平成30年度　グローバル安全学トップリーダー育成プログラム　履修要項

東北大学

Tohoku University

文部科学省　博士課程教育リーディングプログラム　複合領域型（安全安心）
Program for Leading Graduate Schools, MEXT
Multidisciplinary Field of Safety and Security

グローバル安全学トップリーダー育成プログラム

Inter-Graduate School Doctoral Degree Program on Science for Global Safety

平成３０年度

Academic Year 2018

履修要項

Course Guideline

東北大学学位プログラム推進機構リーディングプログラム部門
グローバル安全学教育研究センター
宮城県仙台市青葉区荒巻字青葉６－６

Division for Leading Graduate School Programs,
Tohoku University Institute for Promoting Graduate Degree Programs
Center for Education and Research on Science for Global Safety
6-6, Aramaki Aza Aoba Aoba-ku, Sendai, Miyagi

Contents

1. Objectives concerning the development of people participating in the Inter-Graduate School Doctoral Degree Program, and policy concerning degree conferment

■ Tohoku University mission

Tohoku University has been committed to the "Research First" principle and "Open Door" policy since its foundation, and is internationally recognized for its outstanding standards in education and research. The university contributes to world peace and equity by devoting itself to research useful in solving societal problems, and educating human resources in leadership skills.

■ From the 2012 Program for Leading Graduate Schools application guidelines

Sponsored by MEXT (Ministry of Education, Culture, Sports, Science and Technology), the program was established to prepare students with broad interests and creative ideas for them to become active leaders who could extend the industry-university relationship in our global society. The university will gather outstanding faculty members and students both domestic and overseas, promote the multidisciplinary doctoral education program that is consistent with international standards, and support this higher learning institute through reform of traditional education system, that is beneficial for the university, industry, and the government.

(1) Objectives concerning the development of people participating in the Inter-Graduate School Doctoral Degree Program

The following objectives are to be achieved based on the integrated master's and doctorate degree program that comes with an assurance of quality and that transcends the confines of individual specialized fields: (1) act globally based on steadfast values while working with others and demonstrating courage; (2) find challenges on one's own initiative, establish hypotheses, and tackle such challenges using individual knowledge and originality; and (3) find the true essence of things from a panoramic perspective based on one's broad knowledge as well as expertise and an international mindset and develop students into future leaders globally active across the boundaries between industry, academia, and government.

(2) Admission policy for the Inter-Graduate School Doctoral Degree Program

Tohoku University is looking for people on board with the objectives of the Inter-Graduate School Doctoral Degree Program as conducted by the University, who possess the basic skills, learning, and ethical fiber needed to achieve them; and who have a great passion to participate.

Admission policy details are provided for this program.

(3) Curriculum policy for the Inter-Graduate School Doctoral Degree Program

The University seeks to develop people through progressive self-instruction by dialogue with multiple teaching staff and leaders both in Japan and overseas, and cooperation from government, industry, and academia. Through this, it aims to formulate and implement a curriculum that takes a panoramic view of diverse areas of specialization and that gives students the ability to implement their research plan, to explain things to society, and to put together research teams and act as international leader in new research fields. It also aims to be relevant to a world where students must develop the skills required to undertake creative problem-solving.

A curriculum will be formulated and implemented so as accomplish two goals during the period of study leading up to the master's thesis research basic skills review: to give students a wide knowledge of the program through quality-assured and diverse specialized education, and to instill a comprehensive understanding of specialized fields through research guidance provided by multiple teaching staff. It will also provide students the ability to develop communication skills, to plan and carry out research and development, and to find challenges on their own initiative through practical education in collaboration with government, industry, and academia.

Curriculum policy details are provided for this program.

(4) Diploma policy for the Inter-Graduate School Doctoral Degree Program

Completing a master's program requires students to acquire credits for the prescribed lectures and the necessary training for their graduate school or major. Students must also take the courses set in accordance with the program's principles and objectives aimed at developing future top leaders in global safety, must acquire the standard number of credits, and must complete all courses. The university will return a student to a standard program if they do not pass Qualifying Examination I (QE I)—usually conducted about 1 to 1.5 years into a master's program—due to reasons such as poor academic performance. In order to complete a master's program and proceed to a doctoral program, students must pass Qualifying Examination II (QE II) conducted by the Center for Education and Research on Global Safety upon completion of the master's program. Master's degrees will be conferred upon those passing QE II, and such students may proceed to a doctoral course within the Inter-Graduate School Doctoral Degree Program. Students who do not pass the

QE II will only be eligible to participate in dissertation reviews for a master's degree as part of a standard course and a review to proceed to a doctoral program.

Completing a master's program requires that students have a broad and deep knowledge that extends beyond a single area of specialization, that they have excellent knowledge and skills needed to become safety and security leaders, who require broad range of perspectives, and that they have skills for communicating on a global basis.

Completing a doctoral program requires that students acquire credits for the prescribed lectures and the necessary training for their graduate school or major. In addition to passing their proposal defense, conducted about one year after matriculation, they must take a leader development program, receive research guidance in accordance with the principles and objectives of this program, and pass a specialized academic review of their dissertation as well as a test for the graduate school to which they belong within the prescribed time frame. The name of the Inter-Graduate School Doctoral Degree Program will be added to the student's diploma when they pass a comprehensive review for program completion candidates held by the dissertation review board, which is part of the Division for Leading Graduate School Programs, Tohoku University Institute for Promoting Graduate Degree Programs.

Completing a doctoral program requires that students stand on their own as researchers, work creatively, and possess both the skills necessary to engage in advanced, specialized work and the skills to act as a future global leader in a variety of situations. Students must have also acquired all foundational learning.

Other important areas considered upon graduate school course completion are whether the individual has a strong moral compass and sense of responsibility towards various activities including research, and whether they have become capable of acting in harmony with other people, nature, and society.

2. Inter-Graduate School Doctoral Degree Program on Science for Global Safety

This program seeks to develop people through international research activities and activities at sites engaged in earthquake recovery as they collaborate with the International Research Institute of Disaster Science, the Graduate School of Engineering, the Graduate School of Science, the Graduate School of Environmental Science, the Graduate School of Arts, and other organizations based on cutting-edge research results from the International Research Institute of Disaster Science, built as a part of Tohoku University. It also carries out initiatives focused on developing leaders who can contribute to addressing climate change, a challenge for all of humanity, as well as handling major accidents, of which nuclear incidents are a primary example, and solving problems such as that involving global energy security.

In this program, the Center for Education and Research on Global Safety is in charge of providing student education. At the center, students beginning master's programs belong not to individual laboratories, but to the center itself. There they receive guidance from multiple advisors and mentors in order to acquire dependable knowledge in core disciplines along with knowledge in peripheral disciplines through cross-disciplinary lectures. Among the other training taken is Convergence Lab training, which focuses on C-lab activities.

3. Admission policy for the Inter-Graduate School Doctoral Degree Program on Science for Global Safety

(1) The type of people this program will produce

More than seven years have passed since the Great East Japan Earthquake struck and caused extensive damage to the Tohoku region, but the social and industrial infrastructure of the damaged areas have not yet fully recovered. Furthermore, the situation has compelled Japan to enter into discussions on making a major shift in energy policy, including the issue of restarting nuclear power plants. It would not be an exaggeration to say that we are approaching a crucial turning point that may determine the future of Japan. As a university located in the disaster region, Tohoku University shoulders a significant part of the responsibility in taking the lead to rebuild the Tohoku region, and carries a deep sense of mission toward realizing the safe and secure society that society strongly demands. We recognize that the university's mission is to foster leaders who are able to contribute to the development of a safe and secure society.

The Great East Japan Earthquake served as a cautionary lesson that highlighted the limitations of dependence on scientific technology in disaster prevention, as well as the importance of mitigating disasters from the perspective of social science. Hence, utilization of technology, as well as contributions from the humanities and social sciences in order to incorporate this utilization into the social system with human beings as the focal point, are of great importance in order to recover from major disasters and minimize any damage that may be caused by the various risks forecasted to materialize in the future.

