TOHOKU UNIVERSITY
STEM SUMMER PROGRAM 2019:
Exploring the Frontier of Science and Technology

2019.6.17 - 7.12

TABLE of CONTENTS

TOHOKU
UNIVERSITY

1. Participants list

Tohoku University STEM Summer Program 2019

List of Paticipants

No	Family name	First name	Home University[*1]	College/Department	Year[*2]
1	YU	Jialu	UCSD	Physical Science	1
2	KABIGTING	Taylor John	UCR	College of Natural and Agricultural Science	1
3	ALLEN	Dexter	UCR	College of Natural and Agricultural Science	2
4	ALLISON	Ashley	UW	College of Engineering	1
5	BARONA	Paula	UW	College of Engineering	2
6	CHEN	Zhengyi	UW	College of Engineering	2
7	CHONG	Joshua	UW	College of Engineering	1
8	FORD	Cameron	UW	College of Engineering	2
9	HOU	Yun	UW	College of Arts and Sciences	2
10	JAMAL	Leila	UW	College of Engineering	2
11	KIEU	Tan	UW	College of Engineering	1
12	KWAN	Amber	UW	UW Bothell	1
13	LE	James	UW	College of Engineering	2
14	LU	Daoyi	UW	College of Arts and Sciences	1
15	PHUNG	Isabella	UW	College of Engineering	1
16	SHI	Megan	UW	College of Engineering	1
17	TAM	Tiffany	UW	College of Engineering	2
18	TRAN	Melinda	UW	College of Engineering	1
19	WANG	Zhiyuan	UW	College of Arts and Sciences	2
20	WEDAA	Eduardo	UW	College of Arts and Sciences	3
21	WU	Aaron	UW	Interdiscliplinary Undergraduate Programs	1
22	ZHANG	Allan	UW	College of Engineering	1
23	ZHAO	Justin	UW	College of Arts and Sciences	1
24	ZHAO	Yunze	UW	College of Arts and Sciences	1
25	ZHAO	Zhouyangguang	UW	College of Arts and Sciences	3
26	ZHU	Ruihan	UW	College of Arts and Sciences	2

*1 UCSD: University of California-San Diego
UCR: University of California-Riverside
UW: University of Washington

*2 1: Freshman
2: Sophomore
3: Junior

Instructors List

Professor Yoshitaka Kasukabe (Head TU instructor):yoshitaka.kasukabe.c3@tohoku.ac.jp

Professor Yumiko Watanabe:yumiko.watanabe.a5@tohoku.ac.jp

Professor Takeshi Koike: takeshi.koike.b6@tohoku.ac.jp

Professor Fumio S. Ohuchi (Head UW instructor): ohuchi@uw.edu

Ms. Morgan Susannah Sherer (Teaching Assistant): mssherer@uw.edu

2. Syllabus

PROGRAM DESCRIPTION

Japan continues to be a world leader in technological, manufacturing, and engineering innovation. **Tohoku University STEM Summer Program (TSSP): Exploring the Frontier of Science and Technology** provides a unique opportunity for freshmen and sophomores to learn about the originality and the state of the advanced and art technology that can be seen in various engineering produced in Japan. Students will also get hands-on experience learning about creative science and engineering at one of Japan's premier universities, Tohoku University, in Sendai City.

During the course of the program, students will be introduced to fundamental engineering concepts through lectures, lab visit, and laboratory work. Students then work on project teams with Tohoku University engineering students to use innovative engineering concepts to solve problems. In addition, several special seminars and lectures are given by experts to develop knowledge about more advanced science and engineering principles.

During the four-week program, lessons and site visits will show students how Japanese society impacts the country's culture of science and engineering. The program provides Japanese language training and exposure to traditional local culture through workshops and site visits. Several field trips will take students to tour J-PARC of a series of world-class proton accelerators and the experimental facilities, a production plant for a Japanese automotive manufacturer, to visit the historic castle in Shiroishi, and to see the recovery efforts in coastal areas around Sendai, most affected by the 2011 tsunami.

LEARNING OBJECTIVES

This course has been designed to provide students with the contextual engineering background to apply critical thinking skills to modern engineering problems in an international context. Through this course, you will be able to:

1) Understand key information about advanced science and engineering concepts and their application in professional engineering practice
2) Demonstrate a knowledge of engineering culture and practice in Japan
3) Utilize technical design skills
4) Work effectively in diverse teams
5) Articulate your own academic and professional goals related to science and engineering
6) Communicate at an introductory level in Japanese and apply the language in real-world contexts

ATTENDANCE POLICIES

Attendance is mandatory at all academic activities, including laboratories, guest lectures, instructor lectures, laboratory visits, field trips, discussion groups, course meetings, etc.

Academic activities are scheduled on all weekdays and some Saturdays. Excessive tardiness or absence may be grounds for dismissal from the program. Optional activities will be advertised as such and may include trips to sightseeing, shopping, or social gatherings. **Each student submits a Summary (a word file) of what you learned from each activity in 250 words.** If it is unclear if an activity is optional, please ask Prof. Kasukabe and/or other professors.

PROGRAM SCHEDULE

Program schedule is shown below. This Program has been designed to require 200 hour of work, equivalent to an 8-ECTS, 4-week long course. The outline below is provided to help students guide use of their time.

A. Students pre-program work and home work during the program

Pre-program work before the program and home work during the program (40 educational hour equivalents):

- 12 hour equivalents: pre-program work (including self-study about Japan)
- 28 hour equivalents: home work during the program

B. June-July Program Time:

160 educational hours over the 4 weeks term with approximate distribution as follows

- 2 hour equivalents of orientation and guidance
- 38 hour equivalents of lectures and lab-visit, including reading preparation
- 44 hour equivalents of group laboratory projects, including reading and report preparation
- 44 hour equivalents of field trips, including reading preparation
- 12 hour equivalents of culture learning
- 10 hour equivalents of language learning, including exercises
- 6 hour equivalents of group discussion
- 6 hour equivalents of individual and group presentation, including PPT preparation

A reading list will be posted in this program site to allow advance preparation. Readings are designed to coordinate with guest lectures, laboratory visits, group laboratory projects and field trips. Final details and assignment schedules will also be posted.

TEACHING APPROACH

This course will focus on learning from "hands-on" projects, field trips, expert topical lectures, targeted scholarly readings, culture and language experience, group discussion, and student presentations.

STUDENT WORK AND ASSIGNMENTS

Student work outside of lectures, lab visits, lab work and field trips which will consists of the TSSP 2019.

Study log and reflection: Students will keep a log recording notes, thoughts, and questions that arise during the program. Designated time will be set aside in the schedule for reflection on technical and cultural topics. In some cases, these individual thoughts will form the basis of small group discussion.

GRADING/SCORING

Students receive a numeric grade for their work. Students should expect grades to be comparable to those awarded for on-campus study.

Learning will be assessed in the following ways:

20% Participation in lectures, project lab work, lab visits, and field trips

Because of the unique nature of this study abroad program, engaged participation in all program activities is critical to allow for learning. Therefore, students are expected to attend all program activities and actively participate. As a general rule, students please note that being present is not the same as participating.

30% Study log

You will be given a dedicated log book. Keep your all recording of your experience in the log book during the program. You should include lecture notes, lab results, field trip notes, data from readings, cultural observations, opinions on the engineering topics, and reflections on experiences. This information will be used for your final report and presentation preparation. At certain points during the program, you may be asked to include specific information in your study log (e.g., response to a question posed by the program director). **Your Log Book will be collected and graded for completion before final presentation.** Students should plan to fill 5-10 pages of their notebook each week to receive full points.

20% Reports from three hands-on-laboratory

Lab report format and other details TBA

30% Project report and presentation

Each student will make a presentation, covering what you learned from this program and what you found interesting in your potential career. The presentation will be made on the last day of the program.

FINAL ORAL PRESENTATION AND REPORT

Final oral presentation: ~~group~~ Individual presentation during a five-hour presentation session
Final report: 4 pages in A4 format (TBA).
Contents: Students will discuss either the frontier science and technology or the science and

technology of disasters and damage reduction. Based on insights through the study of Japanese language and experience of Japanese culture and traditions, they will discuss how uniquely Japanese ways of thinking and approaches affect and influence the program's themes, their thoughts on basic sciences and cutting edge technologies, and how this program relates to their future careers.

Tip for your presentation

TU STEM Summer Program has given you opportunities to challenge yourself in multiple ways over the four weeks of the program. Before departing from Sendai, we want you think about your experiences and consider the skills, knowledge, and awareness you will take away from this program as a result. To help you with this, you will give a final presentation reflecting on what you have learned.

In your presentation, you will identify critical incidents you experienced in the program. A critical incident is "an event which made you stop and think, or one that raised questions for you" (Monash University, 2017). You should address at least one critical incident in each of three areas related to the learning objectives for the course: 1) technical learning in lectures and labs, 2) Japanese culture and language, and 3) your personal and academic development. For each incident, reflect on why it was important to you and what knowledge you will take from it. You can refer to steps of the DEAL Model of Critical Reflection (Ash & Clayton, 2009) to help with this:

1. **D**escribe the incident you experienced in an objective and detailed way (What happened? How did you feel and react?)
2. **E**xamine the incident beyond just summarizing it to understand why it was important (What did you learn? Why does it matter?)
3. **A**rticulate your **L**earning from that incident and how you will apply what you learned in the future (What will you do now? How has this experience affected your future goals and plans?)

Lectures and labs	**Culture and language**	**Personal and academic development**
1.What occurred in this incident? What was your initial reaction to it? 2. What was engaging or challenging about this incident, and why? What other questions do you have a result of this incident that you would like to answer? How did the lecture style used by the Japanese professors affect the way you learned in the lectures and labs? 3. How might your academic and professional careers be affected as a result of what you learned?	1. What occurred in this incident? What was your initial reaction to it? 2. Why did you find this incident engaging or challenging? How did it improve your understanding of Japanese language and culture? What other elements of Japanese language and culture might provide context for this incident? 3. What did this experience make you realize about how you interact with new cultures? How might you be able to generalize what you learned from this experience and apply it to your encounters with other cultures in the future?	1. What occurred in this incident? What was your initial reaction to it? 2. What assumptions and expectations did you bring to this incident? How do you interpret the thoughts and behaviors of the other people involved? 3. How did this incident reinforce or challenge your values, beliefs, or priorities? How did this incident impact your sense of personal or academic identity, or your identity as a future engineering/scientist? How has this experience prepared you to respond to similar situations in the future?

You should address at least one incident related to each focus area, but you can provide more details on a given area if you have more to say about what you learned in that area. Also, a single incident may correlate to several focus areas; for instance, an incident that occurred during a lab session may have had an impact on your view of your own academic identity and development. In that case, you can present that incident as an example of one of the relevant lectures areas, but you should still provide 2 additional incidents. While this is an academic presentation, we hope this will also serve you after this program as a record of your thoughts, observations, and experiences in Japan as well as a guide to help you put into practice some of your new skills, knowledge, and awareness. So feel free to have fun with this; photos, memes, etc. are encouraged if they will help make this a better reference point for you in the future.

Presentations will be graded on the following criteria:

- Presentation addresses at least one critical incident from the three focus areas
- Presentation demonstrates deep engagement with the process of examining the incidents to understand the context surrounding it and why it is important
- Presentation shows how the reflection of the incidents leads to a set of realistic, achievable, and productive goals for the student's future
- Presentation offers high level of substantive reflection that will allow it to be useful as a guide for future practice

Summary of TU STEM Summer Program Assignments

(1) Group Lab reports

1. **Challenging Experiments for Quantum Theory** performed on 6/19(W).
   Report due: **noon on Monday June 24**

2. **Paper Aircraft Competition** performed on 6/20(Th) and 6/21(F).
   Report due: **noon on Monday July 1**

3. **Fastest Clip Motor Competition** performed on 7/9(Tu)
   Report due: **noon on Thursday July 11**

Report size: Single spaced 3 page max. including figures and tables
12 font Times New Roman

(2) Lectures:

1.	June 18 (T)-M	Tohoku Earthquake (Prof. Matsuzawa)
2.	June 20(Th)-M	Intro to aircraft design (Prof. Nakamura)
S1.	June 24 (M)-M	Mat Sci of Japanese sword making (Prof. Ohuchi)
3.	June 26(W)-A	Symmetry Breaking Create Nature (Prof. Tanaka)
4.	June 28 (F)-M	Structural metallic materials (Prof. Yoshimi)
5.	June 28 (F)-A	Robotics for SpaceExploration (Prof. Yoshida)
6.	July 1 (M)-M	Historical and Social Approaches to Disaster (Profs. Ebina and Boret)
7.	July 2 (T)-M	Origin of Life (Prof. Kakegawa)
8.	July 2 (T)-A	Japanese second sample return mission: Hayabusa2 (Prof. Nakamura)
9.	July 4 (Th)-M	Interactive "Content" Design (Prof. Kitamura)
10.	July 4 (Th)-A	Advanced research with accelerator (Prof. Koike)
11.	July 8 (M)-M	Spintronics (Prof. Ohno)
12.	July 10 (W)-M	Renewable Energy Systems (Dr. Warzecha and Ms. Mehta)

Summary of what you learned from it in 250 words.
Google Classroom will be created. Each student submits a word file
File name: n_your last name (example: **3_smith.docx** = lecture **3** written by **smith**)

(3) Final report due by 8:00 am on Friday, July 12, Final presentation on Friday, July 12.

