Data Tools Hands-On **curriculum** | The following data analysis tools will be covered in the Data Tools Hands-On course.

Data Tools First

MATLAB

MATLAB is a numerical computing environment for data analysis, visualization, and programming. The course introduces MATLAB programming language syntax and basic image-processing operations.

R

The R software includes a programming language for statistical analysis and a development environment. The course introduces data operations and basic statistical calculation methods.

SAS

SAS is a widely used statistical analysis software. The course introduces the method of using the tools as well as the basic procedures of data analysis and programming.

SQL

SQL is a programming language used for managing data in a relational database. Using MySQL, the course introduces basic SQL functions such as data registration and data searches.

ROS

ROS is a framework for developing software for robots. The course introduces a method of performing simultaneous localization and mapping (SLAM), i.e., estimating position and creating an environment map using a sensor.

Stata

Stata is a statistical analysis software used in economic, societal, and health care fields. This course introduces its basic operations, the methods to perform regression analysis and display the results, and the procedures to create diagrams.

OpenCV

OpenCV is a computer vision library for C, MATLAB, Java, and Python. The course introduces image-processing and object-detection methods through demonstrations.

Linux

Linux is an UNIX-compatible OS used in a wide range of fields. Using CentOS, the course introduces shells, editors, and file transfers.

Android

By creating simple applications using an actual device, the course introduces programming methods for Android smartphones and tablets.

Java

Java is a general-purpose object-oriented programming language. Using the Eclipse editor, the course introduces programming with exercises including grammar and execution methods.

Python

Python is a programming language that comes with many libraries for machine learning. The course introduces large-scale data classification using real examples.

Data Tools Next

Geoinfomatics

In a two-days unit, the course introduces Java + SQL + Android programming required to detect location information. In an exercise-based format, the course introduces how to acquire location information using an Android terminal as well as data accumulation and visualization methods using an actual device.

Marketing science

The course introduces the statistical theory and analytical techniques using the Stata statistical analysis software, which is frequently used in economics and sociology. In particular, the course introduces analytical techniques that are important for analyzing economic data, e.g., survival analysis and propensity score matching, through an exercise-based format including theory.

Medical science

The course introduces analytical techniques using simulated disease data, with a focus on actual basic statistical calculations and the process of testing statistical hypotheses by observing data analysis methodologies in the medical field. This course will be exercise-based and employ the SAS software package.

MATLAB applications

This is a two-days exercise-based course that will cover MATLAB data analysis functions. Using multiple raw data, the course introduces the application development flow, from interface design to completed application, focusing on processing missing data and data visualization as well as data-distribution and approximation models.

Electronics Assembly

This is the only course that focuses on hardware. It involves developing data acquisition devices and learning data acquisition methods using RaspberryPi. By creating a simple electronic circuit, the course introduces the structure of such circuits, their application to real-world data acquisition, and methods of using the acquired data.

Robotics

This is a one-day exercise-based course focusing on SLAM implementations and automatic operation mechanisms using a small high-performance robot car. The course introduces how to control the robot via programming. The ROS development framework will be used.

Students' voices | Data Tools Hands-On – **What is its attraction?**

Miho Toyama

Second Inaugural Class,
Graduate School of Medicine

I am mainly using the R-language for my own research, but I had neither the knowledge nor skills in information processing until I entered graduate school. In the R-language lecture of DataToolsFirst course that I took after conditional admission to graduate school, I was exposed to the procedures and ways of thinking about data processing while actually writing code. This helped me with the courses that I took after my official admission to graduate school. In addition, while MATLAB lectures were very useful in my own research and in lectures of essential subjects that required reading MATLAB code, I learned that MATLAB is also suited for data analysis using images, and I plan to use it in future research. I also learned languages like SQL, and Java, which at first do not appear to be related to statistical analysis. However, knowledge of these languages is essential for maintaining the analytical environment for the analysis of medical genomic data. Therefore, I feel that I have been able to use the wide range of knowledge gained from this course.

Takumi Ban

Second Inaugural Class,
Graduate School of Engineering

I am affiliated with the Department of Social Infrastructure Engineering of the Graduate School of Engineering, and I needed to use a mathematical optimization program in my own research. However, because I had been primarily using the Fortran language during my undergraduate studies, I had difficulty in actualizing it and had hit a brick wall. Although Data Tools Hands-On teaches basic concepts and methods of using various analytical tools, it was particularly important for me to learn that by using MATLAB, which comes equipped with various commands and toolboxes, mathematical optimization becomes possible. If Data Tools Hands-On did not exist, I probably would not have had the opportunity to use MATLAB and probably would have had ongoing difficulty in realizing my aspirations. MATLAB, which I learned through this course, has become one of the vital tools for my research.

