on Statistical Mathematics with R software in Nepal, February 9, 2023
- International Workshop on Statistical Mathematics with R software in Indonesia, February 17, 2023
- Workshop on Functional Inference and Machine Intelligence 2023, March 14-16, 2023
- ISM Symposium on Environmental Statistics 2023, March 22, 2023

The Institute actively encourages researchers to come to talk or give lectures and also to stay for collaboration with the staff. as shown in the list below, the Institute has received 34 visitors from 16 different countries. Of these researchers, 25 entered into a visiting research fellowship including a visiting professorship. Another list follows showing all the colloquia that were given by foreign visitors.

Foreign Visitors (April 2021-March 2023)

- The asterisk * before a visitor's name indicates that he/she is a visiting professor or a visiting research fellow.
 - Date in the list refers to the period of visiting professorship/research-fellowship or the date of colloquium.

<i>From Algeria</i>	
Rahmani, Sofiane.....	22.11.14
<i>From Australia</i>	
* Sejdinovic, Dino	23.3.13-23.3.18
* Shevchenko, Pavel.....	23.3.1-23.3.31
<i>From Canada</i>	
* Asante, Patrick	22.12.8-22.12.13
* Zhang, Qi	22.9.1-23.3.31
<i>From China</i>	
* Li, Yongbo.....	22.12.20-23.12.19
* Zhang, Wei.....	22.10.11-23.10.10
<i>From Cuba</i>	
* Jimenez-Sobrino, Juan Carlos .	22.10.10-22.12.11
<i>From France</i>	
Garreau, Damien	23.1.6
* Rosso, Alberto	23.3.20-23.3.22
Graczyk, Piotr	23.3.17
* Septier, Francois Jean Michel.....	23.1.28-23.3.1
* Kanagawa, Motonobu	22.9.26-22.9.30
* Zhang, Fangyuan.....	22.9.26-22.9.30
* Ibid.	23.1.10-23.1.20
<i>From Germany</i>	
An, Chen	22.10.11
* Spodarev, Evgeny.....	22.10.6-22.10.10
* Hainzl, Sebastian.....	23.2.28-23.3.24
* Ibid.	23.1.31-23.3.31
* Shinano, Yuji	22.5.12-23.3.31
<i>From Hong Kong</i>	
Zhang, Michael Minyi	23.1.12
<i>From Italy</i>	
* Gentili, Stefania	22.12.8-22.12.13
* Petrillo, Giuseppe	22.4.9-22.4.30

		<i>From New Zealand</i>	
Wang, Ting	21.9.21		
		<i>From Norway</i>	
* Myrvoll, Tor Andre	22.10.24-22.11.4		
		<i>From Singapore</i>	
* Chen, Ying	22.9.26-22.9.28	* Choi, Michael	22.12.1-22.12.15
		<i>From Swiss</i>	
* Dong, Ziqing	22.6.3-22.11.29		
		<i>From Taiwan</i>	
* Hwang, Hsien-Kuei	22.12.9-22.12.17		
		<i>From U.K.</i>	
* Kanagawa, Heishiro	22.12.19-22.12.23	Stockman, Sam	23.3.17
* Liu, Song	23.3.13-23.3.17		
		<i>From U.S.A.</i>	
Huang, Hsin-Hsiung	23.3.16	* Scarvelis, Christopher Basil	23.3.15-23.4.14
* Peters, Gareth William	22.7.22-22.8.22	Sethi, Suresh P	22.10.31

Colloquia by Foreign Visitors
(2021.4-2023.3)