See the details on the previous pages.
Final report: Single spaced 4 page including figures and tables 12 font (Times New Roman)
Final presentation: 10min. (PPT slides not more than 10 pages).

QR code for Google Classroom

GENERAL OUTLINE OF A LABORATORY REPORT

Scientific writing is just as important as scientific investigation or experimenting. Although the major part of scientific investigation takes place in the laboratory--connecting equipment together, repairing, obtaining supplies and samples, checking each apparatus for consistency, calibration, and finally data collection by running the experiment—a great deal of time is spent to present the results in a concise, objective, critical and conclusive format called laboratory report (similar to research paper). Therefore, a well-organized laboratory report is much more effective and influential than one without a structure. There is no short list of instructions for writing a good laboratory report. You may have only one chance to influence your reader. While ineffective writing can turn off the readers, a well-written laboratory report can have impacts on your reputation, chance of employment or promotion. You may also draw the attention of the scientific community to your work and retain them as your readers.

Sections of a laboratory report:

A laboratory report usually have several sections identified by titles. A typical report would include such sections as TITLE, INTRODUCTION, PROCEDURE, RESULTS, and DISCUSSION/CONCLUSION. If you are using a computer to type your work, section headings should be in boldface.

Title:

The title can usually draw attention of the reader to your work. It should clearly represent the work presented. If the purpose of the experiment is to measure the gravitational acceleration of the earth using pendulum as the experimental apparatus, the title should be like " *Measurement of the Gravitational Acceleration Using Simple Pendulum*". Avoid "The" as the first word in the title for it will lead to misleading searches when one uses the database.

Introduction:

State the purpose of the experiment in general terms. For example, " It is possible to measure the gravitational acceleration using the oscillations of a simple pendulum."

Review the existing information or the theory. Reader will look for some reminder of the basic information relating to this particular area. This can be done by giving him/her a brief summary of the existing state of knowledge. We can also include a summary of earlier work with proper references.

Supply a paragraph or two about how the basic information, such as an equation representing the behavior of a model (theory), can be used to make measurements.

Procedure:

Indicate what parameter or properties of the system you are measuring. Usually you change a parameter of the system (such as changing the temperature, *independent variable*), and measure its effect (such as the length of a metal rod, *dependent variable*). Specify such measurement details as the type of standard or instrument used to make the measurement (for example, meter stick or vernier caliper, etc.). Give the instrument uncertainties. For example, if we are using a meter stick, we can say, " the length of the rod is measured using a laboratory meter stick accurate to within 1 cm. You may also provide an apparatus diagram if necessary.

Results:

- Provide at least 3 scientific observations
- Scientific observations are things like "the solution turned blue upon adding a component", not "we turned on the gas tank"
- Provide tables showing your measurement with units.

- Describe the uncertainties: standard, instrument, random errors
- Provide graphs. Graphs should be neat, clear, and include the axis label and units.
- Computation of the final answer: slope calculation, averages, and standard deviations all in proper significant figures.

Discussions/Conclusions:
- Present your findings from the experiment.
- Evaluate the outcome objectively, taking a candid and unbiased point of view. Suppose that the outcome is not close to what you expected. Even then, after checking your results, give reasons why you believe that outcome is not consistent with the expected. Make it plain, simple. Make factual statements such as "graph 1 shows a linear variation of velocity with time".
- State the discrepancies between the experimental results and the model (theory), and discuss the sources of the differences in terms of the errors by offering logical inferences.
- Suggest improvements

Although these do not make an exhaustive list of do's or don'ts, they nevertheless offer a framework around which one can write an effective report. In our experiment, some of the items indicated under each section may not be needed. we will give you more feedback in class. we expect that, the lab reports, either typed or handwritten, should be neat, clear, and organized. Points will be deducted for these, as well as for missing units and failing to follow the outline (i.e. title, introduction, procedure, results, conclusion) given above.

GENERAL OUTLINE OF NOTEBOOK (LOG BOOK) INSTRUCTIONS

Keeping a notebook that's organized and legible is very important in science and engineering as you always want to be able to bring yourself back to an experiment or situation simply by reading your notes. To do this, your notes should be thorough and comprehensive. Instructions have been provided below as to how you can start working towards a great notebook:

Title, Date, and Page number should be at the top of EVERY page.

On days with a lab, a pre-lab should be completed
- Pre-labs should have a definite beginning and end. Put PRE-LAB at the top of the first page and END at the bottom of the last page. Your in-group discussion/notes from lectures should go with the pre-lab section
- For actual lab create the following sections:
    - Purpose & Actual procedures
    - Drawings & Calculations
    - Observations (include problems encountered and solved)
    - Results
    - Comparison to published values or results
    - Conclusion

On without a lab, treat this like a notebook.
- At the end, include a summary of what you have learned.

LOG BOOK will be collected before the final presentation.

3. Program Schedule

Tohoku University STEM Summer Program (TSSP) 2019

WEEK 1

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	16-Jun	17-Jun	18-Jun	19-Jun	20-Jun	21-Jun	22-Jun
AM 9:00 - 12:00		9:00-12:00 **Opening Ceremony & Orientation** Welcome Speech (Vice President, Prof. Yamaguchi) Introduction to Tohoku University (Prof. Kasukabe) Orientation for Tohoku University STEM Summer Program (Profs. Watanabe, Koike and Ohuchi) **Self-introduction (3 min PPT x 30=~90 min)** **Campus Tour** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館501室） Aobayama Campus	9:00-12:00 Lecture 1 **The 2011 Tohoku Earthquake** Prof. Matsuzawa Research Center for Prediction of Earthquakes and Volcanic Eruption, Lecture room 1 (Building A (B32), Room No. 205） 地震・噴火予知研究観測センター第一講義室（A棟 (B32) 205号室） Aobayama Campus	9：00-9：30 **Introduction to Quntum Theory** Prof. Kasukabe 9:30-11:30 **Challenging Experiments for Quantum Theory (1)** Prof. Kasukabe Student Laboratories (A06) Kawauchi Campus	8:50-11:30 Lecture and Lab Visit 2 **Introduction to aircraft design** Prof. Nakamura Conference Room, 2nd Floor, 1st Building (C09) Institute of Fluid Science （流体科学研究所、第1棟2階会議室） Katahira Campus	9:00-12:00 **Paper Aircraft Competition 2** Prof. Moriya, Prof. Watanabe & Prof. Koike Creative Engineering Center (D02) 創造工学研修センター Aobayama Campus	
	Arrive in Sendai	Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	
PM 13:00 - 16:00		13:00-16:00 **Interactive Japanese Language** **Instructors: Ms. Backley & Ms. Mikoda** **Self-introduction in Japanese** Aobayama Commons (J41) Lecture Room No. 3 & 10, School of Agricultural Science （農学研究科青葉山コモンズ第3及び第10講義室） Aobayama Campus	13:30-16:30 **Japanese Culture 1** **Ikebana (Flower arrangement)** Prof. Chen Education and Student Support Center (A01), 4F Main Conference Room （教育学生総合支援センター 4階大会議室） Kawauchi Campus	12:30-14:30 **Challenging Experiments for Quantum Theory (2)** Prof. Kasukabe 14:30-16:00 **Group Work of Challenging Experiments for Quantum Theory** Student Laborarories (A06) Kawauchi Campus	13:00-16:00 **Paper Aircraft Competition 1** Prof. Moriya Creative Engineering Center (D02) 創造工学研修センター Aobayama Campus	13:00-16:00 **Paper Aircraft Group Work** Prof. Moriya, Prof. Watanabe & Prof. Koike Creative Engineering Center (D02) 創造工学研修センター Aobayama Campus	

WEEK 2

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	23-Jun	24-Jun	25-Jun	26-Jun	27-Jun	28-Jun	29-Jun
AM 9:00 - 12:00		9:00-12:00 Special Lecture 1 **Material Science and Japanese Sword Smith** Prof. Ohuchi Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus	**8:30-18:00** **Field Trip** **(Shiroishi (Castle) and Sward Smith)**	9:00-12:00 **Japanese Culture 2** **Rinnouji Temple and Experience in Zen Meditation** Prof. Ohuchi & Prof. Kasukabe Rinnouji Temple (輪王寺)	**7:45-18:00** **Field Trip** **(Ichinoseki and Toyota)**	9:00-12:00 Lecture and Lab Visit 4 **Structural Metallic Materials for Industry Innovation** Prof. Yoshimi Materials Science and Engineering (B01) Lecture room 2 (Room No. 102) （工学研究科材料科学棟(B01)講義室2(102室)） Aobayama Campus	
		Lunch (with TU students)		Lunch (with TU students)		Lunch (with TU students)	
PM 13:00 - 16:00		13:00-16:00 **Interactive Japanese Language** **Instructors: Ms. Backley & Ms. Mikoda** **Introducing Culture** Aobayama Commons (J41) Lecture Room No. 3 & 10, School of Agricultural Science （農学研究科青葉山コモンズ第3及び第10講義室） Aobayama Campus		13:00-16:00 Lecture and Lab Visit 3 **Symmetry Breaking Create Nature** Prof. Tanaka Lecture Room (2nd floor of Molecular Imaging Building(G12)), Cyclotron and Radioisotope Center (CYRIC) （分子イメージング棟(G12) 2階講義室、サイクロトロン・ラジオアイソトープセンター、北青葉山キャンパス） Aobayama Campus		13：00-16：00 Lecture and Lab Visit 5 **Robotics for Space Exploration** Prof. Yoshida Lecture Room Building-M.E (A02) in Aobayama campus, Lecture Room no.4 （機械系講義棟（青葉山キャンパスA02）第四講義室） Aobayama Campus	

Tohoku University STEM Summer Program (TSSP) 2019 (tentative)

WEEK 3

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	30-Jun	1-Jul	2-Jul	3-Jul	4-Jul	5-Jul	6-Jul
AM 9:00 - 12:00		9：00-12：00 Lecture and Lab Visit 6 **Historical and Social Approaches to Disaster** Profs. Ebina and Boret International Research Institute of Disaster Science (J31) Seminar room S100 (災害科学国際研究所セミナー室、S100、青葉山キャンパス) Aobayama Campus	9:00-12:00 Lecture 7 **Origin of Life: The early Earth made the first life** Prof. Kakegawa Earth Science Research Bldg. (H12) Room 513, 503, School of Science （理学研究科地球科学513室、503室） Aobayama Campus	**8:30-18:00** **Field Work** Prof. Kakegawa **(Disaster-affected area: MInamisannriku, Arahama, etc.)**	9:00-12:00 Lecture and Lab Visit 9 **Interactive "Content" Design** Prof. Kitamura M531, RIEC Main building (G10), Katahira Campus （電気通信研究所本館5階 M531 セミナー室、片平キャンパス） Katahira Campus	**7:45-19:00** **Research Facility Tour** **(Japan Proton Accelerator Research Complex: J-PARC in Tokai-mura, Ibaraki)**	
		Lunch (with TU students)	Lunch (with TU students)		Lunch (with TU students)		
PM 13:00 - 16:00		13：00-16：00 **Japanese Culture3 Calligraphy** Prof. Watanabe International Exchange Building (A12) Room R115 （国際交流棟 (A12) R115室） Kawauchi Campus	13:00-16:00 Lecture and Lab Visit 8 **Japanese second sample return mission: Hayabusa2** Prof. Nakamura Earth Science Research Bldg. (H12) Room 503, School of Science （理学研究科地球科学 503室） Aobayama Campus		13：00-16：00 Lecture 10 **Introduction to Advanced Research with Accelerator** Prof. Koike Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus		

WEEK 4

	Sun	Mon	Tue	Wed	Thu	Fri	Sat
	7-Jul	8-Jul	9-Jul	10-Jul	11-Jul	12-Jul	13-Jul
AM 9:00 - 12:00		9:00-12:00 Lecture and Lab Visit 11 **Introduction to Spintronics** President, Prof. Ohno Laboratory for Nanoelectronics and Spintronics (E04) (ナノ・スピン実験施設) A401 Katahira Campus	9：00-12：00 **Fastest Paper Clip Motor Competition 1** Prof. Moriya Creative Engineering Center (D02) 創造工学研修センター Aobayama Campus	9:00-12:00 Lecture 12 **Introduction to Renewable Energy Systems: Engineering and Constructing a Solar Power Plant** Dr. Jan Martin WARZECHA & Ms. Shivani MEHTA Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus	9:00-12:00 **Group Work Session** **（Preparation for Experimental Reports and/or Wrap-up Presentation）** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus	9:00-12:00 **Wrap-up Presentation of TSSP 2019** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus	
		Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	Lunch (with TU students)	**Depart from Sendai**
PM 13:00 - 16:00		13：00-16：00 **Japanese Culture 4 Aikido** Prof. Fujino Kawauchi Sub Arena, 3rd Floor (B05) (川内サブアリーナ棟3F) Kawauchi Campus	13：00-16：00 **Fastest Paper Clip Motor Competition 2** Prof. Moriya Creative Engineering Center (D02) 創造工学研修センター Aobayama Campus	**13:00-17:00** **Field Work :Introduction to Renewable Energy Systems: Engineering and Constructing a Solar Power Plant** Dr. Jan Martin WARZECHA & Ms. Shivani MEHTA **(Kurokawa (Solar) photovoltaic power plant)**	13:00-16:00 **Group Work Session** **（Preparation for Experimental Reports and/or Wrap-up Presentation）** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus	13:30-15:30 **Wrap-up Presentation of TSSP 2019** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室） Aobayama Campus 16:00-16:45 **Closing Ceremony** 17:00-18:30 **Farewell Party** Aoba Memorial Hall (C03) Room No. 501, School of Engineering （工学研究科青葉記念会館 501室）	

4. Outline of Lectures

Lecture #1
The 2011 Tohoku earthquake

Professor Toru MATSUZAWA
Graduate School of Science
Research Center for Prediction of Earthquakes and Volcanic Eruptions

Research fields

・Natural disaster science
・Solid earth physics

Room: Research Center for Prediction of Earthquakes and Volcanic Eruption, Lecture room 1 (Building A (B32), Room No. 205)地震・噴火予知研究観測センター 第一講義室(A 棟(B32) 205 号室), Aobayama campus

Outline of the lecture

The M9 Tohoku earthquake on 11 March 2011 had a great impact on the seismologists all over the world. This is because Tohoku (northeastern Honshu, Japan) is located in one of the most investigated plate subduction zones and the interplate coupling was thought to be too weak to generate M9 earthquakes there. In the lecture, I explain an elementary seismology, what happened in the source region of the M9 earthquake, and reasons why we failed to anticipate the event.