Contact Us

Nagoya University Graduate Program for Real-World Data Circulation Leaders
Administrative Office for the Leading Graduate School, Graduate School of Informatics

TEL 052-789-3171 FAX 052-789-3172 E-mail office@rwdc.is.nagoya-u.ac.jp WEB http://www.rwdc.is.nagoya-u.ac.jp/index-e.php

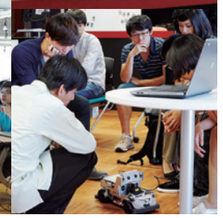
Graduate Program for
Real-World Data Circulation Leaders
Program for Leading Graduate Schools
Nagoya University

REAL-WORLD DATA CIRCULATION: Special Practical Course

Data Tools Hands-On

Data Tools First + Data Tools Next

REAL-WORLD DATA CIRCULATION is the systematic study of the acquisition, analysis, and implementation of real-world data. The use of data processing tools is an essential element in this process. Data Tools Hands-On is a special practical course to learn methods of using data processing tools in informatics and engineering as well as in medicine and economics, and to learn various practical data analysis skills using these tools.



名古屋大学
NAGOYA UNIVERSITY

What is Data Tools Hands-On

To analyze real-world data, it is essential to learn about data as well as analytical methods and techniques using data analysis tools. Selecting and using analytical tools that are suitable for research and experiments can improve the speed and accuracy of data analysis and allow smoother implementation of research. Furthermore, students from a wide range of fields, such as informatics and engineering as well as medicine and economics, enroll in this program to learn data analysis skills. Their levels of experience range from fluent command of the tools to completely inexperienced, which makes individual differences in proficiency a problem. Therefore, the special practical course "Data Tools Hands-On" is being offered to equalize these individual differences. Students learn data analysis techniques through exercises using real data and thus become more proficient.

There are two main courses in Data Tools Hands-On. The first is an introductory course called "Data Tools First," which allows students to experience various data analysis tools. This course is intended to align students' knowledge and skills prior to enrollment. In this course, we learn about the use of data analysis tools through demonstrations and direct experience. The second course is "Data Tools Next," which is an applied course that expands on the knowledge and skills gained in Data Tools First. This course is exercise-based. Students use real data from various fields to learn analytical methods and techniques and see how they can be useful in actual research.

Both courses are offered in English, taking into consideration the international nature of data circulation. The curriculum is unique among courses offered in Japan in that it allows students to learn about various data analysis tools from a team of expert lecturers through practical exercises.

Although Data Tools Hands-On is not a credit course in this program,
it provides useful lectures and exercises for learning data analysis knowledge and techniques.
We also distribute reference books and sample programs as well as review lectures via video.
Please see the following URL for details.
http://www.rwdc.is.nagoya-u.ac.jp/eng/data-tools/

Message from the Program Coordinator

Human Resource Development Program for Leaders of Real-World Data Circulation and Data Tools Hands-On

We will nurture doctoral talent that will create new social value and apply data science to industrial science.

Program Coordinator, Professor, Graduate School of Informatics
Kazuya Takeda

Real-World Data Circulation, which is a new field of study in IT, implements products and services to acquire and analyze users' comments and dissatisfaction as data to develop new designs and manufacturing processes. This process is considered as the value-creation aspect of real-world data circulation and the root of social-value creation. This program develops future industry leaders who can venture into new fields and create value by making each auditing student discuss his or her research in a multilateral manner, mainly in practical science and not only basic science, and by teaching about the acquisition of knowledge from the surroundings. One of the essential elements in the process of learning real-world data circulation is data analysis tools. In Data Tools Hands-On, we ensure that students can systematically learn, from a team of expert lecturers, the mathematical techniques that are common in the analyses of informatics, engineering, medicine, and economics. The objective of this course is to produce doctoral talent equipped with data analysis skills, resulting in graduates who can contribute to the development of society.

Lectures will start before admission!

Introductory level

Data Tools First

Data Tools First, which teaches the purpose of various data processing tools and the basic ways to use them,
is offered as an introductory practical data processing course to provide auditing students with the relevant skills prior to admission.

Analysis tools covered by Data Tools First

- Robotics — ROS
- Image processing — OpenCV
- Health care — SAS
- Economics — Stata
- Machine learning — MATLAB, R, Python
- Basic systems — Linux, Android, SQL

The tools covered are essential for the acquisition, analysis, and implementation of real-world data

From basic concepts to practical applications

Challenge to develop a more practical data processing method.

Applied level

Data Tools Next

Data Tools Next involves application development/data analysis exercises based on various data processing tools.
The objective of this course is to teach practical data processing by utilizing the knowledge acquired from the introductory-level Data Tools First course.
Practical application learning primarily focuses on six topics:
Geoinfomatics, marketing science, medical science, MATLAB applications, electronics assembly, and robotics.

Analysis tools covered in Data Tools Next

- Geoinfomatics — SQL, Android, Java

- Marketing science — Stata

- Medical science — SAS

- MATLAB applications — MATLAB

- Electronics Assembly — Raspberry Pi, Python

- Robotics — Ros, Linux