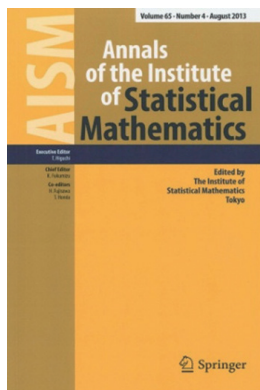
Speaker (Country)	Title	Date
Wang, Ting (New Zealand)	A time series model for forecasting earthquake energy release	2021. 9.21
Kanagawa, Motonobu (France)	Counterfactual mean embeddings	2022. 9.27
Zhang, Fangyuan (France)	Intergenerational risk sharing in a defined contribution pension system: Analysis with Bayesian optimization	2022. 9.29
Spodarev, Evgeny (Germany)	Spectral properties of fullerenes	2022.10. 6
An, Chen (Germany)	Individual demand for retirement products	2022.10.11
Sethi, Suresh P. (U.S.A.)	Hierarchical and mixed leadership games for dynamic supply chains: Applications to cost learning and co-op advertising	2022.10.31
Rahmani, Sofiane (Algeria)	Time-dependent and spatiotemporal statistical analysis of Algerian	2022.11.14
Hwang, Hsien-Kuei (Taiwan)	Bell numbers in Matsunaga's and Arima's Genjiko combinatorics: Modern perspectives and local limit theorems	2022.12.12
Kanagawa, Heishiro (U. K.)	Controlling moments with kernel stein discrepancies	2022.12.22
Garreau, Damien (France)	A sea of words: An in-depth analysis of anchors for text data	2023. 1. 6
Zhang, Michael Minyi (Hong Kong)	Latent variable modeling with random features	2023. 1.12

Speaker (Country)	Title	Date
Huang, Hsin-Hsiung (U.S.A.)	Bayesian methods: ultrahigh dimensional variable selection for generalized linear models and spatiotemporal data modeling	2023. 3.16
Hainzl, Sebastian (Germany)	Stress-based seismicity modeling	2023. 3.17
Stockman, Sam (U. K.)	Forecasting the 2016-2017 central apennines earthquake sequence with a neural point process	2023. 3.17
Graczyk, Piotr (France)	Pattern recovery by penalized estimators with polyhedral penalty	2023. 3.17

Periodicals

One of the driving forces behind the rapid progress of modern science has undoubtedly stemmed from the broad communication of research findings through international journals and reports. For the sake of publicizing its activities throughout academic and industrial circles, the Institute launched *Annals of the Institute of Statistical Mathematics* (AISM) in 1949 shortly after its foundation. Today AISM, distributed by Springer, has a worldwide reputation and is listed in citation review journals.

In the past two years, Volumes 73 to 75 were published. For paper titles, abstracts, and full texts, visit our website at <https://www.ism.ac.jp/editsec/aism/>, or at <https://springerlink.com/>. The aims of AISM are shown in the excerpt below:



AISM aims to provide a forum for open communication among statisticians, and to contribute to the advancement of statistics as a science to enable humans to handle information in order to cope with uncertainties. It publishes high-quality papers that shed new light on the theoretical, computational and/or methodological aspects of statistical science. Emphasis is placed on (a) development of new methodologies motivated by real data, (b) development of unifying theories, and (c) analysis and improvement of existing methodologies and theories.



The Institute publishes another periodical, *Proceedings of the Institute of Statistical Mathematics*. This biannual journal made its first appearance in 1953 and now carries scientific papers and articles on topics of research (in Japanese with abstracts in English). Volumes 69 and 70 were published in the past two years.

Refer to <https://www.ism.ac.jp/editsec/toukei/> for paper titles, abstracts and full texts.

Technical Reports

In addition to the two journals mentioned above, the Institute issues five technical reports:

- *ISM Survey Research Report*
- *Computer Science Monographs*
- *Research Memorandum*
- *ISM Report on Research and Education*
- *ISM Reports on Statistical Computing*

A list of the five reports released from April 2021 to March 2023 follows.



ISM Survey Research Report

(Technical reports, mostly in Japanese, on the methodology of survey and analysis of measured data. Formerly published as Research Report (no.1-101).
Full text can be downloaded from <https://www.ism.ac.jp/>.)