Lecture and Lab Visit #2
Introduction to aircraft design

Associate Professor, Hisashi NAKAMURA
Institute of Fluid Science, Tohoku University

Research fields

Combustion engineering
Industrial furnaces and engines (reciprocating, gas turbine, rocket, etc.)
Quantum chemistry
Analytical chemistry

Lecture room:

Conference Room, 2nd Floor, 1st Building (C09), Institute of Fluid Science (流体科学研究所、第 1 棟 2 階会議室), Katahira Campus

Outline of the lecture

Fundamental knowledge on aerodynamics and structural mechanics required for aircraft design will be introduced. Practical learning will be given through the observation of flight of paper planes.

Lecture and Lab Visit #3
Symmetry Breaking Create Nature

Assistant Professor Kazuo TANAKA

Cyclotron and Radioisotope Center (CYRIC)

Research Field

Fundamental Physics by using an "exotic" atom

Room: Lecture Room (2nd floor of Molecular Imaging Building (G12)), Cyclotron and Radioisotope Center (CYRIC), (分子イメージング棟(G12) 2 階講義室、サイクロトロン・ラジオアイソトープセンター), Aobayama Campus

Outline of the lecture

There are plenty of parity asymmetries around us, which make our world so unique. Why is not antimatter observable from the earth? Why is the human heart on the left side? In this lecture, we focus on breaking of the fundamental symmetries (parity symmetry, time reversal) which is an origin of asymmetries in nature.

Lecture and Lab Visit #4
Structural Metallic Materials for Industry Innovation

Professor Kyosuke YOSHIMI

Graduate School of Engineering
Department of Materials Science

Research fields

・Structural Materials

・Ultrahigh-Temperature Materials
・Mechanical Properties and Crystal Lattice Defects

Room: Materials Science and Engineering (B01), Lecture room 2 (Room No. 102)
（工学研究科材料科学棟(B01)，講義室2(102 室)）, Aobayama Campus

Outline of the lecture

Modern iron and steel industry has been established around the middle of the 19th century, and an extraordinary amount of iron and steel has been enabled to supply to the human society since then. Nickel-based superalloys were born in the 1940s, and the aeronautics industry has been dramatically developed in the world since then. Nowadays, titanium alloys are making big impacts on many industrial fields such as not only the automobile and airline industries but also social welfare and medical services. In this lecture, advanced metallic materials will be introduced, focusing on structural applications as well as scientific backgrounds.

Lecture and Lab Visit #5
Robotics for Space Exploration

Professor Kazuya YOSHIDA
Graduate School of Engineering
Department of Aerospace Engineering
Space Robotics Laboratory

Research fields

・Space Robotics
・Dynamics and control of orbital free-flying robots
・Mobility/traction mechanics, sensing and navigation of mobile robots
・Development and operation of space flight models of university-based micro-satellites

Room

Lecture Room no.4, Lecture Room Building-M.E (A02) in（機械系講義棟（青葉山キャンパス A02）第四講義室）, Aobayama Campus

Outline of the lecture

Robotics is a crucial technology for investigation/exploration of remote and difficult-to-access places, such as surface/sub-surface of the Moon and other planets. This

lecture will provide an introduction to robotics for lunar/planetary exploration from different aspects such as hardware design, motion mechanics, sensing and navigation control, and artificial intelligence.

Lecture #6
Historical and Social Approaches to Disaster

(1) Study of Japanese historical disaster and culture

Associate Professor Yuichi EBINA

Human and Social Response Research Division
Japanese Disaster Culture
Seminar room S100, International Research Institute of Disaster Science (IRIDeS) (災害科学国際研究所セミナー室、S100), Aobayama Campus

Research fields

・Historical disasters.
・Preservation of historical records.

(2) Approaches of Social Sciences to Disaster Mitigation

Associate Professor Sébastien Penmellen Boret

Disaster Information Management and Public Collaboration Division
International Research Promotion Office
International Research Institute of Disaster Sciences (IRIDeS)

Research fields

・Anthropology of Disasters
・Death studies
・Mass Fatality Management

Room: Seminar room S100, International Research Institute of Disaster Science (IRIDeS) (J31) (災害科学国際研究所セミナー室、S100), Aobayama Campus

Outline of the lecture

The lecture about rescue and preservation of historical records in the Great East Japan Earthquake, and historical disasters research which united history and science in IRIDeS.
Demonstration of historical-records preservation. ＊The dress which works easily is required.

Lecture #7
Origin of Life: The early Earth made the first life

Professor Takeshi KAKEGAWA
Natural Resources and Environmental Geochemistry Research Group
Department of Earth Science
Graduate School of Science

Research fields

・Environments and Life on the Early Earth
・Origin of Life

Room

Room 513 (1st half)& 503 (2nd half) of Earth Science Research Building (H12),（理学研究科地球科学系研究棟（H12）513 室、503 室）, Aobayama Campus
http://www.es.tohoku.ac.jp/EN/access/index.html

Outline of the lecture

The Earth was born ca. 4.6 billion years ago. The earliest Earth was too hot to make this planet habitable. The Earth started to cool down within billion years, allowing the appearance of the early ocean. Then, building blocks of life, such as amino acids, started to accumulate in the early oceans, suddenly. However, we do not know why and how amino acids accumulated in the early oceans. In the first part of my lecture, I introduce varieties of ideas proposed by different scientists, including myself. Scientists at Tohoku University contributed to finding traces of earliest life from ancient rocks. As a result, we now know that life was flourished on the Earth by ca. 3.8 billion years ago. In the second half of my lecture, I introduce how and where we can find the traces of life in ancient rocks.

Lecture and Lab Visit #8
Japanese second sample return mission: Hayabusa2

Professor Tomoki NAKAMURA
Department of Earth Science
Graduate School of Science

Research fields

・Early solar system evolution

Room: Room 503 of Earth Science Research Building (H12), （理学研究科地球科学系研究棟(H12)503 室), Aobayama Campus

Outline of the lecture

Hayabusa2 mission was developed based on heritage of Hayabusa mission that realized first successful recovery of asteroidal sample to the Earth. Hayabusa2 spacecraft was launched in Nov 2014, carried out Earth swing by in Dec 2015, and arrived at C-type asteroid Ryugu in July 2018. Ryugu is classified to C-type asteroids that are expected to contain water and organic material and thus important objects for the origin of life and water in the solar system. Observation from the space craft suggested that Ryugu shows spinning top shape with diameter of 900m and very low density (1.2 g/cc) (Watanabe et al. 2019), suggesting that Ryugu is not a first-generation asteroid but a rubble-pile asteroid formed by re-accretion of impacted and disrupted first-generation asteroid. The top shape indicates that the asteroid was rotated much faster than the current rotation period. The reflectance spectra in the visible and near-infrared wavelength indicate that the surface mineralogical distribution seems to be heterogeneous, but most regions show spectra similar to partially dehydrated carbonaceous chondrites, implying that Ryugu surface material experienced hydration and subsequent dehydration by heating (Sugita et al. 2019: Kitazato et al. 2019). In the lecture, update of the ongoing mission is introduced.

Lecture and Lab Visit #9
Interactive "Content" Design

Professor Yoshifumi KITAMURA

Research Institute of Electrical Communication (RIEC)

Research fields

- Human-Computer Interaction
- Virtual/Augmented Reality
- 3D User Interface

Room: M531, RIEC Main building (G10)（電気通信研究所本館 5 階 M531 セミナー室）, Katahira Campus

Outline of the lecture

As the Internet of Things (IoT) expands, everything around us is coming online and joining integrated networks. Even everyday items like furniture are going digital. Our research explores interactions between people, content, systems, and environments in order to build a world that is not only smarter, but also one that is happier, and better integrated. We focus on relationship and interaction in order to achieve greater harmony.

We view all artifacts, physical and digital, as content. Honouring the unique perspectives of people, systems, and the environments they inhabit, we study the interactions between types of content, with the ultimate goal of formulating cohesive, holistic, and intuitive approaches that promote efficiency, ease of use, and effective communication. We focus on content design to enhance living.

I will describe and demonstrate our recent efforts on realizing this vision.

Lecture #10
Introduction to Advances Researches with Accelerators

Associate Professor Takeshi KOIKE

Institute for Excellence in Higher Education

Graduate School of Science

Research Field

Experimental Nuclear Physics

Nuclear structure and nuclei with strangeness

Room: Aoba Memorial Hall (C03)　Room No. 501, School of Engineering,
（工学研究科青葉記念会館　501 室）, Aobayama Campus

Outline of the lecture

As its name suggests, an accelerator is a device to accelerate various particles to high energy and provide beams of such particles for scientific research as well as application to medical and industrial fields. In the first half of the lecture, working principle of an accelerator and different types of accelerators will be explained. In the second half, some of various researches conducted at Japan Proton Accelerator Research Complex (J-PARC) in our field trip will be discussed.

Lecture and Lab Visit #11
Introduction to Spintronics

President, Professor Hideo OHNO
Tohoku University

Research fields

・Electron/electric material engineering(Properties of Semiconductors)
・Electronic device/electronic equipment(Semiconductor Devices)
・Applied physical properties/crystal engineering(Semiconductor Crystal Growth)

Room: Laboratory for Nanoelectronics and Spintronics (E04) (ナノ・スピン実験施設 A401), Katahira Campus

Outline of the lecture

Spintronics is an emerging field that utilizes both spin and charge to realize new functions. I will discuss about the nonvolatile spintronic memory as an example; its basic operating principle and how it can make next generation VLSI's "greener".

Lecture #12
Introduction to Renewable Energy Systems: Engineering and Constructing a Solar Power Plant

Jan Martin WARZECHA Ph.D. (Physics)
Representative Director, juwi Shizen Energy Inc. & juwi Shizen Energy Operation Inc., Tokyo, Japan

Shivani MEHTA
Engineering Department, juwi Shizen Energy, Inc., Fukuoka, Japan

juwi Shizen Energy Inc. is a joint venture of globally acting juwi group (Germany) and Shizen Energy group (Japan). Both mother companies are active in development, construction and operation of renewable Energy power plants based on PV and other technologies.

Room: Aoba Memorial Hall (C03)　Room No. 501, School of Engineering（工学研究科青葉記念会館　501 室), Aobayama Campus

Outline of the lecture (part I):

What impact has the tremendous progress of photovoltaic technology for the advances of renewable energy? How can we understand the markets and the developments? What experiences have we made?

We will structure the overview in following chapters:

- Short introduction of juwi Shizen Energy and the vision of 100% RE
- Development of PV industry globally and in Japan
- Cost development of PV generated power
- Integrating PV plants into the electricity grid
- Specifics of Japan's PV industry

Outline of the lecture (part II):

What does it take to construct a megasolar power plant? How can we optimize the plant for both energy output and equipment and construction costs? Let's go through the steps it takes and the important factors to consider when building a photovoltaic power plant.

This lecture will give you more insight into…

- Basic physics and applied physics engineering aspects of renewable energy systems
- Geographical and meteorological parameters of the plant
- Major design considerations from the solar panels all the way to the grid connection where the energy is fed into the grid
- What the main factors are to consider for the equipment of the solar power plant
- How to simulate the design using the simulation software PVSyst
- General costs for components and construction
- What to consider when it is actually time for construction

Once we have these ideas in mind, we will take a look at a megasolar power plant.

Outline of the lecture (planned, part III):

Being constructed at Kurokawa we see all the above conditions coming together.

Finally, we will have the opportunity to see the energy generation of a plant that has already been constructed via the monitoring system that is typically set up for all plants.

Above lecture parts will give you a greater sense of what all it takes to engineer, construct and operate a photovoltaic power plant.