The objectives of human resource development in this program are to foster top leaders in the field of global safety capable of understanding what generates the diverse risks confronting Japan and the world, including natural disasters such as major earthquakes and tsunamis, climate change, and energy security; who are able to purposefully integrate multiple scientific disciplines; and who can design engineering and social science systems aimed at preventing and mitigating disasters.

To this end, we will foster leaders from the three perspectives of "recognizing safety and security," "creating safety and security," and "living in safety and security," through a program bringing together researchers in science, technology, and humanities and social science through collaboration.

The following three courses have been established in this program, corresponding to the three units

of "recognizing," "creating," and "living in" safety and security.

○ Natural Disaster Science Course

○ Safety and Security Engineering Course

○ Human Science Course

These courses aim to develop human resources who will be equipped with the following capabilities:

- Human resources with professional capability demonstrated through sophisticated research (core), and the applied skills to solve a wide variety of issues (shell)
- Human resources with the capability to establish logical systems for problem-setting and problem-solving, research and development, project development, and grand design in an independent manner, and to apply these systems
- Human resources with the ability to take a bird's-eye view of phenomena, organize the information, and to communicate their own thoughts accurately to others
- Human resources able to take on leadership roles on the global stage
- Human resources with a sense of ethics and responsibility in their roles as leaders

The following careers await leaders who possess the abovementioned qualities and capabilities:

○Global business leaders: Leaders equipped with global perspectives who are able to provide accurate assessments of various risks, including natural disasters and economic risks; take the appropriate countermeasures, and manage business continuity

○Academic leaders: World-class researchers in their core disciplines, as well as leaders able to impart knowledge from a broad perspective

○National/regional leaders in disaster prevention: Leaders able to take the lead in formulating disaster prevention policies at the national or regional level, in administrative organizations, research institutes, disaster prevention centers, and other organizations

○Global risk management leaders: Leaders able to carry out crisis management for diverse risks from global perspectives, at international and other organizations

Fig.1 "Hexagonal(Confeito) type" Human Resources

Fig. 2 Expected career paths following program completion

(2) Eligibility

- Those who are enrolled in the first year of the Master's program for the graduate schools/specializations in **Table 1** as of Academic Year 2017.
- Those who will advance to the Doctoral program for the graduate schools/specializations in **Table 1** in Academic Year 2018.
- Those who will transfer to the Doctoral program for the graduate schools/specializations in **Table 1** from other schools in Academic Year 2018 .

Table 1 Graduate schools/programs participating in the Inter-Graduate School Doctoral Degree Program on Science for Global Safety

Arts and Letters	Humane Studies, Human Sciences, Historical Studies
Law	Legal and Political Studies
Economics and Management	Economics and Management
Science	Astronomy, Geophysics, Earth Science
Engineering	Mechanical Systems Engineering, Finemechanics, Robotics, Aerospace Engineering, Quantum Science and Energy Engineering, Electrical Energy Systems, Chemical Engineering, Civil Engineering, Architecture and Building Science, Technology and Society Systems
Information Sciences	Human-Social Information Sciences, Applied Information Sciences
Environmental Sciences	Environmental Studies for Advanced Society, Frontier Sciences for

	Advanced Environment,
Biomedical Engineering	Biomedical Engineering

(3) Scholarship

Tohoku University provides financial aid in the form of scholarship that entails no repayment obligation to distinguished doctoral program students selected for this program. These scholarships are intended solely for use by selected students during this program and are provided within that academic year. Scholarship amounts are determined based on the student's capabilities.

4. Curriculum for the Inter-Graduate School Doctoral Degree Program on Science for Global Safety

(1) Courses offered in the Inter-Graduate School Doctoral Degree Program on Science for Global Safety

With a focus on developing people to mitigate the impact of various risks on society, this program offers three courses aimed at preparing people to build a safer, more secure society. These are the Natural Disaster Science, the Safety and Security Engineering, and the Human Science courses.

[1st and 2nd year courses]

- Core Subjects:

Students will take lectures on basic concepts concerning science for global safety and study subjects related to philosophy, social science, and historical science in order to become leaders in science for global safety with grounding in the humanities.

- Major Subjects:

Students will take different foundational lectures based on their major within their course of study, but all three courses will provide grounding in the core aspects of specialized skills.

- Multidisciplinary Subjects:

Students will receive a specialized, multifaceted education needed to become leaders in safety and security. This will focus on Action-oriented Disaster Mitigation I through VIII and includes Advanced Lecture on Natural Hazards, Earthquakes and Volcanoes, Disaster Control System, Aerospace Safety, Introduction to Environmental Studies, and Study of Social Change. Students will develop applied skills for solving multi-disciplinary problems through their own abilities.

- Convergence Lab (C-lab) Training

As a student research team (convergence lab), students engage in project-based learning, field exercise, learning, and other forms of team learning aimed at solving problems. This program offers numerous research themes within the areas of "special seminars on natural disaster science", "training

in the frontiers of safety engineering", and "foundational training in the humanities and social sciences". Students in these training programs will ideally participate in tasks provided by laboratories that are different from their own, and will work together in groups with students from a variety of graduate schools and programs. Through setting their own research methodologies and following through, students of these programs will strengthen their leadership skills in heading up teams and hone their creativity in giving form to ideas.

- Global Communication Skill Training:

Creating people who can act on the global stage requires developing in them a global outlook and improving their skill in using English. This training program will provide education aimed at giving students more advanced skills.

- Pre-research (overview training: preliminary doctoral dissertation):

Under the guidance of at least a head and assistant advisor, students will conduct studies and research, and present an overview in a field related to research they will conduct for their degree. This will comprise qualifying examination (QE II). Reviewers will be comprised of Tohoku University teaching staff as well as people including frontline researchers in Japan and overseas and researchers at private companies. Designed with a global perspective on research for students selected for the program, this process will develop in students the ability to take an all-encompassing view of trends concerning policies and research in their field.

[3rd, 4th, and 5th year]

- Global Leader Training:

The university will provide the following training in order to give students the grounding they will need to become global leaders active in a variety of disciplines.

- Advanced Technology Management Seminar

A series of practical seminars conducted by current leaders working at the front lines of the corporate world, this course will reinforce a leader identity in students through discussions on subjects such as organization and project management as well as running a business.

- Super Internship

This internship focuses on developing people through collaboration between industry and academia and provides an experience different from simply working at a private company. Students will conduct research and development for clear product targets they set themselves.

- Overseas Training

At an appropriate point during a student's research activities, this program will take advantage of international partnerships formed through the GCOE program and have students take training overseas for a period of about 6 months. This will give students a command of facilitating teamwork among people that have different nationalities and speak different languages.

- Industry- Academia Partnership Seminar

Instructors from industry and academia are invited to give talks informed by experience gained in their fields. The course consists of a master's component and doctoral component.

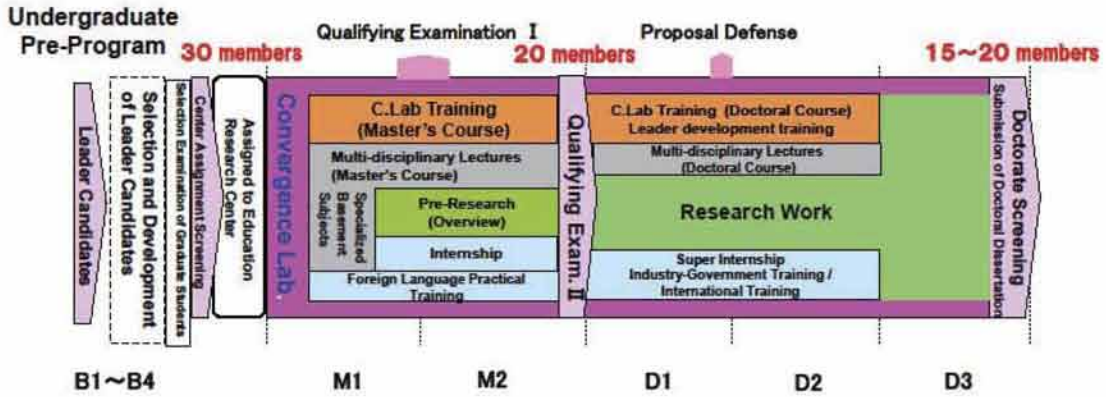

Fig. 3 Details of programs conducted by the Center for Education and Research on Global Safety

(2) Degree conferment

Degree conferment is conducted in two stages as shown in Fig. 4.