No.121: Shibai, K., Cross-National Survey on Nuclear Disarmament Issues –Japan, Hiroshima, Nagasaki, and the U.S. 2022 Web Survey– (Japanese edition) (June, 2022)

No.122: Shibai, K., Cross-National Survey on Nuclear Disarmament Issues –Japan, Hiroshima, Nagasaki, and the U.S. 2022 Web Survey– (English edition) (November, 2022)

Computer Science Monographs

(Technical reports in English on computer programs and software for statistical science. Full text and supplementary materials of No.31 onwards can be downloaded from <https://www.ism.ac.jp/>. Not issued during the period April 2021 to March 2023.)

Research Memorandum

(Technical Reports, mostly in English, that give immediate publicity to research findings. The full content of some of them can be downloaded from <https://www.ism.ac.jp/>.)

- No.1215:* Hoshino, N., Urn Models Closed under Resizing. (April 7, 2021)
No.1216: Mano, S. and Takayama, N., Algebraic Algorithm for Direct Sampling from Toric Models. (November 16, 2021)
No.1217: Kumon, M., Information Geometry of Nonlinear Feedback Systems. (February 14, 2022)
No.1218: Nakanishi, T., Estimation Accuracy of Mixed Time Series Regression Model –Monte Carlo Experiment with R Package ‘midasr’–. (August 18, 2022)
No.1219: Senda, T. and Nakanishi, T., On the Sustainability of Primary Budget Deficits. (February 3, 2023)
No.1220: Kumon, M., Information geometry of multiple martingale models. (February 27, 2023)
No.1221: Mano, S., A measure-on-graph-valued diffusion, a particle system with collisions, and their applications. (March 10, 2023)
No.1222: Noma, H., Hamura, Y., Gosho, M. and Furukawa, T. A., Kenward-Roger-type corrections for inference methods of network meta-analysis and meta-regression. (March 22, 2023)

ISM Report on Research and Education

(Reports and documents concerned with education and research.)

- No.51:* The Institute of Statistical Mathematics, and Department of Statistical Science, The Graduate University for Advanced Studies (ed.), 2021 ISM Openhouse Posters and Annual Symposium of the Graduate Students of the Department of Statistical Science. (February 2022)
No.52: Department of Statistical Science, The Graduate University for Advanced Studies (ed.), Annual Symposium of the Graduate Students

- of the Department of Statistical Science, 2021. (February 2022)
- No.53:* The Institute of Statistical Mathematics, and Department of Statistical Science, The Graduate University for Advanced Studies (ed.), 2022 ISM Openhouse Posters and Annual Symposium of the Graduate Students of the Department of Statistical Science. (August 2022)
- No.54:* Department of Statistical Science, The Graduate University for Advanced Studies (ed.), Annual Symposium of the Graduate Students of the Department of Statistical Science, 2022. (February 2023)

ISM Reports on Statistical Computing

(Technical reports in Japanese and English that describe management and manipulation of computer systems. Not issued during the period April 2021 to March 2023.)

Published Papers and Books

Many of the achievements made by the staff of the Institute consist of scientific papers and monographs. Each of the staff has selected works worthy of note out of his/her papers and books published in the period from April 2021 to March 2023, to complete the following list. Also included are works by visiting professors and students.