Japanese language Lecture
Interactive Japanese language

Huja BACKLEY, Yuna MIKOTA
Lecturer, Institute for Excellence in Higher Education, Tohoku University

Room: Aobayama Commons (J41) Lecture Room No. 3 & 10, School of Agricultural Science（農学研究科青葉山コモンズ第 3 及び第 10 講義室）Aobayama Campus

Outline of the lecture

The purposes of the Japanese classes are (1) to help students communicate with fellow students on campus and with local people during their short stay in Sendai, (2) to promote an understanding of Japanese language and culture. Students will gain a basic knowledge of the Japanese sound and writing systems, and acquire basic communication skills such as greetings, asking and answering basic questions in order to introduce themselves and their own country/town. This course is designed for novices. Students are required to actively participate in classroom activities. Instructors will assess how actively students are participating and how much they achieve the objectives of each class.

Japanese Culture 1: Japanese Flower Arrangement (*Kadou*)

Professor Ying CHEN
School of Engineering

Research fields

・Condensed Matter Physics
・Computational Materials Science
・Materials Design Science

Room

Education and Student Support Center (A01), 4F MainConference Room（教育学生総合支援センター 4 階大会議室）, Kawauchi Campus

Outline of the lecture

Let's take the opportunity to experience something authentically Japanese! Ikebana, the Japanese flower arrangement, has been appreciated since almost 600 years ago, and you are at the entrance of a traditional as well as creative world of Ikebana. Anybody can enjoy the process of mere flowers being sublimed to a type of art. In addition to flowers, green plants play an important part to make the world richer and denser.
You will learn techniques such as fixing materials in a vase, cutting off unwanted leaves and twigs, curving materials and so on. Use your imagination, and decorate the room with flowers of calm and quite beauty.

Japanese Culture 2: Rinnou-ji (temple) and Shikan taza (zazen for its own sake)

Rinnou-ji is a temple of Soto sect in Japanese zen Buddhism. Much information can be found in https://global.sotozen-net.or.jp/eng/ Soto sect was founded by Zen master, Dogen upon returning to Japan from China at age 28. In China he has attained enlightenment (satori) under the Zen master, Nyojyo. It is worthwhile to mention that he brought no scrolls of Buddha teaching from China when it had been customarily for high priests studying in China to do otherwise. Their journeys must have been dangerous enough to risk their lives through rough ocean path by ships. Instead he has expressed his own thoughts and experiences of zen meditation and Buddhism in Japanese. Soto sect emphasizes paying full attention to every aspect of your life. Be it eating, talking and meeting with others, studying, playing and goes on. When you enter the temple, you might see a sign written in Chinese character as 脚下照顧 (Kyakka Shyoko, look at your feet) What does it mean? How do you enter the hall as you take off your shoes?

Also the sect approaches act of Zazen (zen sitting) as end itself instead of path to enlightenment. In other words, you have no purpose when sitting other than paying attention to each breath (只管打坐, Shikan taza) with proper posture. Dogen states that when you let yourself come out to be truly as your being through meditation (身心脱落、shinjin-daturaku), you will experience will oneness with the whole universe or "satori".

In sprit of Zen, a tea ceremony holds a special meaning. Your host does her/his best to make a cup of tea for you, the hosted. You then will truly put yourself to savor the offering. It is an elevated act of fully paying attention to your meeting. (一期一会, every meeting is just one and the one only)

After all, let us forget all that and just enjoy the meditation, the moment, and the tea.

How to do Zazen: https://global.sotozen-net.or.jp/eng/practice/zazen/howto/index.html

Japanese Culture 3: Calligraphy (*Shodou*)

Professor Yumiko WATANABE
Global Learning Center, Institute for Excellence in Higher Education
Department of Earth Science, Graduate School of Science

Research fields

・Environments and Life on the Early Earth
・Astrobiology

Room

International Exchange Building(A12) Room R115（国際交流棟　R115 室）, Kawauchi Campus

Outline of the lecture

Shodou is the art of Japanese calligraphy. It has developed a unique style that mainly depends on the written characters of the Japanese language. *Shodou* was strongly influenced by Chinese calligraphy at the early stage. However, after the invention of *Hiragana* and *Katakana*, which are unique Japanese writing systems, Japanese calligraphy developed its own distinctive look.

The basic tools for *Shodou* are as follows:

- brush (筆:*fude*)
- inkstick (墨:*sumi*)
- inkstone (硯:*suzuri*)
- paper (和紙:*washi*)

Japanese students of Tohoku University will help you learn how to write with the unique *Shodou* tools. You will take your work with you as a souvenir for your family or friends.

http://www.naraya-honpo.com/images_mt/%E7%AD%86.jpg

Japanese Culture 4: Japanese Martial Arts (*Aikidou*)

Professor Yutaka FUJINO

Research fields

・Materials Science and Engineering

・Ion Beam Analysis and Surface Modification Engineering

Room

Kawauchi Sub Arena, 3rd Floor (B05) (川内サブアリーナ棟 3F), Kawauchi Campus

Outline of the lecture

In the course, students learn Japanese culture through practice of Aikidou, a Japanese martial way (budo) developed by Morihei Ueshiba (often referred to as 'O-Sensei' or 'Great Teacher' by his title). Morihei Ueshiba developed Aikido, drawing on the rich history of the martial traditions of Japan and refining them into a wholly new system for the future. On the technical side, Aikido is, in this way, rooted in several styles of jujutsu, traditional Japanese martial arts, (in which modern Judo is also originated), in particular Daito-ryu-(aiki)jujutsu, as well as sword and spear fighting arts.

5. Field Trips

Field trip to City of Shiroishi

June 25, Tuesday 8:30-17:00

Shiroishi city is a city south of Sendai in Miyagi prefecture. Here you will visit some historical Japanese architecture and observe and try yourself the traditional craftsmanship. Of course, enjoy the local cuisine, Shiroishi style Japanese wheat noodle, Wumen.

8:30: departure

9:30 – 11:30: Visit to Shiroishi castle (try putting on Samurai armors and helmet, and kimono)

12:00-13:00: lunch at Japanese traditional noodle shop (savor a local Shiroishi style wheat noodle Wumen)

13:30 – 14:45: Visit to Japanese swordsmith shop (Mr. Akimori Miyagi, Japanese sword (Katana) master or Katana-kaji in Japaense)

15:30-16:00: Visit to a local Japanese wood doll (Kokeshi) museum to paint your own Kokeshi doll.

17:00 arrival at the hotel

Field trip to Ichinoseki city and Toyota automobile factory in Ohira village

June 27, Thursday 8:00-16:30

We will visit a traditional Japanese craftsmanship in city of Ichino-seki which is located north of Sendai and in Iwate prefecture. Ichino-seki is rich in history where a series of historical sites such as Motsu-ji (temple) and Tyuson-ji (temple) is designated as the world heritage site are nearby. Then we will return to Miyagi prefecture to visit an automobile factory of Toyota Co, one of the major drivers of Japanese industry.

8:00 departure

9:30-11:00 Visit to traditional Japanese dye house. Get hands on experience by dying your own face towel

13:30-15:20 Visit to a factory of Toyota Motor Co.at Ohira village located north of Sendai in Miyagi prefecture. Proper clothing for safety reason in the factory is required. Please see further information on

16:30: arrival at the hotel

Field trip to Disaster-affected area:
Experience in disaster affected areas

July 3, Wednesday 8:30-18:00

Professor Takeshi KAKEGAWA

Natural Resources and Environmental Geochemistry Research Group

Department of Earth Science

Graduate School of Science

Research fields

・Environments and Life on the Early Earth

・Origin of Life

Destinations and Schedule

Sendai (8:30)- Utatsu (10:30) - Minimi Sanriku (12:30 lunch) - Arahama elementary school in Sendai (15:30) - Yuriage (16:30)- Sendai

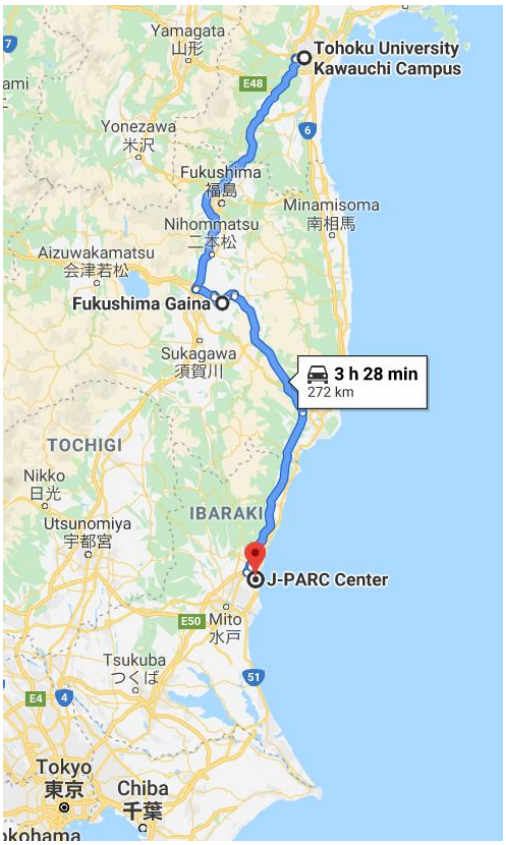
Outline of the fieldwork

March 11th of 2011 becomes unforgettable date for people in the Tohoku region. The earthquake hit Sendai at 14: 46 p.m. on that day. Around 4 p.m., Tsunami washed away cities and towns along the Pacific coast, sacrificing about 20000 people's life. Such tragedies may happen anytime allover the world. One of duties here at Tohoku University is to keep telling people what we learned from the March 11th disaster, so that people can prepare for future natural disasters.

In this filed excursion, we will visit ruined towns by Tsunami at several localities and see how they are recovering. For instance, significant amounts of new landfill changed the view of Minami Sanriku town, and local people started to build new houses at high elevation areas. At Arahama, there was a 4th floored elementary school. Tsunami reached to 2nd floor. Many local people escaped to upper floors and stayed there for a few days until a rescue team arrived. This building is now becoming a museum to tell what happened on March 11th. You may experience how danger Tsunami was. We will have a group discussion for strategies to rebuild towns during this field excursion.

Field Trip to GINAX (Fukushima) and J-PARC (Tokai)

July 5, Friday 7:45-19:00



10:00-11:00 Animation Museum
(GAINAX Fukushima)
13:30-16:30 Guided tour of J-PARC
16:30-19:00 Back to our hotel

GINAX Fukushima (amination museum)

Animation studio Gainax (Neon Genesis Evangelion, Gurren Lagann, Panty & Stocking with Garterbelt) has opened a new studio and museum in Miharu, Fukushima since March, 2015. Gainax established the "Fukushima Gainax" managing company to run the new location. The newly-established branch will be taking more commissioned work from overseas. Locals hope that the museum and studio will draw tourists from abroad as well as from within Japan, and help revive Fukushima tourism in the wake of the Fukushima Daiichi nuclear disaster in 2011. The new studio and museum makes use of a closed junior high school building.

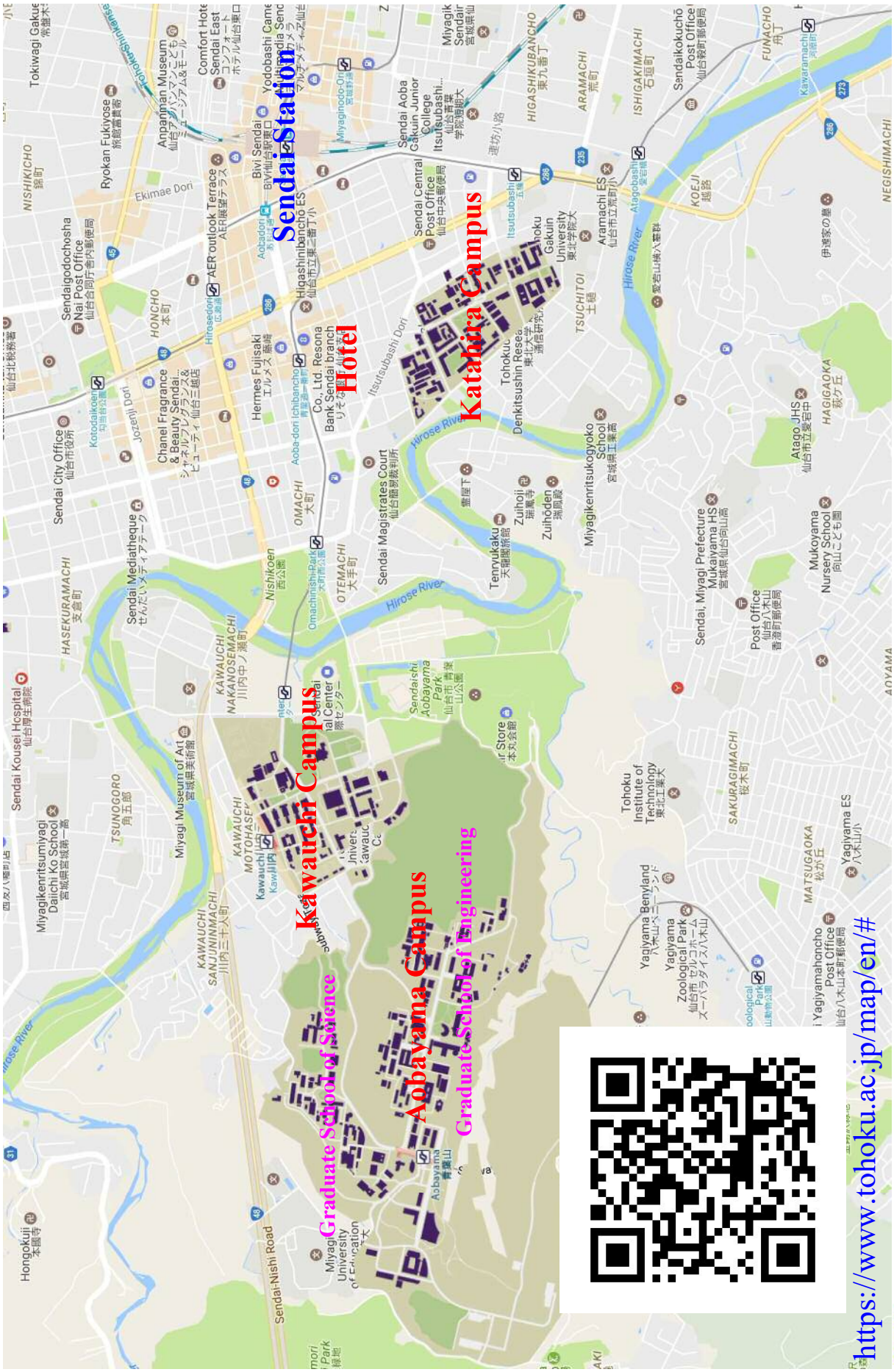
Some of the works can be viewed at https://www.gurutto-koriyama.com/detail/item_480.html