Doctoral degrees are conferred upon those who pass a review that takes an academic look at that student's performance in various areas of specialization at that student's graduate school. Reviews are conducted by the degree review board, which is comprised of researchers from different specialized fields. Review criteria generally follow those of each graduate school and have a solid academic record.

In connection with the grounding acquired by leaders this program seeks to develop, the Leading Dissertation Review Board, which is part of the Division for Leading Graduate School Programs, Tohoku University Institute for Promoting Graduate Degree Programs an organization spending the entire University—conducts a review. Those who pass the review will have it stated on their diploma that they completed the "Inter-Graduate School Doctoral Degree Program".

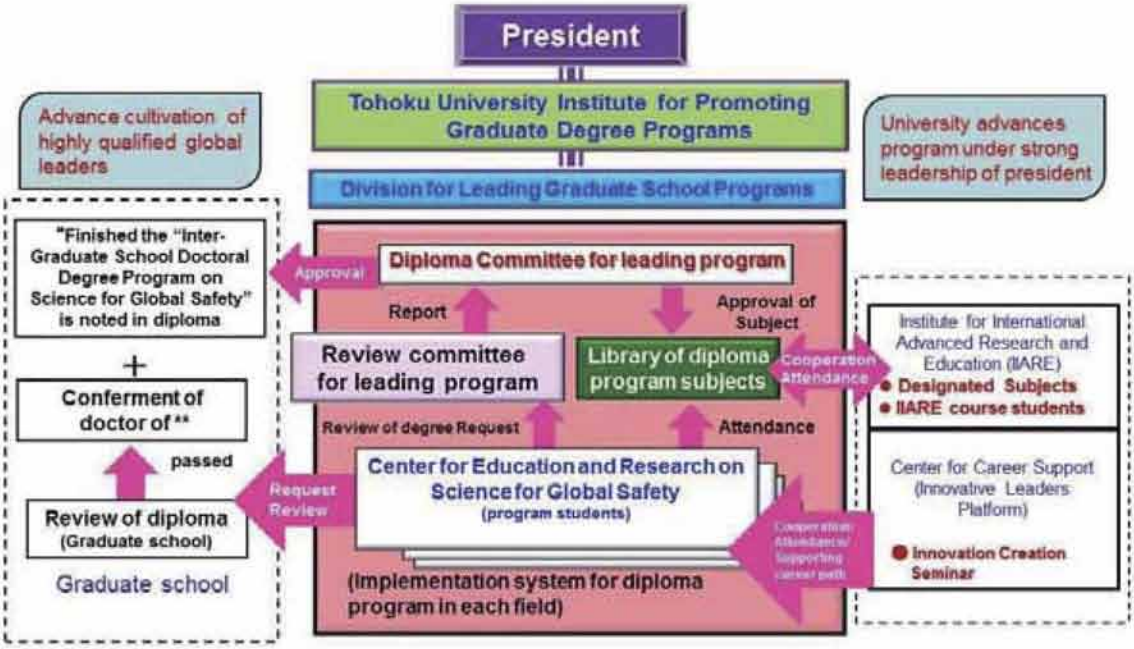

Fig. 4 Structure of the university-wide promotion system administrated by the Organization for Leading Graduate School Program of Tohoku University

(3) Qualifying examination

Qualifying Examinations (QE) are conducted in two stages.

QE I: Between 1 and 1.5 years after starting the program. QE I involves conducting a written review that looks at a student's academic performance and credits acquired, their English ability (TOEFL, etc.), and an evaluation of their project research report. Students will also undergo an interview to test their ability to set tasks and their ability to communicate in English. Those that pass can begin pre-research (overview training) in earnest.

QE II: This is conducted upon completion of the student's second year. In addition to having their record of completed coursework checked, students will undergo an overview training achievement review and oral test administered by the review board, which includes reviewers called in from organizations in industry and government.

Students joining the program in their second or third year take the QE III.

QE III: This examination will select students joining the program in their second year or joining a Tohoku University graduate school in their third year based on their academic

performance, English skill, and results of a document review and interview (oral exam). Graduate students joining the program in their second and third year must have acquired (or be on track to acquire) the necessary number of credits at the time they take the QE III.

(4) Proposal defense

Those passing the QE and acquiring a master's degree then progress to a course focused on research work. About one year after beginning research work, students are evaluated on their research planning skill, creativity, and logical thinking skill through a presentation and oral exam concerning their research plan and progress made. They also undergo a review that includes being given advice on how to make smooth progress with their research work.

(5) Program completion requirements

Students must take the prescribed lectures for their graduate school or program, acquire the necessary training credits, and pass all courses in the below categories. Head and assistant advisers belonging to two different units of the Center for Education and Research on Global Safety provide research guidance.

[Requirements for advancement to 3rd year]

(1) Must acquire 2 or more credits out of the Core Subjects (including more than 1 credit from "Fundamental on Global Safety and/or Global Safety II), 6 or more credits out of the Major Subjects, and 10 or more credits out of the Multidisciplinary Subjects.
(2) Must acquire 2 or more credits out of the Convergence Lab (for 1st and 2nd year) and 2 credits out of Global Communication Skill Training I.
(3) Must take the Master Course Seminar.
(4) Must pass the Qualifying Examination.

[Requirements for program completion]

(1) Must acquire 5 or more credits (including 1 compulsory unit) out of the Multidisciplinary Subjects.
(2) Must acquire 2 or more credits out of the Convergence Lab (for 3rd, 4th, and 5th year) and 2 or more credits out of Global Leader Training.
(3) Must take the Doctoral Course Seminar.
(4) Must pass a proposal defense administered under the program.
(5) Must receive necessary research guidance, then submit a doctoral thesis, pass the Leading Program Dissertation Review administered by the Division for Leading Graduate Programs,

Tohoku University Institute for Promoting Graduate Degree Programs, and pass the final exam.

5. Program website

More information about the program and news concerning student admission can be found at the following website.

http://www.g-safety.tohoku.ac.jp/

6. Inter-Graduate School Doctoral Degree Program : List of subjects

(1) 1st and 2nd year courses

Division	Subject	Credit and Category			Remarks
		Mandatory	Optional-mandatory	Optional	
Core Subject	グローバル安全学 Ⅰ Fundamental on Global Safety		1		Earn more than 2 credits from Core Subjects selected from the list in the left column including more than 1 credit from "Fundamental on Global Safety" and/or "Global Safety II".
	グローバル安全学 Ⅱ Global Safety Ⅱ		1		
	防災と復興の社会学 Sociology of Disaster Prevention and Reconstruction		1		
	災害歴史学 History of Natural Disasters		1		
	Basic Knowledge to Understand History of Disaster ＊		2		
	History of Disaster ＊		2		
	リスクと社会 Risk and Society		2		
	心の哲学 Philosophy of Mind		2		
	生命哲学概論 Introduction to Life Philosophy		2		
	生きることと倫理 Life and Ethics		2		
	知の探究の起源 Origins of the Quest for Knowledge		2		
	マクロ経済学 Macroeconomics (will not open in 2018)		(2)		