- Abdillahi-Ali, D., Azzaoui, N., Guillin, A., Mailloux, G. L. and Matsui, T.: Penalized least square in sparse setting with convex penalty and non Gaussian errors, *Acta Mathematica Scientia*, 41, 2198-2216, doi:10.1007/s10473-021-0624-0, 2021.
- Abdurro'uf, Lin, Y. -T., Hirashita, H., Morishita, T., Tacchella, S., Akiyama, M., Takeuchi, T. T. and Wu, P. -F.: Dissecting nearby galaxies with piXedfit. I. Spatially resolved properties of stars, dust, and gas as revealed by panchromatic SED fitting, *The Astrophysical Journal*, 926(1):81, 1-27, doi:10.3847/1538-4357/ac439a, 2022.
- Abdurro'uf, Lin, Y.-T., Hirashita, H., Morishita, T., Tacchella, S., Wu, P. -F., Akiyama, M. and Takeuchi, T. T.: Dissecting nearby galaxies with piXedfit. II. Spatially resolved scaling relations among stars, dust, and gas, *The Astrophysical Journal*, 935(2), id.98, 1-21, doi:10.3847/1538-4357/ac7da4, 2022.
- Abe, T., Fujisawa, H., Kawashima, T. and Ley, C.: EM algorithm using overparameterization for multivariate skew-normal distribution, *Econometrics and Statistics*, 19, 151-168, 2021.
- Aida, T., Komachi, M., Ogiso, T., Takamura, H. and Mochihashi, D.: A comprehensive analysis of PMI-based models for measuring semantic differences, in *Proceedings of PACLIC 2021*, 21-31, 2021.
- Amano, R., Nakao, M., Matsumiya, K. and Miwakeichi, F.: A computational model to explore how temporal stimulation patterns affect synapse plasticity, *PLOS ONE*, 17(9), e0275059, doi:10.1371/journal.pone.0275059, 2022.

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Tutorial Programs and Consultation

Tutorial courses on statistical science are held for the benefit of researchers, students, and the general public. The levels of courses vary from beginner's level to advanced level.

Year	Level/ Category	Title	Month	Number of par- ticipants
Single Courses				
2021	Standard	Extreme value statistics using R (online)	May	114
	Basic	Philosophizing statistics: Why statistics provides scientific evidence (online)	July	128
	Standard	Introductory Time Series Analysis using R (online)	October	90
2022	Basic	Introduction to Multivariate Analysis (online)	August	79
	Standard	Introduction to spatial and spatiotemporal modeling with R (online)	October	112
Leading DAT (Data Analytics Talents)				
2021	L-A	Introductory Data Science (online)	September -October	96
	L-B1	An Introduction to Statistical Modeling (online)	November	101
	L-B2	Machine Learning and Modern Methodologies in Data Science (online)	December	95
		Leading DAT Training Course (online)	November -January 2022	40

Year	Level/ Category	Title	Month	Number of par- ticipants
2022	L-X1	Introduction to Graphical Models (1)- How to read and write graphs (online)	August	208
	L-A	Basics of Modern Statistics (online)	September	86
	L-X2	Introduction to Graphical Models (2)- Graphs and Probabilistic Inference (online)	September	87
	L-Y1	Introduction to Time Series Analysis	November	96
	L-B	An Introduction to Statistical Model- ing (online)	December	80
2023	L-S1	Decision Trees and Ensemble Learn- ing: From Basics to Practice (online)	January	131
	L-S2	Statistical Causal Effect Estimation and its Applications (online)	February	150

The Institute launched the School of Statistical Thinking in January 2012. Since then, the School has centralized control over the educational programs for the general public except regular courses in SOKENDAI, the Graduate University for Advanced Studies, see Supplement.

Tutorial courses are the most popular among the programs operated by the School. There is consistent demand for non-degree pursuing continuous education from the private sector. Actually around 70% of the total attendants are from private companies. A yearly open lecture is a more accessible half-day program where a timely topic relating to statistical science is explained in plain language.

In FY 2017, the School of Statistical Thinking launched a program called “Leading DAT (Data Analytics Talents)” aimed at training data scientists with the knowledge and skills in statistical mathematics required by modern society. As the program’s first projects, we organized two Leading DAT lectures entitled “L-B1: Bayesian Modeling in Practice” and “L-B2: Machine Learning and Modern Methodologies in Data Science.” At the same time, we established the Leading DAT Training Course, in which we grant certificates to participants who have fulfilled the course requirements, including attendance in all lectures and submission of reports. A total of 25 people has been granted the certificate of completion.