Japan Accelerator Research Complex (J-PARC)

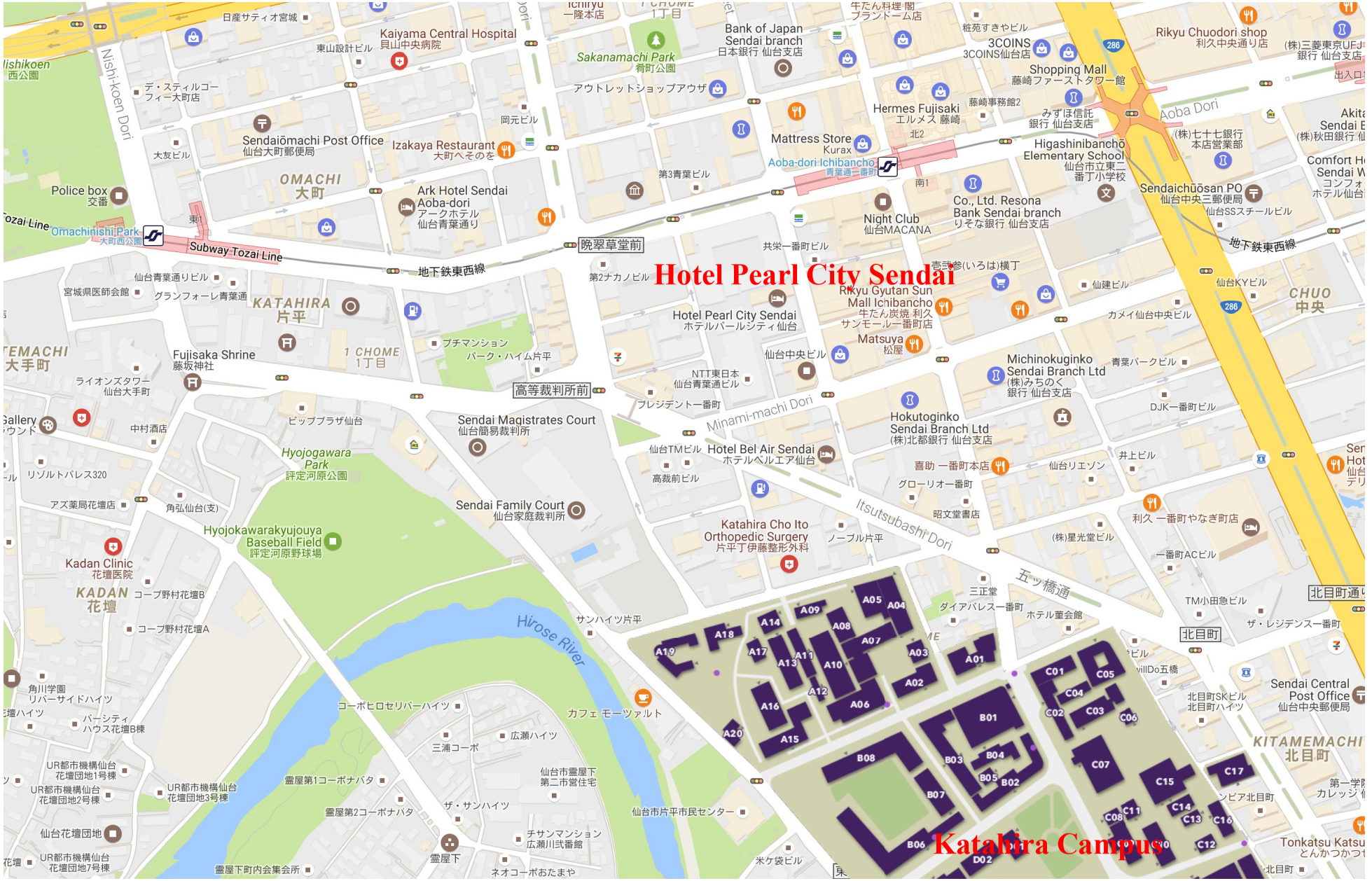
J-PARC consists of a series of world-class proton accelerators and the experimental facilities that make use of the high-intensity proton beams. Open to users from around the world. J-PARC is a multi-purpose and multidisciplinary facility that is unique in the variety of secondary-particle beams produced and put to use in cutting-edge research across a wide range of scientific fields. Neutron, pion, kaon and neutrino beams are all produced at J-PARC via collisions between the proton beams and target materials (spallation reactions). The applications of these beams include fundamental nuclear and particle physics, materials and life science, and nuclear technology.

It is the intensity of the secondary-particle beams that makes J-PARC special. Responding to the ever-increasing demands of modern experiments, the high-intensity makes possible the impossible and unlocks the door to new and exciting research endeavors.

6. Maps


Sendai Station
Katahira Campus
Kawauchi Campus
Aobayama Campus
Graduate School of Science
Graduate School of Engineering
Hotel
https://www.tohoku.ac.jp/map/en/#
Map data ©2017 Google, ZENRIN
Google

CAMPUS MAP | TOHOKU UNIVERSITY



https://www.tohoku.ac.jp/map/en/

AobayamaEast Campus Map School of Engineering

青葉山東キャンパス | 工学研究科/工学部

最終更新日:2017/4/1

[レストラン・カフェ Can teen |]
A 31 こもれびカフェ Komorebi cafe
C 01 あおば食堂 THE AOBA DINING
C 02 BOOOK(ブーク) Book+cafe "Boook"
C 03 四季彩 Shikisai
C 10 エスパース・コマン Espace Commun
E 10 けやきダイニング Keyaki dining

[バス停 Bus stop |]
1 青葉山植物園西 Aobayama Shokubutsuen-nishi
2 工学部中央 Kogakubu-chuo
3 工学部西 Kogakubu-nishi
4 青葉山駅 Aobayama-eki
5 理学部自然史標本館前 Rigakubu Shizenshi Hyohonkan-mae
6 災害科学国際研究所前 Saigai kagaku kokusai kenkyujyo-mae

[地下鉄駅 Subway Station |]
1 青葉山駅 北1番出口 Aobayama sta. North 1
2 青葉山駅 南1番出口 Aobayama sta. Sorth 1

[凡例 Explanatory notes]
インフォメーション Informa tion
警備員室 Guardroom
バス停 Bus s top
バス停[るーぷる仙台停留所] Bus stop[Loople SENDAI]
地下鉄駅 Subway Station

レストラン・カフェ Can teen
カフェ Cafe
コンビニエンスストア Newsagent store
購買部 Cooperative store
避難場所 Place of refuge
工事等に伴う立入禁止範囲

A 機械・知能系 Mechanical and Aerospace Engineering

A 01 機械系 1号館［M1］
Research Building No.1 - M.E.
A 03 機械系 2号館［M2］
Research Building No.2 - M.E.
A 02 機械系 講義棟
Lecture Room Building - M.E.
A 05 機械系 実験棟I［M-I］
A 04 機械系 実験棟J［M-J］
Research Laboratory A to J - M.E.
A 06 機械系実験研究棟
Mechanical Engineering Laboratory Building
A 07 機械・知能系 教育実験棟・高機能試作センター
Laboratories for Students - M.A.E.
Nano-Precision Machining Shop
A 15 機械・知能系 共同棟
Research Building - M.A.E.
A 40 量子エネルギー工学専攻 本館
Research Building - Quantum Science and Energy Engineering
A 10 機械系 環境材料強度研究棟
Environmental Strength Research Laboratory-M.E.
A 14 マイクロ・ナノマシニング研究教育センター マイクロマシニング棟
Micromachining Facility
Micro/Nano-Machining Research and Education Center
A 17 マイクロ・ナノマシニング研究教育センター ナノマシニング棟
Nanomachining Facility

A 13 ナノ医工学研究棟
Nano-Biomedical Engineering Research Building
A 21 ナノ医工学実験棟
Nano-Biomedical Engineering Research Laboratory

環境科学研究科
Graduate School of Environmental Studies

A 50 研究棟 Research Building
A 51 研究棟（講義室） Research Building(Lecture Room)
A 52 地殻環境強度特別実験室
Geoscience Research Laboratory
A 53 実験棟 Research Laboratory
A 54 研究棟アネックス Annex
A 55 エコラボ Ecollab.

A 30 自動車の過去・未来館
Automobile Museum
A 31 デイリーヤマザキ・こもれびカフェ
Daily Yamazaki, Komorebi Cafe
A 32 青葉山植物園ゲート
Botanical Gardens Tohoku University Aobayama Gate

M.E.: Mechanical Engineering
M.A.E.: Mechanical and Aerospace Engineering

A 40 量子エネルギー工学専攻 本館 Research Building - Quantum Science and Energy Engineering
A 41 量子エネルギー工学専攻 講義棟 Lecture Room Building
A 42 生活環境早期復旧技術研究センター 研究棟
Research building of research center for remediation engineering of living environments contaminated with radioisotopes
A 43 放射性同位元素実験室 Radioisotope Laboratory
A 44 先進核融合炉工学総合実験棟 Integrated Laboratory for Advanced Fusion Reactor Engineering
A 45 生活環境早期復旧技術研究センター 実験棟
Laboratory building of research center for remediation engineering of living environments contaminated with radioisotopes
A 46 高速中性子実験室 Fast Neutron Laboratory
A 47 臨界未満実験装置室［量子エネルギー科学館］ Subcritical Assembly

B マテリアル・開発系 Materials Science and Engineering

B 01 マテリアル・開発系 教育研究棟 Education and Research Building
B 02 マテリアル・開発系 材料実験棟 The Materials Experiments Building
B 03 大講義棟 Lecture Hall
B 04 マテリアル共同研究棟 Materials Collaborative Research Building
B 11 革新材料研究棟 Materials Evolution Research Building
B 12 マテリアル・開発系 実験・研究棟 Research & Machining Building
B 14 教育研究基盤支援棟17［M5］ Education and Research Base Support Building 17
B 15 教育研究基盤支援棟14［M2］ Education and Research Base Support Building 14
B 16 教育研究基盤支援棟13［M1］ Education and Research Base Support Building 13

環境保全センター Environmental Conservation Research Institute

B 20 実験廃液処理棟
B 21 実験研究棟
B 22 分析棟
B 23 教員棟

C センタースクエア Centersquare

C 01 中央棟 CENTER HALL
あおば食堂 AOBA DINING
C 02 BOOOK（ブーク） Book+cafe "BOOOK"
C 03 青葉記念会館 Aoba Memorial Hall
C 04 青葉山会館 Aobayama Hall
C 05 工学部管理棟［医工学研究科］
カタールサイエンスキャンパスホール
Administration Office - School of Engineering [Graduate School of Biomedical Engineering]
Qatar Science Campus Hall
C 06 ハッチェリースクエア Hatchery Square
C 10 総合研究棟［技術社会システム専攻 他］ Engineering Laboratory Complex Building

D

D 01 附属図書館 工学分館 Engineering Library
D 02 創造工学センター Innovation Plaza

電子情報システム・応物系 Electrical Engineering and Applied Physics

D 03 磁気共鳴電波実験室 Research Room for Magnetic Resonance and Radio Wave
D 04 南実験棟2 South Research Laboratory No.2
D 05 南実験棟1 South Research Laboratory No.1
D 07 教育研究基盤支援棟10［E5］ Education and Research Base Support Building 10
D 08 教育研究基盤支援棟11［E6］ Education and Research Base Support Building 11
D 09 教育研究基盤支援棟12［E7］ Education and Research Base Support Building 12
D 10 電子情報システム・応物系1号館 Electrical, Information and Physics Engineering Building No.1
D 11 1号館別館 Building No.1 Annex
D 12 2号館 Research Building No.2
D 13 北実験棟 North Research Laboratory
D 14 北研究棟 North Research Building
D 15 特殊電磁界実験室 Research Room for Peculiar Electromagnetic Field
D 17 大講義棟 Main Lecture Hall
D 18 南講義棟 South Lecture Room Building
D 20 教育研究基盤支援棟7［E2］ Education and Research Base Support Building 7