	経営管理 Business Management		2		
Major Subject	Each course presents a different menu.				They must include more than 4 credits from subjects of your own major and more than 2 credits from subjects of other majors that each major specifies.
Multidisciplinary Subject	実践的防災学国際講義Ⅰ ＊ International Lectures of Global Disaster Mitigation I		2		Earn more than 2 credits from list in the left column.
	実践的防災学国際講義Ⅱ ＊ International Lectures of Global Disaster Mitigation II (will not open in 2018)		(2)		
	実践的防災学Ⅰ Action-oriented Disaster Mitigation I		1		Earn more than 4 credits from Action-oriented Disaster Mitigation I-Ⅷ, Top Leader's Special Lecture Ⅰ, Practice on Global Safety Ⅰ-IV, including more than 2 credits from Action-oriented disaster Mitigation Ⅰ-Ⅷ.
	実践的防災学Ⅱ ＊ Action-oriented Disaster Mitigation II		1		
	実践的防災学Ⅲ Action-oriented Disaster Mitigation III		1		
	実践的防災学Ⅳ Action-oriented Disaster Mitigation IV		1		
	実践的防災学Ⅴ Action-oriented Disaster Mitigation V		1		
	実践的防災学Ⅵ Action-oriented Disaster Mitigation VI		1		
	実践的防災学Ⅶ ＊ Action-oriented Disaster Mitigation VII		1		
	実践的防災学Ⅷ Action-oriented Disaster Mitigation VIII		1		
	トップリーダー特別講義Ⅰ Top Leader's Special Lecture Ⅰ		1		
	グローバル安全学実践演習Ⅰ Practice on Global Safety Ⅰ		1		
	グローバル安全学実践演習Ⅱ Practice on Global Safety Ⅱ		1		

	グローバル安全学実践演習Ⅲ Practice on Global Safety Ⅲ		1		
	グローバル安全学実践演習Ⅳ Practice on Global Safety Ⅳ		1		
	自然災害特論 Advanced Lecture on Natural Hazards (will not open in 2018)		(2)		Earn more than 4 credits from the subjects listed in the left column.
	地震と火山 Earthquakes and Volcanoes		2		
	地球環境変動と生態系 Ecosystem and Global Environmental Change (will not open in 2018)		(2)		
	防災システム論 Disaster Control System		2		
	Hydrology ＊		2		
	計量行動分析 Behavioral Analysis		2		
	維持管理工学 Maintenance Engineering		2		
	エネルギー安全科学概論 Mechanical Reliability Design for Safe Energy Systems ＊＊		2		
	Robotics for Safe and Dependable Society ＊		2		
	航空宇宙安全学 Aerospace Safety		2		
	環境科学概論 Introduction to Environmental Studies		2		
	Strategy for energy and resources＊		2		
	リスク評価・管理学論 Risk Assessment and Management		2		
	イノベーションとアントレプレナーシップの経済学入門 A Introduction to Economics of Innovation and Entrepreneurship A		2		
	アントレプレナーシップの経済学 The Economics of Entrepreneurship＊		2		
	プロジェクト・マネジメント論 Project Management		2		

		社会変動学 Study of Social Change (will not open in 2018)		(2)		
		生命環境倫理学 Bioethics and Environmental Ethics		2		
		リスクと防災の社会学 Sociology of Risk and Disaster Reduction		2		
		地域計画特論 Regional Planning		2		
		Nonprofit Organizations ＊		2		
		加齢経済特論 Aging Economy		2		
		International Business (will not open in 2018)		(2)		
		科学と社会 Science and Society		1		
		科学とコミュニケーション Science Communication		1		
		防災法 Disaster Management Laws		2		
		認知情報学 Cognitive Psychology		2		
Training Subject	Convergence-Lab Training	自然災害科学特別演習 Natural Disaster Science Special Training		2		Earn more than 2 credits from the list in the left column.
		安全工学フロンティア研修 Project Based Learning for Frontier of Safety Engineering		2		
		人文社会科学基盤研修 Humanities and Social Basic Training		2		
		グローバルコミュニケーションスキル研修Ⅰ Global Communication Skill Training Ⅰ	2			
		グローバルコミュニケーションスキル研修Ⅱ Global Communication Skill Training Ⅱ			2	
		国際インターンシップ International Internship Training			2	
Major		実践的防災学国際セミナーⅠ International Seminar of Global Disaster Mitigation Ⅰ ＊			1	

	実践的防災学国際セミナーII International Seminar of Global Disaster Mitigation II ＊			1	
	産学連携セミナーI Industry-Academia Partnership Seminar I (will not open in 2018)			(1)	
	産学連携セミナーII Industry-Academia Partnership Seminar II (will not open in 2018)			(1)	
	修士研修 Master Course Seminar	Required to pass the Master Course Seminar			Credit for the Master Course Seminar shall apply the credit of specific subject obtained at their own graduate schools (Graduate School of Art and Letters, School of Law, Economics and Management, Science, Engineering, Information Science, Environmental Studies and Biomedical Engineering,.
Related Subject of other majors	Subjects that the Curriculum Committee of the Center for Education and Research on Science for Global Safety has approved as Related Subjects of Other Majors.				

※Subjects marked「＊」are opened in English. Subjects marked「＊＊」are opened in English in case international students take the classes.

Credits of the above-mentioned subjects may be approved as required subjects for completion at their own graduate schools. As to the detail about the application procedure, please consult with the academic affairs section of their own majors.

<<Major Subjects for the 1st and the 2nd Year Course>>

Major subjects for the 1st and the 2nd year courses comprise of the subjects mentioned below. For the detail of each subject, please refer the syllabus of the relevant faculties and graduate schools.

・Graduate School of Engineering

Major Basic Subjects (専門基盤科目) opened in the Master Courses of the following departments ;

Mechanical Systems Engineering, Finemechanics, Robotics, Aerospace Engineering, Quantum Science and Energy Engineering, Electrical Energy Systems, Chemical Engineering, Civil Engineering, Architecture and Building Science, Technology and Society Systems

・Graduate School of Environmental Studies

Major Basic Subjects opened in the Master Courses of the Graduate School of Environmental Studies.

・Graduate School of Science

Major subjects opened in the Master Courses of the following departments ;

Astronomy, Geophysics, Earth Science

・Graduate School of Arts and Letters

Name of Lecture	Instructors
Psychology (Advanced Seminar) II 心理学研究演習 II	Prof. Jiro Gyoba 行場次朗教授
Applied Psychology (Advanced Lecture) 応用心理学特論	Associate Prof. Nobuyuki Sakai 坂井信之准教授
Science of Religion(Advanced Seminar) I 宗教学研究演習 I	Prof. Toshiaki Kimura 木村敏明教授
Science of Religion(Advanced Seminar) II 宗教学研究演習 II	Associate Prof. Hitoshi Yamada 山田仁史准教授
Quantitative Behavioral Science (Advanced Lecture) II 計量行動科学特論 II	Prof. Yoshimichi Sato 佐藤嘉倫教授
History of Japanese Thought (Advanced Lecture) III 日本思想史特論III	Associate Prof. Ryu Kataoka 片岡龍准教授
Archaeology (Advanced Lecture) I 考古学特論 I	Associate Prof. Yoshitaka Kanomata 鹿又喜隆准教授
Experimental Psychology (General Lecture) 実験心理学概論	Prof. Tsuneyuki Abe 阿部恒之教授 (the credit will not be included to the required subjects of their own major.)
Contemporary Philosophy (General Lecture) 現代哲学概論	Associate Prof. Saku Hara 原塑准教授 (the credit will not be included to the required subjects of their own major.)

Please consult with the educational committee of the Leading Program (リーディング教務委員会)about the subjects not mentioned above.

- **Graduate School of Information Sciences**

Common Ground Subjects and Major Subjects opened in the Department of Human-Social information Sciences and the Department of Applied Information Science, Graduate School of Information Sciences.

- **Graduate School of Biomedical Engineering**

医工学基礎科目(Kiso kamoku) and 医工学応用科目(Ouyou kamoku) opened in the Graduate School of Biomedical Engineering.

- **Graduate School of Law**

Please consult with the educational committee of the Leading Program.

- **Graduate School of Economics and Management**

Please consult with the educational committee of the Leading Program.

