Research Organization of Information and Systems

The Institute of Statistical Mathematics

ISM

■ **Extracting information and acquiring knowledge from data**

Researching scientific methods for data analysis, for use in a wide range of disciplines, including the life sciences, environmental science, social studies and economics.

■ **Research for the benefit of society**

Pursuing cutting-edge research on decision-making methods, and promoting research targeted at solving important problems in academia, society and industry.

■ **Hub for interdisciplinary and frontier research**

Promoting a wide variety of cooperative research projects and developing human resources, to meet academic, social and industry needs. Encouraging international cooperation and joint usage of our high-performance computing resources.

Basic Research

Department of Statistical Modeling

The Department of Statistical Modeling works on the structural modeling of real world phenomenon related to numerous factors, and it conducts research on model-based statistical inference methodologies. By means of the modeling of spatially and/or temporally varying phenomena, complex systems, and latent structures, the department aims to contribute to the development of cross-field modeling intelligence.

Spatial and Time Series Modeling Group
Complex System Modeling Group
Latent Structure Modeling Group

- Professors: 8
- Associate Professors: 7
- Assistant Professors: 2

Department of Data Science

The aim of the Department of Data Science is to contribute to the development of natural and social sciences by conducting research into the methodology of designing statistical data collection systems, measuring and analyzing complex phenomena for evidence-based sciences, and performing exploratory multivariate data analyses.

Data Design Group
Metric Science Group
Structure Exploration Group

- Professors: 4
- Associate Professors: 8
- Assistant Professors: 4

Department of Mathematical Analysis and Statistical Inference

The Department of Mathematical Analysis and Statistical Inference carries out research into general statistical theory, statistical learning theory, optimization, and algorithms in statistical inference.

Mathematical Statistics Group
Learning and Inference Group
Computational Inference Group

- Professors: 7
- Associate Professors: 4
- Assistant Professors: 3

ISM conducts the following research and education using the Biaxial Structure.

Horizontal Axis (Basic Research)

- These three departments develop "tools" for interdisciplinary research. The field of statistical mathematics itself particularly connects various research fields and must evolve constantly.
- Also these departments engage in cutting-edge research to develop methodologies for rational prediction and decision making which are based on data and existing knowledge.
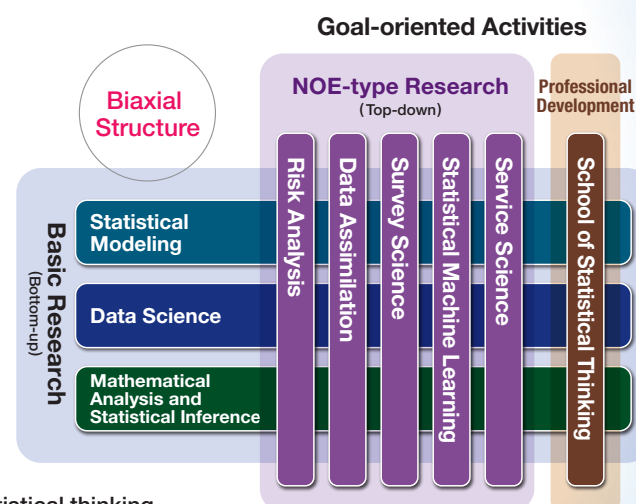 * All tenured research staff are assigned to one of these departments.

Vertical Axis (Goal-oriented Activities)

NOE-type Research
- These five centers engage in research activities that interface statistical mathematics with individual scientific disciplines in order to find solution to urgent social problems.
- Through establishment of NOE (Network Of Excellence) these centers conduct related research activities as the core of each NOE domain.

Professional Development
- The School of Statistical Thinking develops T-type researchers and other specialists.
- The school also conducts projects for fostering and promoting statistical thinking.

Goal-oriented Activities

Biaxial Structure

NOE-type Research (Top-down)

Professional Development

Basic Research (Bottom-up)

Statistical Modeling

Data Science

Mathematical Analysis and Statistical Inference

Risk Analysis | Data Assimilation | Survey Science | Statistical Machine Learning | Service Science | School of Statistical Thinking

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NOE (Network Of Excellence) Project

Use of large-scale data and integrated research is essential for solving complex problems of the modern society. Our interdisciplinary NOE (Network Of Excellence) is a unique program to establish collaborations around statistical mathematics. We are forming each NOE in the five research areas of risk research, next-generation simulation, survey science, statistical machine learning, and service science. This project pursues activities to establish new methodologies in their respective research fields and serves as hubs for interdisciplinary interaction as a new approach to collaboration research.

Risk Research NOE

The Risk Analysis Research Center, the core of Risk Research NOE, manages risk scientifically by building appropriate models of various increasing uncertainties in society and economics, and by evaluating risk quantitatively.

Next-Generation Simulation NOE

The Research and Development Center for Data Assimilation, the core of Next-Generation Simulation NOE, combines observed or measured data with simulation to build simulation models that allow prediction for the future and contribution toward the design of efficient observation systems.

Survey Science NOE

The Survey Science Center, the core of Survey Science NOE, employs social survey research spanning over more than half a century as a foundation for analyzing the changes in the viewpoint of Japanese people as well as comparing with viewpoints in other countries. The Center will pursue the development of methodologies in social survey and statistical analysis methods.