E 化学・バイオ系 Applied Chemistry, Chemical Engineering and Biomolecular Engineering

E 01 化学・バイオ系研究棟 本館 Research Building - Main
E 02 研究棟分館 Research Building - Annex
E 03 第二研究棟 Research Building No.2
E 04 講義棟 Lecture Room Building
E 05 大講義棟 Lecture Hall
E 06 実験棟 Laboratories for Students
E 08 超臨界溶媒工学研究棟 Supercritical Fluid Research Laboratory

E 07 総合実験棟 Complex Building of Experimental Research Laboratories
E 10 けやきダイニング KEYAKI DINING - Student Restaurant

F 人間・環境系 Civil Engineering and Architecture

F 01 人間・環境系 教育研究棟 Civil Engineering and Architecture
F 02 建築実験棟 Laboratory Building of Architecture and Building Science II
F 03 社会環境工学実験棟 Laboratory Building of Civil and Environmental Engineering
F 04 教育研究基盤支援棟19［A1］ Education and Research Base Support Building 19

F 10 東北大学連携ビジネスインキュベータ［T-Biz］
T-Biz (Business Incubator collaborated with Tohoku University)
F 11 未来科学技術共同研究センター 本館 New Industry Creation Hatchery Center
F 12 未来情報産業研究館 Fluctuation Free Facility for New Information Industry

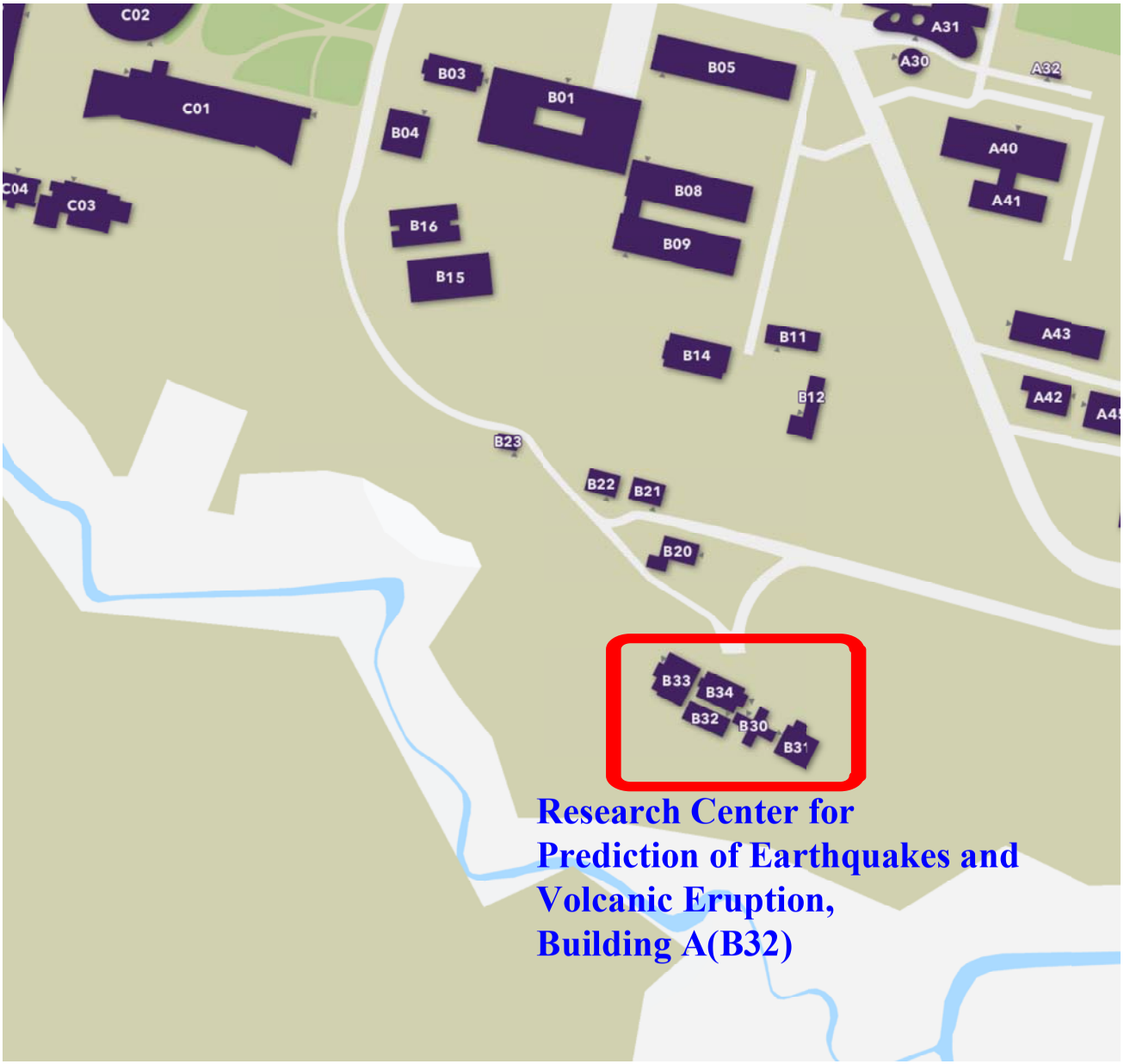
G

G 01 情報科学研究科 Graduate School of Information Sciences
G 02 電子情報システム・応物系 3号館
Research Building No.3 - Electrical Engineering and Applied Physics
G 03 青葉山体育館 Aobayama Gymnasium
G 04 建築実験所 Laboratory of Architecture and Building Science
G 05 サイバーサイエンスセンター Cyberscience Center
G 06 学際科学フロンティア研究所
Frontier Research Institute for Interdisciplinary Sciences
G 07 教育研究基盤支援棟6［E1］ Education and Research Base Support Building 6
G 08 サイバーサイエンスセンター 2号館 Cyberscience Center

J

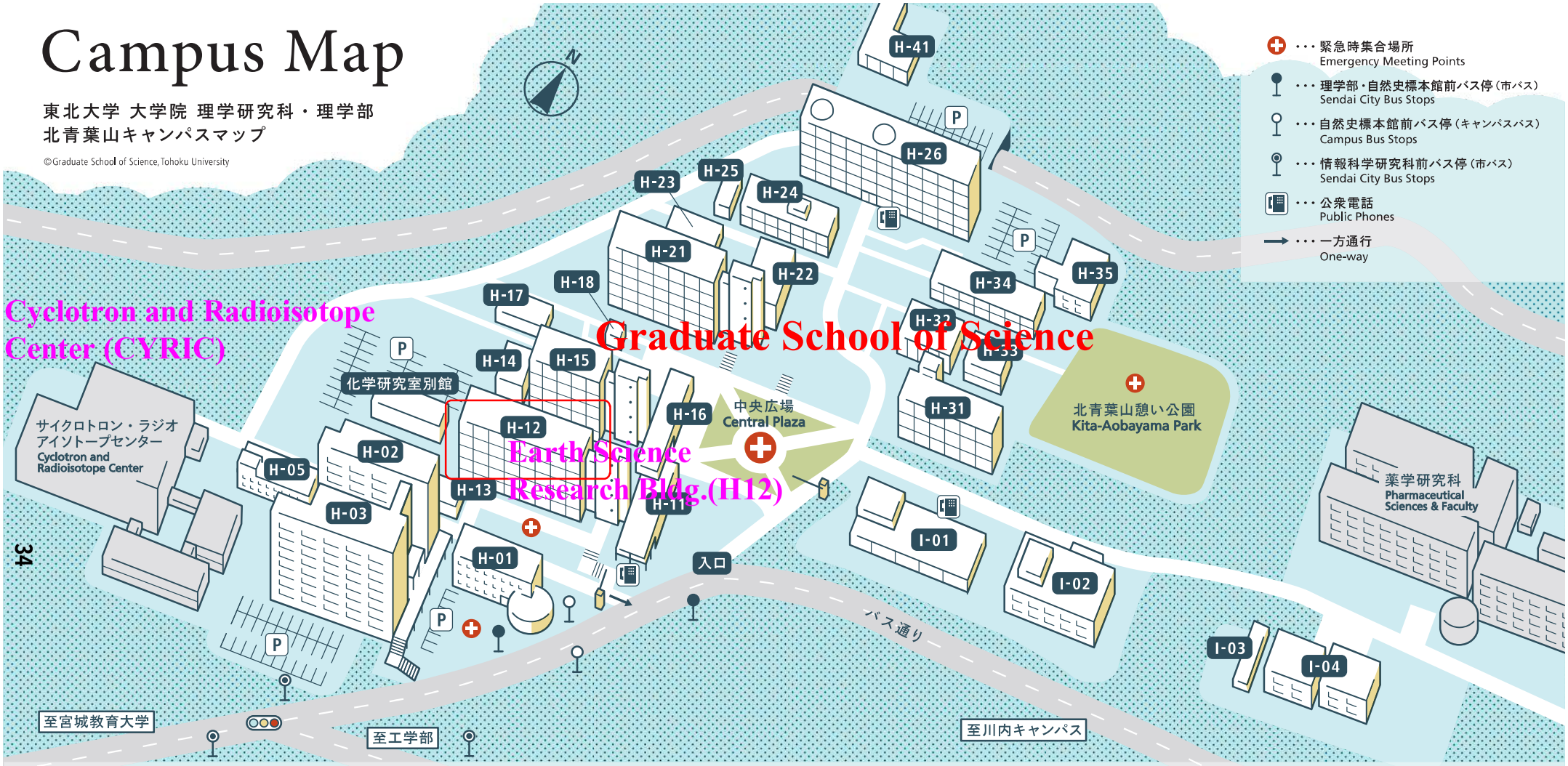
J 02 レアメタル総合棟
Laboratory for Rare Metal Research
J 03 レジリエント社会機構イノベーションセンター
Innovation Center for Creation of a Resilient Society
J 04 未来産業技術共同研究館

［凡例 Explanatory notes］
インフォメーション Information
警備員室 Guardroom
レストラン・カフェ Canteen
カフェ Cafe
コンビニエンスストア Newsagent store
購買部 Cooperative store
避難場所 Place of refuge
自動体外式除細動器AED

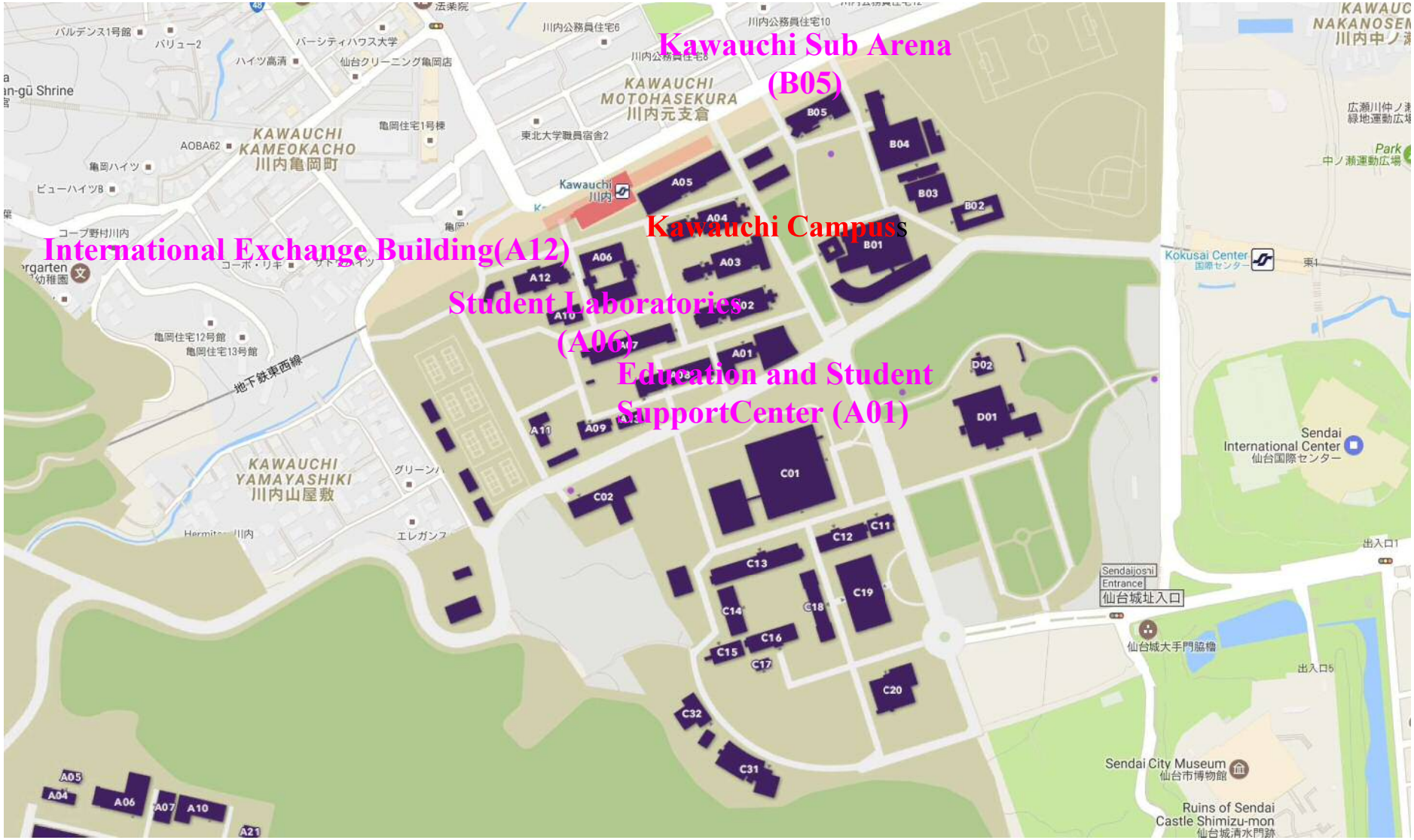

C02
C01
C04
C03
B03
B01
B04
B05
B08
B09
B16
B15
B14
B11
B12
B23
B22
B21
B20
A31
A30
A32
A40
A41
A43
A42
B33
B34
B32
B30
B31
Research Center for
Prediction of Earthquakes and
Volcanic Eruption,
Building A(B32)
Google
Map data ©2019