(2) 3rd, 4th and 5th year courses

Division	Subject	Credit and Category			Remarks
		Mandatory	Optional-Mandatory	Optional	
Multidisciplinary Subject	リーダー論 Lecture for Leadership	1			Earn more than 3 credits from list in the left column.
	トップリーダー特別講義Ⅱ Top Leader's Special Lecture Ⅱ		1		
	実践的防災学特殊講義Ⅰ Advanced Disaster Mitigation I		1		
	実践的防災学特殊講義Ⅱ Advanced Disaster Mitigation II		1		
	実践的防災学国際講義Ⅲ Advanced Disaster Mitigation III ＊		2		
	実践的防災学国際講義Ⅳ Advanced Disaster Mitigation IV ＊ (will not open in 2018)		(2)		
	地球惑星ダイナミックス論特殊講義 Special Lecture on Earth and Planetary		2		Earn more than 2 credits from the list in the left

	Dynamics				column, except for "Research IntegrityI・II" However it is strongly recommended to take "Research Integrity I・II"
	国際自然災害特殊講義 International Special Lecture on Natural Disasters (will not open in 2018)		(2)		
	地球表層環境変動論 Environmental Change of the Earth's Surface (will not open in 2018)		(2)		
	災害制御学特論 Disaster Control Engineering		2		
	地球環境システム学特論 Advanced Earth System and Global Change (will not open in 2018)		(2)		
	原子核システム安全工学特論 Advanced Safety Engineering of Nuclear Systems		2		
	生産工学論 Industrial Engineering		2		
	プロジェクト・マネジメント論 Project Management		2		
	研究開発マネージメント論 R&D Management		2		
	イノベーションとアントレプレナーシップの経済学入門 B Introduction to Economics of Innovation and Entrepreneurship B		2		
	アントレプレナーシップの経済学 The Economics of Entrepreneurship ＊		2		
	社会変動学 Study of Social Change (will not open in 2018)		(2)		
	生命環境倫理学 Bioehics and Environmental Ethics		2		
	リスクと防災の社会学 Sociology of Risk and Disaster Reduction		2		
	科学と社会 Science and Society		1		
	科学とコミュニケーション Science Communication		1		

		リスク管理学特論 Advanced Theory and Practice of Risk Assessment and Management		2		
		よりよい研究のための倫理Ⅰ Research Integrity I		1		
		よりよい研究のための倫理Ⅱ Research Integrity II		1		
Training Subject	Convergence-Lab. Training	自然災害科学特殊演習 Advanced Natural Disaster Science Special Training		2		Earn more than 2 credits from list in the left column.
		実践的防災学国際研修 Overseas Project-based Learning for Disaster Mitigation(will not open in 2018)		(2)		
		自主企画研修 Self-planned Project		2		
	Global Leader Training	高度技術経営塾 Advanced Technology Management Seminar		2		Earn more than 2 credits from list in the left column.
		海外研修 Overseas Training		2		
		スーパーインターンシップ Super Internship		2		
Major General Subject		実践的防災学国際セミナーⅢ International Seminar of Global Disaster Mitigation Ⅲ ＊			2	
		実践的防災学国際セミナーⅣ International Seminar of Global Disaster Mitigation Ⅳ ＊			1	
		産学連携セミナーⅢ Industry-Academia Partnership Seminar Ⅲ			(1)	
		産学連携セミナーⅣ Industry-Academia Partnership Seminar Ⅳ			(1)	
		博士研修 Doctoral Course Seminar	Required to pass the Doctoral Course Seminar			Credit for the Doctoral Course Seminar shall apply the credit of specific subject obtained at their own graduate schools (Graduate

			School of Art and Letters, Science, Engineering, Economics and Management, Information Science, Environmental Studies and Biomedical Engineering, School of Law).
Related Subject of other majors	Subjects that the Curriculum Committee of the Center for Education and Research on Science for Global Safety has approved as Related Subjects of Other Majors.		

1. Above-mentioned subjects may be approved as required subjects at their own graduate schools. As to the detail about the application, please consult with the academic affairs section of their own majors.

※Subjects marked「＊」are opened in English. Subjects marked「＊＊」are opened in English in case international students take the classes.

※Those who enter this Leading Program from the 2nd or the 3rd year need to take some of the subjects set for 1st and 2nd year Leading students. For the details, consult with the Leading Program Office.

7. Syllabus

Name of Lecture	Fundamental on Global Safety
Schedule / Venue	Friday 16:20-17:50 / Leading Lecture Room
Category	Core Subject
Credit(s)	1
Course	All
Semester	Spring semester (5/11, 6/1, 8, 7/6, 13, 20, 27)
Instructor	Prof. Fumihiko Imamura and President-appointed Extraordinary Prof. Keiichi Noe

Name of Lecture	Fundamental on Global Safety
1. Purpose / Abstract	Safety is one of main theme for sustainable humanosphere after the birth of human beings. The idea and methodology of safety is changed by the social system, life style and industry. And now a new one is necessary including global warming effect. The lecture aims to introduce and discuss the purpose, idea and methodology of global safety.
Goal	Understand the purpose and idea of Global safety through the examples, and issues on the safety at the modern society, and the methodology to estimate the risk in medium term and to reduce them.
Contents	The topics at the lecture is summarized as follows; 1.What is global safety and relationship with the resilience 2.Expectation of the modern science and technology and its limit, correspondence to the assumption outside 3.Idea of nuclear plant safety after the 2011 and dense in the depth 4. The trans science looking from the viewpoint of Science and Technology and Society (STS) 5. Risk society and need of risk evaluation and the value judgment 6.Indivisibility of advanced technology and the social risk 7.Whereabouts of the modern civilization and switch of a lifestyle and the sense of values

Grading	report
2. Book required / referenced	野家啓一『科学哲学への招待』ちくま学芸文庫、2015年 The information will be provided at the class
Remarks	

Name of Lecture	Global Safety　II
Schedule / Venue	Wednesday 10:30-12:00 / Leading Lecture Room
Category	Core Subject
Credit(s)	1
Course	All
Semester	Spring semester　(5/9, 16, 23, 30, 6/6, 13, 20, 27)
Instructor	Koji Izumi (Guest lecturer),　Prof. Kazuya Yoshida

1. Name of Lecture	Global Safety II
2. Purpose / Abstract	To learn fundamental ideas, thoughts and methodologies of systems engineering for global safety, lectures are given on the topics of systems safety, risk assessment and management in innovative development processes.
3. Goal	Understand the methodologies of systems engineering toward innovative development. Identify the risks in mechanical systems. Understand the methodologies for the risk analysis. Obtain useful knowledge on the risk assessment and its management.
4. Contents	In the 1st semester, 8 lectures are given on the following topics: - History (past, present and future) of innovation in high-tech R&D areas, such as aerospace, automobiles and computer technology - Systems safety and reliability, risk analysis - Design principles to minimize risks - Project management and risk management, etc.
5. Grading	Attendance and deliverables instructed at each lecture
6. Book required / referenced	To be announced during each lecture
7. Remarks	

Name of Lecture	Sociology of Disaster Prevention and Reconstruction
Schedule / Venue	Wednesday 13:00 - / Leading Lecture Room
Category	Core Subject
Credit(s)	1
Course	All
Semester	Fall semester (detailed schedule to be announced)
Instructor	Associate Prof. Michimasa Matsumoto

1. Name of Lecture	Sociology of Disaster Prevention and Reconstruction
2. Purpose / Abstract	The purposes of this lecture are as follows. ①To study cases about disaster preparedness / reduction, and recovery / reconstruction ②To learn basic knowledge to comprehend "community" which is expected to play a central role in disaster preparedness or reconstruction ③To discuss frames of building community to prepare for / reduce disasters
3. Goal	①To study cases about disaster preparedness / reduction, and recovery / reconstruction ②To learn basic knowledge to comprehend "community" ③To study way of thinking about management for disaster preparedness / reduction in communities
4. Contents	(1) Has / Had communities ever existed? (2) What is community? (3) What do we need to (re)build community which enables us to prepare for / reduce disasters?
5. Grading	Considering reports and presentations
6. Book required / referenced	Required books and reference books will be introduced.
7. Remarks	