Statistical Machine Learning NOE

The Research Center for Statistical Machine Learning, the core of Statistical Machine Learning NOE, conducts statistical researches on machine learning, which concerns autonomous learning systems. The Center aims at developing new methods through domestic and international collaborative researches, and supports activities of the research community.

Service Science NOE

The Service Science Research Center, the core of Service Science NOE, brings the data-centric methodologies into the services fields—from marketing, supply chain management, management engineering, to modeling of social systems.

Project for Fostering and Promoting Statistical Thinking

統計思考院

School of Statistical Thinking

The School conducts the Project for Fostering and Promoting Statistical Thinking, and disseminates "statistical thinking" through interactions with various people, including researchers who aim to create new statistical fields as well as individuals who recognize the importance of statistics in their research.

■ **Programs**

- Open Lecture (once a year)
- Tutorial Courses of Statistical Science (around 10 courses a year)
- Graduate School Linkage Program (with six organizations)
- Special Collaboration with Research Students
- Summer Graduate Seminar
- Open-type Professional Development Program
- Statistical Mathematics Seminar Series
- Research Collaboration Start-up (around 40 cases a year)
- Researcher Exchange Promotion Program
- Statistical Training for Teachers

Fusion of Different Fields & Academic-industry Alliance

Coop with Math Program

By providing opportunities for nationwide researchers in mathematics and mathematical sciences as well as researchers in various sciences and industries to discuss intensively and continuously, this Program aims to promote cooperative research of mathematics, mathematical sciences, and industries toward solutions for actual problems.

Data Science Research Plaza

This program accepts visiting researchers from the private sector. At the School of Statistical Thinking they can exchange ideas with ISM staff, and attend various seminars, conferences, and courses for free. All of this will help them to develop their data science analysis skills.

Computing Infrastructure / Research Support / Outreach Activities

Center for Engineering and Technical Support

The Center provides the latest computing infrastructure; it collects and transmits information to support research activities of communities in statistical science.

Supercomputer system for statistical science

Library

Repository of the Institute of Statistical Mathematics (RISM)

Academic publications

International Cooperation

The ISM facilitates international research cooperation by signing memorandum of agreement (MOA) with overseas universities and research institutes. We hold symposia and conduct joint researches to encourage communications among statistical communities.

■ **Agreements have been signed with 18 Japanese organizations, 28 foreign organizations** (As of FY 2014)

Open-type Research Collaboration

This academic study program provides researchers from other academic institutes with access to the facilities of the ISM, and provides opportunities for researchers to conduct theoretical and applied studies on statistics by leveraging various research resources accumulated at the ISM.

■ **177 activities attended by 981 total participants**

（As of FY 2014）

Graduate School Program

The ISM also serves as a platform institute of The Graduate University for Advanced Studies (Sokendai), an overlaid university on the network of national research institutes. As a platform institute responsible for research and education of The Department of Statistical Science of Sokendai, we offer five-year and three-year Ph.D. courses for talented students who aim at becoming world-class researchers and practitioners.

More than 100 Ph.D.'s have been awarded through this program since its inception in 1988.

■ **Admission capacity**
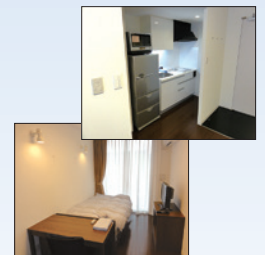 **five-year course: 2**
  three-year course: 3

ISM Open House 2013 celebrates the conferment of 100 doctoral degrees
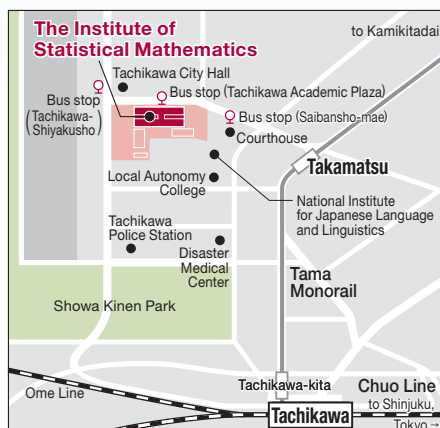
Akaike Guest House

The Guest House is built within the premises to enable collaborating researchers to stay for extended periods and to facilitate active interactions among researchers. There are 18 single rooms, 4 double rooms, and 1 accessible room.

Akaike Guest House

Single room

The Institute of Statistical Mathematics

to Kamikitadai

Tachikawa City Hall
Bus stop (Tachikawa Academic Plaza)
Bus stop (Tachikawa-Shiyakusho)
Bus stop (Saibansho-mae)
Courthouse
Takamatsu
Local Autonomy College
Tachikawa Police Station
National Institute for Japanese Language and Linguistics
Disaster Medical Center
Tama Monorail
Showa Kinen Park
Tachikawa-kita
Chuo Line to Shinjuku, Tokyo →
Ome Line
Tachikawa

Access to the ISM

◎ Tachikawa Bus
— Tachikawa Academic Plaza bus stop
— 5 min walk from Saibansho-mae or Tachikawa-Shiyakusho bus stop

◎ Tama Monorail
— 10 min walk from Takamatsu Sta.

◎ JR Chuo Line
— 25 min walk from Tachikawa Sta.

Research Organization of Information and Systems

The Institute of Statistical Mathematics

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