Campus Map

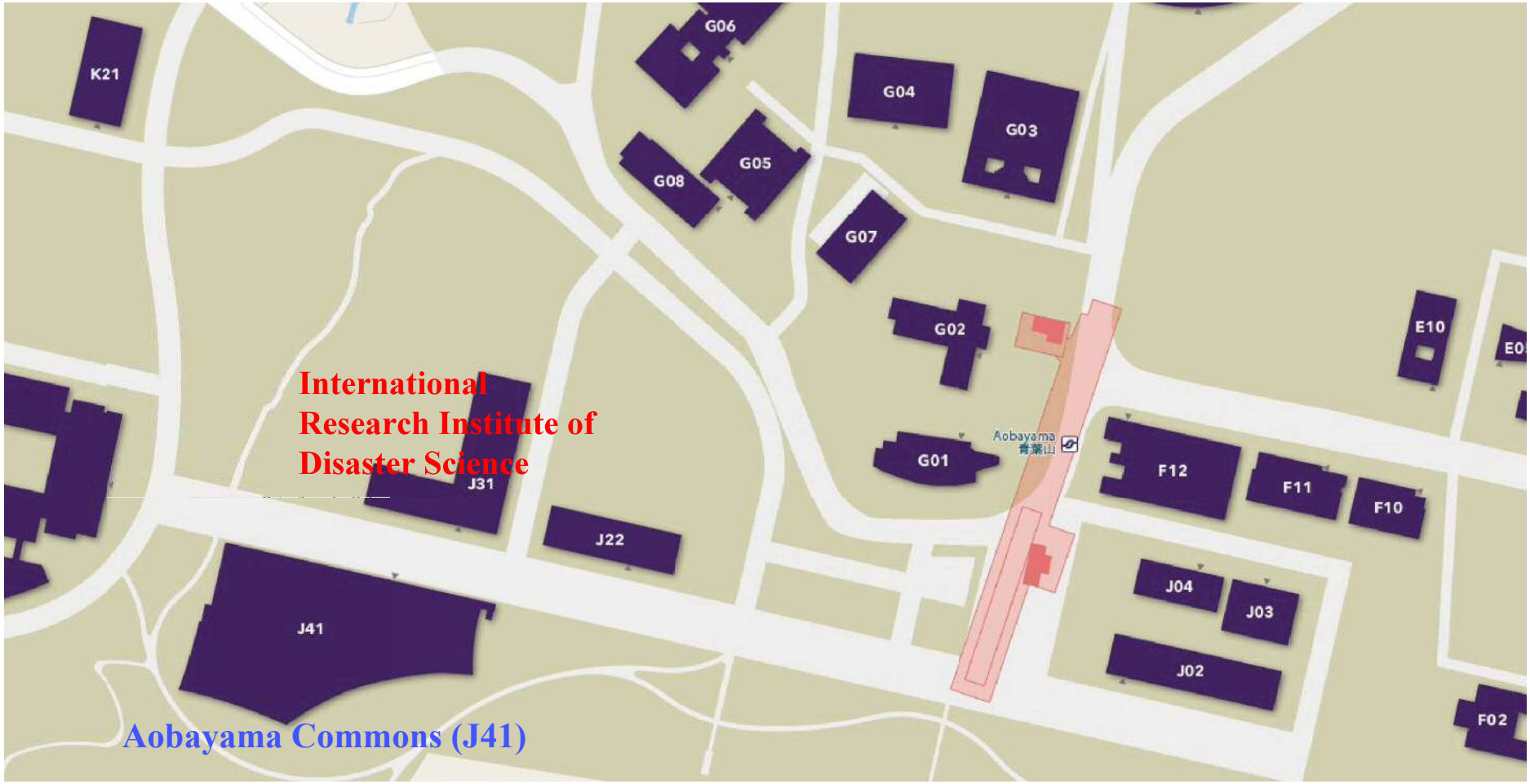
東北大学 大学院 理学研究科・理学部
北青葉山キャンパスマップ



- H-01 自然史標本館 Museum of Natural History
- H-02 理学研究科合同A棟 Science Complex A
- H-03 理学研究科合同B棟 Science Complex B
- H-05 理学研究科合同A棟別館 Science Complex Annex
- H-11 理学研究科事務棟 Science Administration Center
- H-12 地球科学系研究棟 Earth Science Building
- H-13 高温高圧実験棟 High Pressure and High Temperature Laboratory
- H-14 生物学系学生実験棟 Biology Students Laboratories
- H-15 生物学系研究棟 Biology Building
- H-16 生物学系研究棟別館 Biology Building Annex
- H-17 巨大分子解析センター棟 Research and Analytical Center for Giant Molecules
- H-18 超伝導核磁気共鳴装置棟 High Resolution NMR Systems Building
- H-21 化学系研究棟 Chemistry Building
- H-22 化学系学生実験棟 Chemistry Students Laboratory
- H-23 化学系講義棟 Chemistry Lecture Hall
- H-24 物理系講義棟 Physics Lecture Hall
- H-25 極低温科学センター棟別館 Center for Low Temperature Science Annex
- H-26 物理系研究棟 Physics Building
- H-31 数学系研究棟 Mathematics Building
- H-32 理学研究科大講義棟 Science Lecture Hall
- H-33 数理科学記念館（川井ホール） Kawai Hall
- H-34 物理・化学合同棟 Physics & Chemistry Annex
- H-35 機器開発研修棟 Machine Shop & Glass Laboratory
- H-41 極低温科学センター棟 Center for Low Temperature Science
- I-01 北青葉山厚生会館 Kita-Aobayama Commons
- I-02 附属図書館 北青葉山分館 Kita-Aobayama Library
- I-03 ニュートリノ科学研究センター棟別館 Research Center For Neutrino Science Annex
- I-04 ニュートリノ科学研究センター棟 Research Center For Neutrino Science


Kawauchi Sub Arena
(B05)
Kawauchi Campuss
International Exchange Building(A12)
Student Laboratories
(A06)
Education and Student
SupportCenter (A01)
KAWAUCHI
KAMEOKACHO
川内亀岡町
KAWAUCHI
MOTOHASEKURA
川内元支倉
KAWAUCHI
YAMAYASHIKI
川内山屋敷
Kawauchi
川内
Kokusai Center
国際センター
Sendai
International Center
仙台国際センター
Sendaijoshi
Entrance
仙台城址入口
Sendai City Museum
仙台市博物館
Ruins of Sendai
Castle Shimizu-mon
仙台城清水門跡
地下鉄東西線
Google
Map data ©2017 Google, ZENRIN


Institute of Fluid Science
1st Building (C09)
Laboratory for Nanoelectronics and
Spintronics (E04)
Katahira Campus
RIEC Main building(G10)
Hirose River
KOMEGAFUKURO
米ケ袋
OTAMAYASHITA
霊屋下
KITAMEMACHI
北目町
TSUCHITOI
土樋
2 CHOME
2丁目
五ツ橋通
北目町通り
Odori
Sendai Central Post Office
仙台中央郵便局
Sendaichūō Police Station
仙台中央警察署
Tonkatsu Katsusei
Sendaikomegafukuro Post Office
仙台米ケ袋郵便局
Itsutsubashi Junior High School
仙台市立五橋中学校
Tohoku Gakuin University
東北学院大学土樋キャンパス
Supermarket
西友五橋店
Ryokan Otamaya
旅館 オタマヤ
Morishige Ryokan
旅館 森重
Google
Map data ©2017 Google, ZENRIN



Google

Map data ©2017 Google, ZENRIN

7. Accommodation and Transportation

Hotel Pearl City Sendai

Address
2-8-9 Ichiban-cho, Aoba-ku, Sendai, Miyagi, JAPAN
TEL：022-262-8711　FAX：022-268-3942
The hotel is giving a discounted rate for TSSP. The breakfast will be provided by the hotel, and cleaning and new towels will also be provided every day. English-speaking hotel staff may be available at the front desk.

Check-In / Check-Out
A single room at Hotel Pearl City Sendai is reserved for each participant during the period of TSSP (check in: June 17, check out: July14). You can check in from 3:00 pm and must check out by 10:00 am.

Laundry and Internet Access
There will be free internet access in your room and coin-operated laundry machines (200 JPY) and driers (100JPY/ 30 min.) in first basement.

Access
Walk about 3 minutes from the subway station of Aoba Dori Ichibancho (Subway Tozai Line) and find out the **Hotel Pearl City Sendai.**

From Sendai Station to Aoba Dori Ichibancho station

2 minutes by the Subway (Subway Tozai Line), subway fare: 200 JPY

From Aoba Dori Ichibancho station to Aobayama Station (Aobayama Campus)

7 minutes by the Subway (Subway Tozai Line) , subway fare: 250 JPY

How to Ride the Subway
1. Entry via the Automatic Ticket Gate
All tickets on the subway are read via the automatic ticket gate. Please enter using the ticket, pass, icsca or SUICA you have purchased.

2. When Waiting for a Train
(1) Please make sure there is plenty of space between you and the opening of the Automatic Platform Gate.
(2) Do not lean on the Automatic Platform Gate.
(3) Do not lean over the Automatic Platform Gate or stand objects against the gate.
(4) Please don't run to catch your train because it is very dangerous.

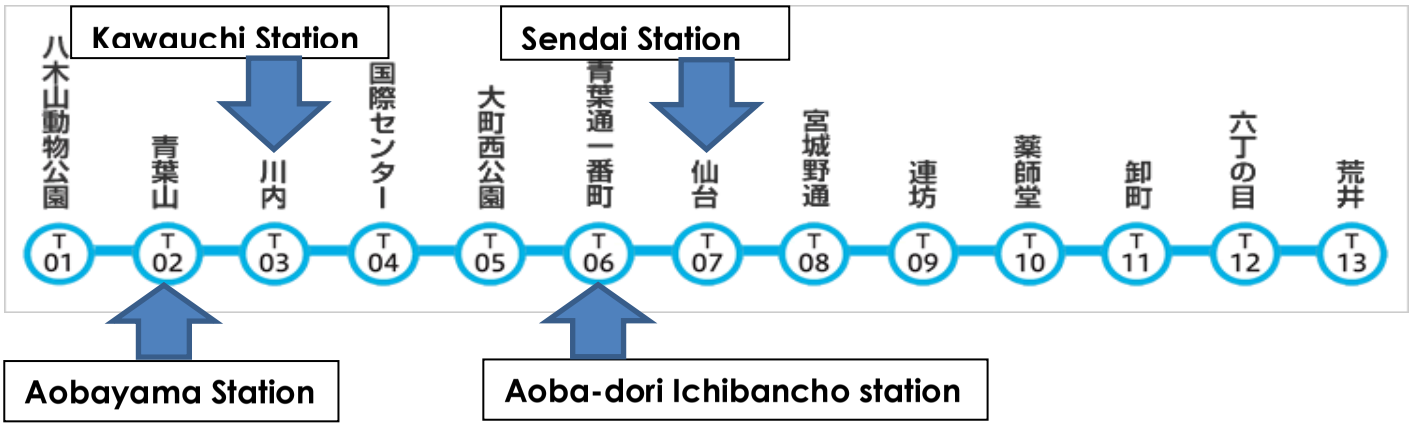
On the Tozai Line, trains heading for Arai stop at Platform 1, while trains heading for Yagiyama Zoological Park stop at Platform 2. At the transfer hub in Sendai Station, trains heading for Arai stop at Platform 3, while trains heading for Yagiyama Zoological Park stop at Platform 4.