Name of Lecture	History of Natural Disasters
Schedule / Venue	Thursday　13:00 – 16:10 / Leading Lecture Room
Category	Core Subject
Credit(s)	1
Course	All
Semester	Spring semester (5/10, 5/17, 5/24)
Instructor	Yoshinobu Tsuji (Guest Lecturer)

1. Name of Lecture	History of Natural Disasters
2. Purpose / Abstract	The decipherment work on document materials before the end of the 19th century is necessary to study on earthquakes, tsunamis, floods and another kinds of natural hazards in the historical ages. We start the training on documentary decipherment of old documents. We study the 1889 and 2016 Kumamoto Earthquakes as an example, and the relationship between the configuration of the active fault and the distributions of damage of a house collapse and human damage.
3. Goal	We start from the training to read historical old documents written in the Edo Period from the beginning of 17th century to the middle of 19th century. In the studying of historical seismology, old documents of four categories are effective; (a) Formal documents recorded by lords, (b) documents written by village headmen, (c) documents written in temples, and (d) diaries. On 16th April 2016, the Kumamoto Earthquake occurred on Kyushu Island. Ninety five percent of killed person were distributed in a narrow zone close to Futagawa active fault. This event shows us that if we clarify the distribution of victims of a historical earthquake, we can identify the fault which induce the earthquake. We also find out the precursor of earthquakes by analyzing description in old documents. We learn the method of such analyzing and apply it to events which nobody dealt with.

4. Contents	We learn the laws of (A) relationship between the location of an active fault and the distribution of human and building damage, (B) precursors of a series of gigantic earthquakes, (C) geological traces of historical and pre-historical earthquakes. In addition them, we find out the laws (A) to (C) are contained in historical old documents.
5. Grading	Attendance, Report
6. Book required / referenced	
7. Remarks	

Name of Lecture	Basic Knowledge to Understand History of Disaster
Schedule / Venue	Tuesday, 14:40-16:10 / Arts and Letters Building R621
Category	Core Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Assistant Prof. Rumi Matsuzaki

1. Name of Lecture	Basic Knowledge to Understand History of Disaster
2. Purpose / Abstract	History helps us understand a country and solve today's social issues. The knowledge of history is important in global communication. The purpose of this course is for students to learn basic knowledge of Japanese history for understanding the course entitled "History of Disaster" and how to express Japanese history in English.
3. Goal	(1) To become familiar with the general history of Japan (2) To examine the characteristics of each period and society in Japan (3) To understand the similarities and differences between Japanese and other countries' histories
4. Contents	This course introduces the general history of Japan from primitive times to modern times including the history of disasters, women, gender, family, and minorities. Students will examine the backgrounds and characteristics of each period and society in Japan and understand the similarities and differences between Japanese and other countries' histories through classroom discussion. This course is conducted in English. The instructor will translate into Japanese based on students' understanding of the English language.
5. Grading	Attendance and participation 20%, Final exam 80%
6. Book required / referenced	No textbook required. Reference books will be introduced in class. Handouts will be distributed in class.
7. Remarks	

Name of Lecture	History of Disaster
Schedule / Venue	Tuesday, 13:00-14:30 / Arts and Letters Building R621
Category	Core Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Assistant Prof. Rumi Matsuzaki

1. Name of Lecture	History of Disaster
2. Purpose / Abstract	The purpose of this course is for students to learn basic knowledge of the history of disasters in Japan.
3. Goal	(1) To become familiar with the history of disasters in Japan (2) To understand the relationship with today' s issues regarding disasters
4. Contents	This course introduces the history of disasters from ancient times to modern times including disaster damage, disaster recovery, and disaster prevention by focusing on the social aspects. Students will examine the backgrounds and characteristics of each period and society and understand the relationship with today's issues on disasters through classroom discussion. This course is conducted in English. The instructor will translate into Japanese based on students' understanding of the English language.
5. Grading	Attendance and participation 20%, Final exam 80%
6. Book required / referenced	No textbook required. Reference books will be introduced in class. Handouts will be distributed in class.
7. Remarks	It is desirable to take this course and also the course entitled "Basic Knowledge to Understand History of Disaster" especially for international students and students unfamiliar with Japanese history.

Name of Lecture	Risk and Society
Schedule / Venue	Monday, 14:40 -16:10 / Art and Letters Lecture Hall #2
Category	Core Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Prof. Yoshimichi Sato

1. Name of Lecture	Risk and Society
2. Purpose / Abstract	To understand the interaction between individuals and society and to acquire skills with which to analyze social phenomena.
3. Goal	(1) Understanding the basic logic of game theory. (2) Understanding academic papers using game theory. (3) Building simple game theoretic model.
4. Contents	The course includes the following topics in game theory. (1) Explanatory logic of game theory (2) Strategy-form game and Nash equilibrium (3) Extension-form game and sub-game perfect Nash equilibrium (4) Repeated game and Folk theorem (5) evolutionary game theory
5. Grading	Examination (60%) and attendance (40%)
6. Book required / referenced	Textbook: Yoshimichi Sato, 2008, *Wordmap Game Theory,* Shinyo-sha.
7. Remarks	Office hour: Wednesday, 4:20-5:50 pm (Need to make an appointment beforehand.)

Name of Lecture	Philosophy of Mind
Schedule / Venue	Wednesday 14:40-16:10 / Arts and Letters Lecture Hall #1
Category	Core Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Associate Prof. Saku Hara

1. Name of Lecture	Philosophy of Mind
2. Purpose / Abstract	In this course, we will investigate the nature of the human mind by analyzing philosophical discussions made by contemporary philosophers such as Ryle, Putnam, Lewis, Jackson, Churchland, etc.
3. Goal	To understand the contemporary discussions on mind-body problems, and philosophical theories on consciousness, intentionality, and rationality. To develop skills in forming and expressing your own arguments.
4. Contents	In this course we will discuss such basic features of mind as mental causation, qualia, intentionality, and rationality.
5. Grading	Comment papers 60% Final exam 40%
6. Book required / referenced	Kanasugi, T. 2007. *Introduction to Philosophy of Mind*, Keiso.
7. Remarks	

Name of Lecture	Introduction to Life Philosophy
Schedule / Venue	Tuesday, 10:30 – 12:00 / Arts and Letters Lecture Hall #1
Category	Core Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Kiyoshi Toshima

1. Name of Lecture	Introduction to Life Philosophy
2. Purpose / Abstract	Concerning a concept of security and safety, the most basic view from a philosophical viewpoint is the subject of this lecture. Other than philosophy, I aim at the general understanding from a biological viewpoint, a linguistic viewpoint and the religious viewpoint.
3. Goal	To understand the most basic view from a philosophical viewpoint concerning a concept of security and safety.
4. Contents	Things can be looked at from the outside, and can be played from the inside. The former thought is to aim at the objective thought to take distance out of an object, and the latter thought is to aim at the independent thought that it is in object itself. By the lecture, we will argue that an original phenomenological thought is located in the moderation of both. 1 “from the outside” and “from the inside” 2 "frameworks of thought" 3 "units and places" 4 "live words, dead words" 5 "parts and whole" 6 "that which is suggested, and that which is talked about” 7 “oneself, and by itself” 8 "things which are not outstanding" 9 "technique " 10 "time" 11 "breakthroughs of the type"

	12 "encounter " 13 "two kinds of efficiency" 14 "having a catch"
5. Grading	report 70%, present 30%
6. Book required / referenced	Presenter will suggest it at the time of a class.
7. Remarks	

Name of Lecture	Life and Ethics
Schedule / Venue	Friday, 14:40-16:10 / Arts and Letters Lecture Hall #2
Category	Core Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Associate Prof. Tatsuya MURAYAMA