Since FY2018, two lectures, L-A and L-S, have been added to the Leading DAT program; “L-A: Introductory Data Science,” aims to consolidate the basics of statistics, while “L-S” treats yearly selected topics. The title of L-B1 has been changed to “An Introduction to Statistical Modeling”. In FY2020, during the COVID-19 pandemic, we conducted L-B1, L-S, and half of the training course as online lectures, which helped us prepare for full line-up online Leading DAT scheduled in FY2021.

Former services for consultancy have been renovated as the “Research Collaboration Start-Up” program. A team of experienced emeritus professors and young research fellows give advice and handle nearly 40 cases a year. Some of them have led to the registration for our Cooperative Research Program or funded joint project between the Institute and the client company.

The ISM Summer School program is also integrated as an activity of the School. It was started in FY2006 as a free crash course open to graduate students from all over Japan. The topic of FY2013 was “Information Geometry” which gathered 120 registrations. From FY2014 to FY2019, we provided a program for “Mathematical Modeling for Pandemic Disease” which lasts for 10 consecutive days. Since FY2016, all the lectures were done in English. This program attracts nearly one hundred participants including international students, and surprisingly we find almost no dropouts. From FY2020, Data Assimilation Summer School has been conducted. The numbers of participants from FY2019 to FY2022 were 89, 81, 70, and 68, respectively.

Software Products

The Institute of Statistical Mathematics has published the Computer Science Monographs (CSM) series as a report on software research and development, and has been actively publishing and providing source code. Software such as TIMSAC, which has been well received for many years, is now provided as a package of programming language R, free and open-source software for statistical analysis, through the CRAN (The Comprehensive R Archive Network) site. Currently, most of the following R packages are published on CRAN, and can be downloaded directly from R Gui, RStudio, etc. Other software can be downloaded from the URL described in the access column. Please contact each developer individually for inquiries.

Program developed in ISM

Program	Explanation, etc.	Access
■ timsac (R package)	Package for statistical analysis, prediction, and control of time series. Composed of most programs of TIMSAC (CSM No. 5, 6, 11, 22, 23). Also includes BAYSEA (CSM No. 13) programs.	https://cran.r-project.org/web/packages/timsac/index.html https://jasp.ism.ac.jp/ism/timsac/index_e.html
■ catdap (R package)	Package for categorical data analysis. Automatically selects optimal explanatory variables for a categorical objective variable.	https://cran.r-project.org/web/packages/catdap/index.html https://jasp.ism.ac.jp/ism/catdap/
■ SAPP (R package)	Package for statistical analysis of series of events and seismicity. Composed of programs SASE (CSM No.32) and SASeis2006 (CSM No.33).	https://cran.r-project.org/web/packages/SAPP/index.html https://jasp.ism.ac.jp/ism/SAPP/index_e.html

Program	Explanation, etc.	Access
■ NScluster (R package)	Package for simulation and estimation for Neyman-Scott spatial cluster point process models and their extensions	https://cran.r-project.org/web/packages/NScluster/index.html
■ TSSS (R package)	Package for statistical analysis, modeling and simulation of time series with state space models	https://cran.r-project.org/web/packages/TSSS/index.html https://jasp.ism.ac.jp/ism/TSSS/index_e.html
■ spmoran (R package)	Package for estimating spatial additive mixed models and other spatial regression models for Gaussian and non-Gaussian data	https://cran.r-project.org/web/packages/spmoran/index.html
■ pimeta (R package)	Package for implementation of prediction intervals for random-effects meta-analysis	https://cran.r-project.org/web/packages/pimeta/index.html
■ scgwr (R package)	Package of programs for linear-time algorithm for empirical Bayes estimation of a large-scale geographically weighted regression model	https://cran.r-project.org/web/packages/scgwr/index.html
■ GWmodel (R package)	A general-purpose package that provides a wide range of statistical analysis methods for geospatial data, including geographically-weighted regression	https://cran.r-project.org/web/packages/GWmodel/index.html
■ treefit (R package)	Software for estimating a tree-structured model of cell differentiation from single-cell RNA-seq data	https://hayamizu-lab.github.io/treefit-r/
■ Treefit for Python		https://hayamizu-lab.github.io/treefit-python/
■ XenonPy	A Python library that implements a comprehensive set of machine learning tools for materials informatics	https://github.com/yoshida-lab/XenonPy
■ RadonPy	A Python library to automate physical property calculations for polymer informatics	https://github.com/RadonPy/RadonPy
■ Seq-Stack-Reaction	A Python library of machine learning algorithms for concurrently designing molecules and synthetic reaction networks	https://github.com/qi-zh/Seq-Stack-Reaction