3. Exiting via the Automatic Ticket Gate

Touch IC Reader in SUICA

乗車券投入口
(磁気乗車券・
普通券)

《磁気乗車券・普通券》
投入口に乗車券をお入れ
ください。

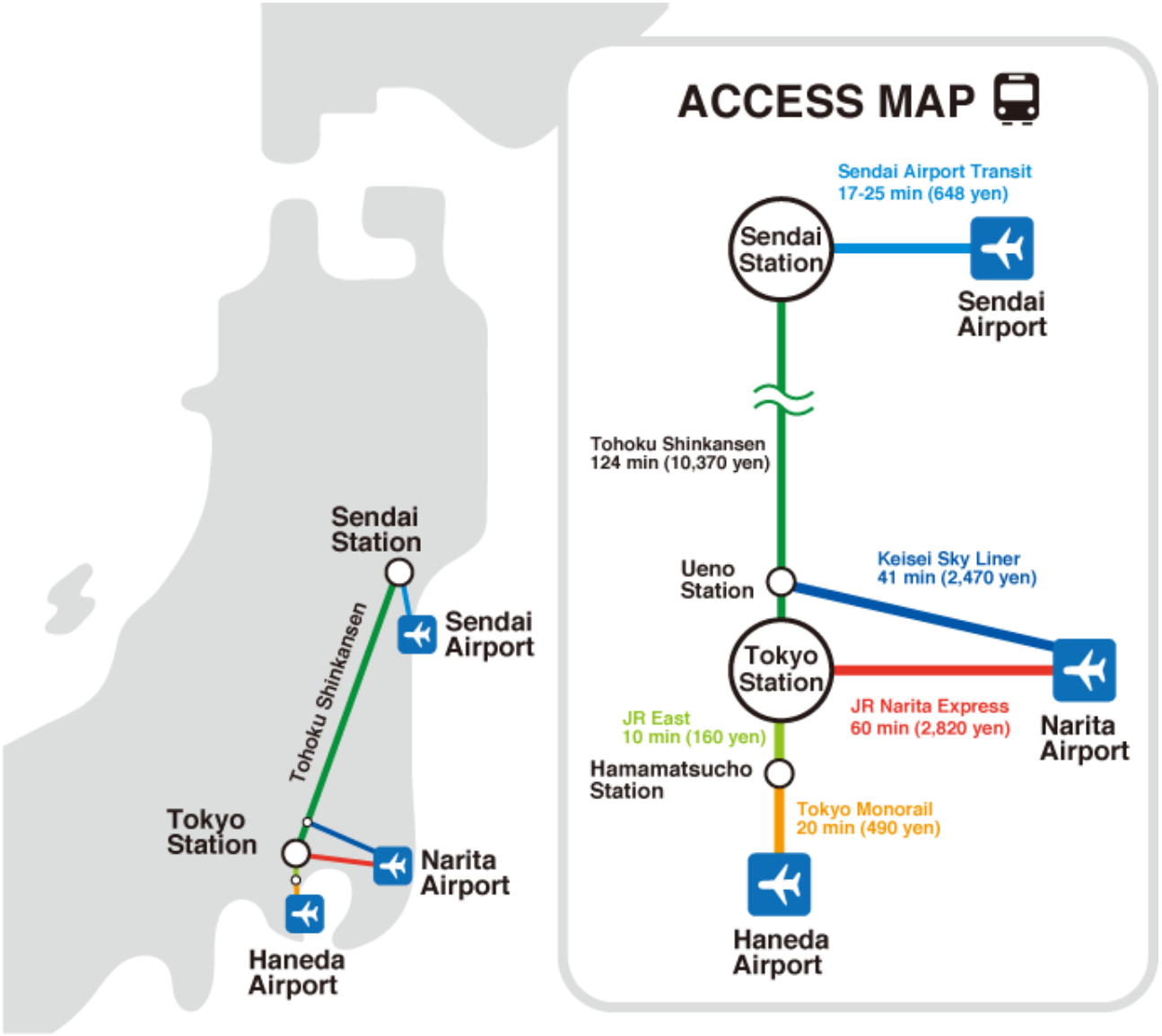


8. Other Information

A. Arrival in Sendai

Getting to Sendai

The simplest way to get to Sendai is by direct flight to Sendai Airport. Another option is to fly into Narita International Airport or Haneda Airport (Tokyo International Airport) and travel the rest of the distance by train.



Related links

- Narita International Airport: http://www.narita-airport.jp/en/
- Haneda Airport (Tokyo International Airport): http://www.tokyo-airport-bldg.co.jp/en/
- East Japan Railway (JR East): http://www.jreast.co.jp/e/
- Tokyo Monorail: http://www.tokyo-monorail.co.jp/english/
- Keisei Skyliner: http://www.keisei.co.jp/keisei/tetudou/skyliner/us/index.html

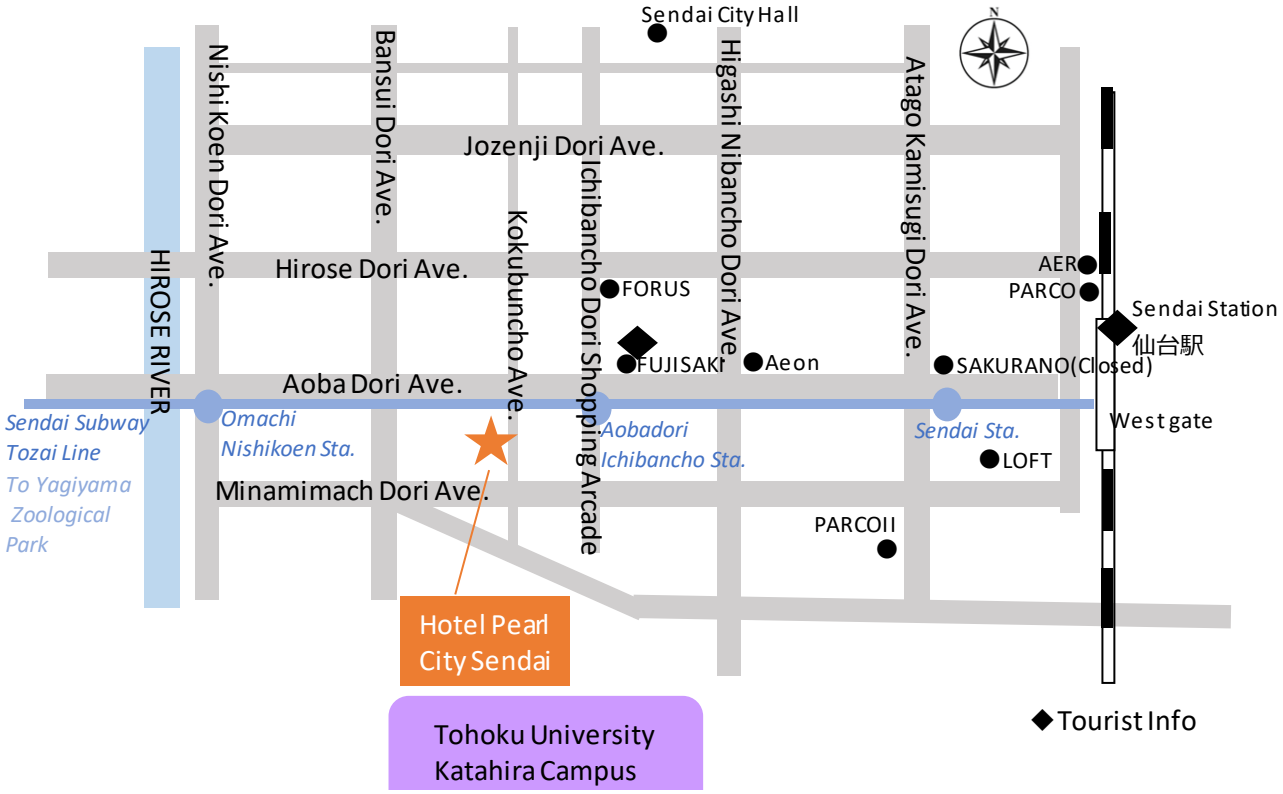
B. Access to your Accommodations

You will be staying at **Hotel Pearl City Sendai**, located 15 minutes on foot, or approximately 5 minutes by taxi, from Sendai Station. The taxi stand is located on the 1st floor of Sendai Station. Please follow the directions and the access map below to get to the hotel on your own.

Hotel Pearl City Sendai（ホテルパールシティ仙台）

Address: 2-8-9, Ichibancho, Aoba-ku, Sendai/ Tel: 022-262-8711
Hotel website: https://www.pearlcity.jp/sendai/en/ Check-in: 14:00/Check-out: 11:00

Access Map from Sendai Station to Hotel Pearl City Sendai



Access from Sendai Station

By Subway
Get on the Sendai Subway Tozai Line from JR Sendai Station. The JR station and subway station are connected, so please follow the signs and instructions at the station. Take the Tozai Line subway bound for Yagiyama Zoological Park and get off at Aobadori-Ichibancho. Hotel Pearl City Sendai is located 3-min. by foot from Aobadori-Ichibancho station.

On Foot
Take the pedestrian deck on the 2nd floor of Sendai Station and walk along **Minamimachi Dori** for approximately 15 minutes until you see **Kokubuncho Dori.** Turn left and you will see the hotel on the right side.

Access to Aobayama Campus from Hotel

By Subway
You can take the subway from Aobadori Ichibancho (or Omachi Nisikoen) station to Aobayama station. Take the Subway bound to “Yagiyama Zoological Park”, and get off at “Aobayama” station. After get off the Aobayama station, go to South 1 exit and walk for 10 minutes, you will get center square
From Omachi Nishikoen to Aobayama (JPY 200, 6 minutes)

Aobayama Campus map
https://www.eng.tohoku.ac.jp/media/files/pdf/campusmap.pdf
Interactive Map https://www.tohoku.ac.jp/map/en/?f=AY_C01

On Foot

To get to Aobayama Campus, go down Aoba Dori towards the Hirose River. Cross the Ohashi Bridge and walk along the Sendai International Center on the right side, then turn right, and walk until you see the International Center subway station. Then turn left and keep going straight and you will see Kawauchi Campus on the right side. To get to Aobayama Camupus from the Kawauchi Campus, keep going straight and you will get to a 3-way junction, then turn to the left side and climb a little hill, you will see a traffic signal. Cross the road, you can get the center square. It takes approximately 45- 50 minutes.

C. Cash Withdrawal.

Japan Post Bank
You can withdraw money with your overseas bank/credit card at any Japan Post Bank ATM in Japan. Withdrawal charges might be deducted for this service.
If you have any questions on ATMs and Cash Withdrawal, please refer to the following website:
http://www.jp-bank.japanpost.jp/en/ias/en_ias_index.html

Seven Bank
You can withdraw cash at any Seven Bank machine at 7-Eleven convenience stores.
The cards you can use for withdrawal at Seven Bank are limited; you can easily find 7-Eleven convenience stores in the city of Sendai.
For more info, please visit the following website:
http://www.sevenbank.co.jp/intlcard/index2.html

Foreign Banks
There are no ATMs of foreign banks in Sendai.

Note: There is two Travelex shops for foreign currency exchange in the Sendai city center.
http://sup.bureau.tohoku.ac.jp/pre/money_en.html

D. JASSO Scholarship

A JASSO scholarship of JPY 80,000 will be provided to qualified participants. You will be given the scholarship money **on Monday, July 1st at Kawauchi campus**.
Please note that recipients of the scholarship are expected to complete the entire program. Students might be asked to return the scholarship in case of unsatisfactory participation in the program. Please remember you will be required to submit the designated reporting forms provided on the final day of the program.

E. Insurance

There is no Japanese travel insurance available to cover your stay in Japan.
BEFORE you come to Japan please make sure to obtain travel insurance that covers the duration of your stay.
The insurance should cover death and medical expenses. It is also strongly recommended that your insurance has a general liability policy. Tohoku University shall not bear any responsibility for injuries, medical treatment, damage to property, or robbery.
It is YOUR OWN RESPONSIBILITY to cover any medical expenses and accidents, and usually you CANNOT use credit cards for medical payments in Japan.
Japan is well known as one of the safest countries in the world, but it is still necessary to be prepared for unexpected incidents at all times.
Students are required to send us a photocopy of their insurance documents via online form **no later than June 3.**

F. General Information on Tohoku University

Please refer to the following website for general information on Tohoku University.
English version: http://www.tohoku.ac.jp/en/

G. Contact Information

Hotel Pearl City Sendai
2-8-9 Ichiban-cho, Aoba-ku, Sendai-shi, Miyagi 980-0811, Japan/ Phone: 022-262-8711

Police: 110	**Ambulance and Fire Department**: 119

Tohoku University Global Learning Center
Address: 41 Kawauchi, Aoba-ku, Sendai
Phone: +81-22-795-3247 (TSSP) 9 :00 am to 5 :00 pm (JST/Mon. to Fri.)
Mobile: 080-2812-4749 (Available only during the program period)
Email: tssp@grp.tohoku.ac.jp
URL: http://www.insc.tohoku.ac.jp/english/short/tssp/
Professor in charge: Yoshitaka Kasukabe, Global Learning Center
TSSP Program Coordinator: Akiko Eguchi, Student Exchange Division

Tohoku University

Established in 1907 as Tohoku Imperial University by consolidating an agricultural college and a science college, Tohoku University is the third oldest former Imperial University after Tokyo and Kyoto.

Tohoku University is well known for its open and progressive policies. It was the first Imperial University to admit women and international students, and also pioneered in opening a university by offering public lectures. Already in 1911, Tohoku University graduated its first international students, thus becoming the Japanese university with the longest history of international graduates. All of these were epoch-making events in the history of Japanese higher education. The "Spirit of Open Doors" remains alive within the tradition of Tohoku University. Along with this spirit, the University has placed a high value on the "Spirit of Search for Truth" and emphasized original and creative research. Thus Tohoku University is known for its strong orientation toward academic research.

In the years following its establishment, Tohoku University has grown into an institution that includes the fields of medicine, science, and engineering among others. Currently the University has ten undergraduate and fifteen graduate schools, and five research institutes. The current student body consists of over 18,000 students, including roughly 2,200 international students from 93 countries. All these students are studying and enjoying their campus life at five campuses spread in Sendai: Katahira, Kawauchi, Aobayama, Seiryo and New Aobayama campuses.

Global Learning Center
Institute for Excellence in Higher Education
Tohoku University
41 Kawauchi, Aoba-ku, Sendai
980-8576 Japan
https://www.insc.tohoku.ac.jp/