1. Name of Lecture	Life and Ethics
2. Purpose / Abstract	This course introduces you to some general topics in ethics (e.g., What should I do? What is an ideal society like? Can morality exist without religion? What is happiness?). It will not presuppose any prior study of ethics, or even humanities.
3. Goal	First, you will learn theories about morality (utilitarianism, virtue ethics, deontology, moral particularism, etc.), happiness (hedonism, desire-satisfaction theory, objective list theory, etc.), etc. so that you can develop a clear understanding of the questions that recur in ethical debate. Second, you will be encouraged to think about these questions so that you can arrive at what you take to be the most sensible positions on them.
4. Contents	1. Introduction: What is ethics? 2. Relativism about Ethical Value 3. Normative Ethics (Utilitarianism, Deontology, Virtue Ethics, Moral Particularism, etc. 4. Metaethics (Emotivism, Cognitivism, Internalism/Externalism about Motivation, etc.) 5. Theories of Justice 6. Theories of Happiness 7. Theories of Meaning of Life
5. Grading	Final Exam: 100%
6. Book required / referenced	There are no required texts for this course. Further information will be provided as needed, as well as upon request.
7. Remarks	

Name of Lecture	Origins of the Quest for Knowledge
Schedule / Venue	Thursday, 10:30-12:00 / Arts and Letters Lecture Hall #1
Category	Core Subject
Credit(s)	2
Course	All
Semester	Spring / Fall
Instructor	Associate Prof. Satoshi Ogihara

1. Name of Lecture	Origins of the Quest for Knowledge
2. Purpose / Abstract	Learn about origins of the quest for knowledge in ancient Greece. Presocratics (from Thales on), Socrates and Plato will be covered in this semester.
3. Goal	Acquire basic knowledge about Presocratics, Socrates and Plato. Understand basic philosophical points of theirs.
4. Contents	SPRING: Introduction (about 0.5 session); Milesians (about 1); Heraclitus (about 1.5); Parmenides and Zeno (about 2.5); Empedocles, Anaxagoras, Democritus (about 1.5); Socrates (about 3); Plato (about 5). FALL: Aristotle (about 6 sessions); Hellenistic philosophy (about 7); Neoplatonism (about 1). Lecture in a large classroom. Questions and comments welcome.
5. Grading	Term paper
6. Book required / referenced	Recommended: 加藤信朗『古代ギリシア哲学史』（東京大学出版会）、『哲学の歴史』1・2（中央公論新社）、A・ロング『ヘレニズム哲学』（京都大学出版会）
7. Remarks	Japanese is used.

Name of Lecture	Business Management 経営管理
Schedule / Venue	Wednesday 10:30-12:00 /Accounting School Building (Katahira), Lecture Room B
Category	Core Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Associate Prof. Takeyasu ICHIKOJI

1. Name of Lecture	Business Management (経営管理)
2. Purpose / Abstract	本講義では経営組織論・経営戦略論を中心とした経営学の基本的概念について学ぶと同時に、経営学について自発的に学習する際に必要な知識を習得する。
3 .Goal	
4. Contents	講義の進め方： 講義は大きく、2つのパートから構成される。前半は経営学の基本的概念の学習、後半は経営学研究論文の読解である。前半パート（1～7回）では、教員が基本的なテーマに関して講義を行った後、各学生に気に入ったテーマの教科書を読みこんで発表する。 後半パート（8~14 回）では、経営学の分野において実際に研究された近年、着目されているテーマの論文を取り上げて、テーマごとに解説すると同時に経営学における研究論文の読み方を理解してもらう。その後、各学生が気に入ったテーマについて論文を調べたうえで発表する。 予習・復習について： 予習は関してはパートや内容ごとに異なるのでその都度指示する。復習に関しては講義内容・発表内容の中で気に入った内容をレポートとしてまとめて次の授業の際に提出してもらう。 第1回：オリエンテーション 1. この授業の概要、進め方、成績評価について 第2回：経営管理論の発展 講義の概要：1. 近代企業の誕生と経営管理 2. 経営管路の領域と発展 第3回：ミクロ組織論 講義の概要：1. モチベーション　2. リーダーシップ 第4回：マクロ組織論

	講義の概要：1. 組織デザイン　2. 組織文化 第 5 回：経営戦略 講義の概要：1. 全社戦略　2. 競争戦略 第 6 回：市場戦略 講義の概要：1. STP/4P　2. プロダクトライフサイクル 第 7 回：学生発表（1） 講義の概要：経営学に関する教科書を紹介してもらい、質疑応答を行う。 第 8 回：学生発表（2） 講義の概要：経営学に関する教科書を紹介してもらい、質疑応答を行う。 第 9 回：クライシスマネジメント 講義の概要：1. クライシスマネジメントの古典 2. 日常にある危機的イベントへの対処 3. 危機中のマネジメント 4. クライシスマネジメントの精緻化 第 10 回：ダイバーシティマネジメント 講義の概要：1. これまでのダイバーシティ研究 2. 企業家志向とダイバーシティ 3. コミュニティとワークユニットダイバーシティ 第 11 回：ワークライフバランス 講義の概要：1. 仕事と家族の綱引き　2. 家族の影響 3. 感情の影響 第 12 回：職場ストレス 講義の概要：1. ストレスの精緻化とパフォーマンス 2. ストレスとパフォーマンスの関係性の構造化 3. リーダーシップの影響 第 13 回：学生発表（3） 講義の概要：経営学研究の論文をテーマに沿って紹介してもらい、質疑応答を行う。 第 14 回：学生発表（4） 講義の概要：経営学研究の論文をテーマに沿って紹介してもらい、質疑応答を行う。 第 15 回：理解度確認セッション 講義概要：論述形式の筆記試験を実施する。
5. Grading	レポート（30%）、発表（20%）、期末試験（50%） AA(90 点以上)，A(80 点以上 90 点未満)，B(70 点以上 80 点未満)，C(60 点以上 70 点未満)，F(60 点未満；不合格)。

6. Book required / referenced	前半パートに関しては、「高松朋史・具承恒（2009）『コアテキスト：経営管理』新世社」を中心に用いる。後半パートに関しては、その出展を適宜指示する。
7. Remarks	・この講義を受講するために必要となる知識： 経営学に関する前提知識は必要としないが、発表や試験にあたって英語の論文を読む必要がある。 ・オフィスアワー：第1回講義でお知らせする。 ・連絡先：第1回講義でお知らせする。 ・その他講義を受講する際注意すべき点： 講義の性質上、教科書を自費で購入したり、論文を自分で調べてみたり、もしくは授業内で発表を行ったりと他の講義とは多少異なる点があるのでその点、理解したうえで受講してほしい。また、履修者数やその意向に応じて、内容を多少変更することがある。

Name of Lecture	International Lectures of Global Disaster Mitigation I
Schedule / Venue	Friday, 10:30-12:00 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Yoshimichi Sato, Prof. Toshiaki Kimura, Assoc. Prof. Saku Hara, Assoc. Prof. Yoshitaka, Kanomata, Assoc. Prof. Anawat Suppasri, Assoc. Prof. Mas Erick, Assoc. Prof. Takako Izumi, Assoc. Prof. Yuichi Ebina, Assist. Prof. Sebastien Boret, Assist. Prof. Elizabeth Maly, Assist. Prof. Daisuke Sasaki

1. Name of Lecture	International Lectures of Global Disaster Mitigation I
2. Purpose / Abstract	Recent disasters show us that their impact not to only one country but internationally. Such large scale disasters should be properly mitigated using integrated disaster science discipline and collaboration from international governments and organizations. This series of lecture will provide opportunity to attendees to expand their vision on global disaster mitigation from well experienced international faculty members in various point of views.
3. Goal	To provide a chance to students knowing about disaster in global scale. After the class, students might be able to have the whole image of global disasters, role of international organizations on disaster mitigation and be able to apply this idea to their research field for disaster mitigation.
4. Contents	For engineering part, following selected topics on global disaster will be provided by international faculties 1) Disasters in Asia, Europe, North America and South America, 2) Role of mapping as tools for disaster planning, 3) International collaboration and role of international organizations on disaster mitigation and 4) Linkage

	between engineering and literature. For humanities and social science parts, following selected topics on 1) Social responsibility, 2) Science and risk communication, 3) Social capital and social inequality, 4) Religious role and 5) Economic recovery. At the end of the course, students will give group presentations and discuss in the final session.
5. Grading	Attendance, group work, and report
6. Book required / referenced	Each instructor will introduce required books and reference books.
7. Remarks	This course is conducted in English.