Program	Explanation, etc.	Access
■ KRFO	A Python program for kernel regression for functional output in Materials Science	https://github.com/yoshida-lab/XenonPy/blob/master/samples/kernel_neural_network.ipynb
■ CSPML	A python program for predicting crystal structure with machine learning-based algorithm	https://github.com/Minoru938/CSPML
■ Sobolev transport	A MATLAB program for computing Sobolev transport in a graph metric space	https://github.com/lttam/SobolevTransport
■ Unbalanced Sobolev transport	A MATLAB program for computing Sobolev transport between distributions having different total mass	https://github.com/lttam/UnbalancedSobolevTransport
■ Jasplot	Java library for drawing interactive statistical graphs	https://jasp.ism.ac.jp/jasplot/index.html
■ SASE	Package for point-process analysis written in FORTRAN77 (CSM No. 32)	https://www.ism.ac.jp/editsec/csm/index_j.html
■ SASeis2006	Package for statistical analysis of seismicity written in FORTRAN77 (CSM No. 33)	
■ Neyman-Scott Cluster	Package for simulation and estimation for Neyman-Scott spatial cluster point process models (CSM No. 34)	
■ HIST-PPM	A collection of source codes written in FORTRAN and R for estimation of seismic activity, short-term earthquake forecasting, and simulations (CSM No. 35)	
■ ARdock	Package for model fitting and interpretation of the linear multivariate time series and systems (CSM No. 30)	https://www.ism.ac.jp/ismlib/jpn/ismlib/soft.html#ARDock
■ DALL	Programs of Davidon's algorithm for log-likelihood maximization written in FORTRAN and C (CSM No. 25)	https://www.ism.ac.jp/ismlib/jpn/ismlib/soft.html#dall



(Supercomputer)

Introduction to the Statistical Science Program, Graduate Institute for Advanced Studies, SOKENDAI

SOKENDAI has implemented a major reform of its educational organization and curricula to offer a 20-program system at Graduate Institute for Advanced Studies starting from April 2023. The new curriculum encompasses 20 programs that span a broad spectrum of academic disciplines, such as elementary particles, materials, life, space, information, history, and culture. The curriculum aims to equip students with foundational knowledge and education in their respective fields of specialization while fostering their autonomy and flexibility in conducting research beyond their own domains. The Diploma Policy of SOKENDAI outlines five competencies: “academic expertise”, “creativity”, “broad perspective”, “global competence”, and “research integrity” for doctoral candidates who aspire to become independent researchers who can tackle any challenge with confidence.

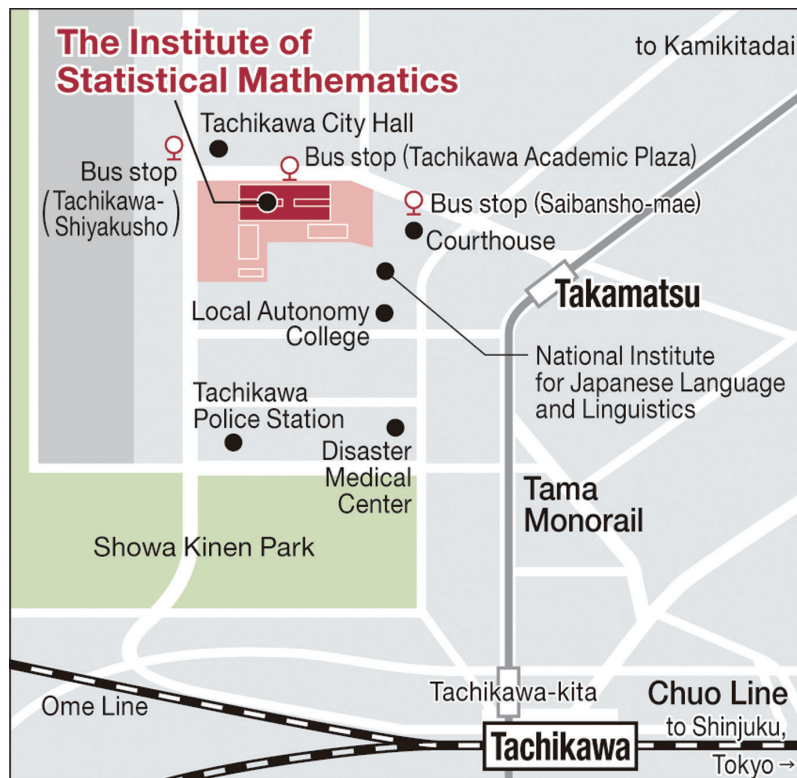
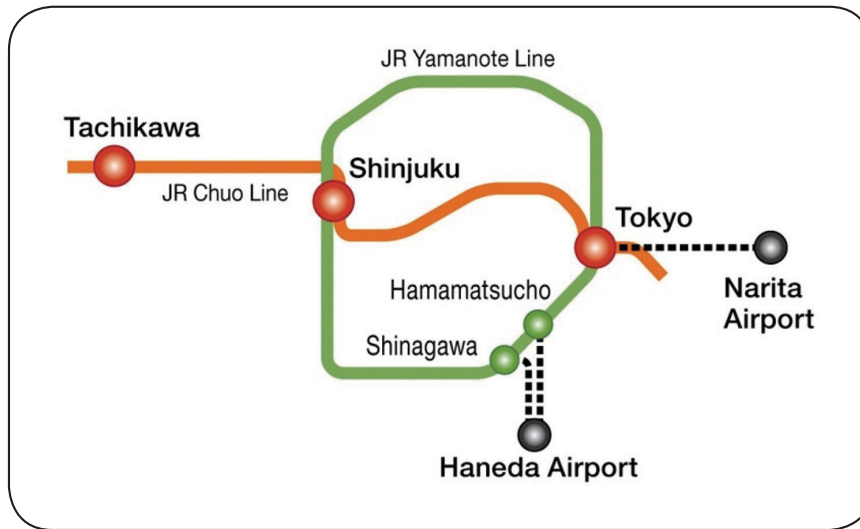
SOKENDAI strives to make a significant contribution to society by envisioning the role of academia in advancing human society in the long run. It aims to nurture doctoral students who can excel and innovate in academia that supports the intellectual foundations of society, lead advanced research and development, and generate new intellectual value.

(from the President’s Statement)

SOKENDAI was thus established in October 1988 with seven institutes as parents. As of April 2023, the University has grown to have 20 parent institutes and 2435 Ph.D. students. In the Statistical Science Program, research and educational activities focus on the effective use of data for the realization of rational inferences or predictions, in the same way as in the construction and confirmation of scientific hypotheses. The subject area covers the theory and application of statistical science, such as fundamental statistical theory and statistical methodologies including prediction, data assimilation, survey science, machine learning, risk analysis, optimization, decision making, and control. Since its establishment, 162 Doctors of Philos-

ophy have been conferred by the Program. As of April 2023, the Program has 37 students.

Location of the Institute



Access to the ISM

- Tama Monorail
 - 10 min walk from Takamatsu Sta.
- Tachikawa Bus
 - Tachikawa Academic Plaza bus stop
 - 5 min walk from Saibansho-mae or Tachikawa-Shiyakusho bus stop

Inter-University Research Institute Corporation
Research Organization of Information and Systems

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