Name of Lecture	Action-oriented Disaster Mitigation I
Schedule / Venue	Tuesday, 16:20-17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester (4/10, 17, 24, 5/1, 8, 15, 22)
Instructor	Prof. Norihito Umino

1. Name of Lecture	Action-oriented Disaster Mitigation I
2. Purpose / Abstract	In this course, mechanisms of earthquakes, volcanic eruptions, violent weather phenomena and asteroid impacts are summarized. Course topics will provide students with an understanding of the characteristics of violent natural disasters in not only Japan but also other countries.
3. Goal	Understand mechanisms of earthquakes, volcanic eruptions, violent weather phenomena and asteroid impacts. Study characteristics of violent natural disasters. Understand common and different features between natural disasters in Japan and those in other countries.
4. Contents	This lecture will be given by five staffs in Graduate School of Science and IRIDeS. The outlines of each lecture are shown below. 1st: Heat and mass transfer in Earth Interior, Volcanic activities: Evidence of low frequency and great disaster (by Dr. M. Kuri) 2nd ,3rd: Severe weather disaster by climate change, Severe weather phenomena (e.g. typhoon and torrential rain) (by Prof. H. Iwabuchi) 4th ,5th: Origin and classification of extraterrestrial materials, and asteroid impacts (by Dr. S. Ozawa) 6th ,7th: Earthquake Early Warning, National Seismic Hazard Map (by Prof. N. Umino)

	Note that the order is subject to change.
5. Grading	Based on attendance/participation in class and exams.
6. Book required / referenced	No required textbook. Handouts of each lecture will be provided in the classroom.
7. Remarks	Contact person: Norihito Umino (norihito.umino.c3@tohoku.ac.jp)

Name of Lecture	Action-oriented Disaster Mitigation II
Schedule / Venue	Tuesday, 8:50-10:20 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester (4/10, 4/17, 4/24, 5/8, 5/15, 5/29, 6/12)
Instructor	Associate Prof. Anawat Suppasri , Associate Prof. Mas Erick

1. Name of Lecture	Action-oriented Disaster Mitigation II
2. Purpose / Abstract	This courses covers the history of water-related disasters (floods, typhoons, tsunamis), mechanisms of damage, damage countermeasures (structures, warning, evacuation), and reconstruction after disasters. Students will learn about and apply disaster forecasting and mitigation theory and models.
3. Goal	-To understand the difference between water-related disasters and other types of disasters (volcanic, seismic, geotechnical, etc). -To understand practical measures enacted for reducing vulnerability to water-related disasters. -To understand the causes and cycle of water-related disasters.
4. Contents	Week 1: Introduction to water-related disasters and countermeasures (Suppasri) Week 2: Modeling for disaster mitigation (Mas) Week 3: River floods (Suppasri) Week 4: Storm surge (Suppasri) Week 5: Tsunami (Suppasri) Week 6: Remote sensing (Mas) Week 7: Group design project presentations (Suppasri, Mas)
5. Grading	Design project 75% Attendance and participation 25%

6. Book required / referenced	
7. Remarks	Lectures will be held in English. Design project presentations will be made in English. Please bring your own laptop for use during the first and following classes.

Name of Lecture	Action-oriented Disaster Mitigation III
Schedule / Venue	Tuesday, 16:20-17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Fall semester (10/2、9、16、23、30、11/6、13、20)
Instructor	Prof. Toshiaki Kimura, Associate Prof. Michimasa Matsumoto Assistant Prof. Rumi Matsuzaki

1. Name of Lecture	Action-oriented Disaster Mitigation III
2. Purpose / Abstract	"Disaster" does not mean natural phenomena themselves such as earthquakes, tsunamis, floods, landslides, and so on but the significant affects on people's lives and property and the various social systems people have built for the betterment of their lives. Therefore, we have to learn various social aspects of disaster prevention, disaster response, and disaster recovery with an understanding of historical backgrounds. Students will learn the problems regarding disasters in the fields of humanities and social sciences by focusing on communities.
3. Goal	To learn basic knowledge in order to think of new disaster prevention and disaster responses centered on people and putting them into action.
4. Contents	1. Disaster prevention, disasters, and disaster recovery in communities Students will learn the realities of disaster prevention, disaster relief, and disaster recovery in communities from the case studies of neighborhood associations. 2. Problems related to local culture It's becoming important to pay attention to people's mental

	health and the significance of history and culture of communities in terms of disaster recovery in disaster-affected areas. Students will learn these problems from various specific activities. ・Disaster prevention, disasters, and disaster recovery in communities, 4 lectures by Matsumoto ・Disasters and history, 2 lectures by Matsuzaki ・Disasters and religion, 1 lecture by Kimura ・Student presentations and discussions
5. Grading	Attendance 30%, presentation and discussion 30%, and final report 40%
6. Book required / referenced	Each instructor will introduce required books and reference books.
7. Remarks	

Name of Lecture	Action-oriented Disaster Mitigation IV (Recovery and Reconstruction Planning)
Schedule / Venue	Friday, 14:40-16:10 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring Semester (4/13, 20, 27, 5/11, 18, 25, 6/1)
Instructor	Associate Prof. Katsuya Hirano, Associate Prof. Michio Ubaura, Associate Prof. Shosuke Sato, Assistant Prof. Kazuya Sugiyasu

1. Name of Lecture	Action-oriented Disaster Mitigation IV
2. Purpose / Abstract	To understand the knowledge (Overview of recovery process, system, land use plan, disaster prevention plan and facility design) through the catastrophic disaster such as the Great East Japan Earthquake, 2016 Kumamoto Earthquake, 2004 Sumatra earthquake tsunami, and so on.
3. Goal	To acquire skills and knowledge as the following, (1) To enumerate the main problem form recovery through the catastrophic disaster. (2) To explain the overview of recovery process and the main problem form the Great East Japan Earthquake. (3) To explain the overview of recovery process and the main problem form the Great East Japan Earthquake. (4) To show your opinion about the confliction of various values based on recovery master plan. (5) To explain the case of characteristic recovery action.

4. Contents	Students will attend lecture and discussion about as the following. (1) Recovery and reconstruction from disaster (2) System and problem in recovery and reconstruction (3) Reconstruction of infrastructure (4) Land use plan in reconstruction (5) Life Restoration from disaster (6) Case study of domestic reconstruction projects (7) Case study of global reconstruction projects
5. Grading	Discussion and report
6. Book required / referenced	Each instructor will introduce required books and reference books.
7. Remarks	

Name of Lecture	Action-oriented Disaster Mitigation V
Schedule / Venue	Wednesday, 8:50-10:20 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester: 4/11, 18, 25, 5/9, 16, 23, 30 (Backup: 6/6, 13, 20)
Instructor	Prof. Kenjiro Terada, Prof. Kohju Ikago, Associate Prof. Susumu Ohno, Associate Prof. Shuji Moriguchi

1. Name of Lecture	Action-oriented Disaster Mitigation V
2. Purpose / Abstract	Various issues on the Great East Japan Earthquake (GEJE) in engineering areas such as earthquake, geotechnical and structural engineering are discussed. Also, learned from the lessons of GEJE, the engineering and design concepts are to be studied for the resilient and sustainable infrastructures and buildings in urban areas. Moreover, the cutting edge of technologies in disaster science as well as the practices and problems for their social implementation are also come within the scope of this class.
3. Goal	To think for oneself the whole concept of engineering and design for resilient and sustainable infrastructures and buildings in urban areas, and to acquire the fundamental knowledge for practical activities of the action-oriented disaster mitigation.
4. Contents	1. Experiences and lessons of GEJE from earthquake engineering viewpoints 2. Experiences and lessons of GEJE from structural engineering viewpoints 3. Experiences and lessons of GEJE from geotechnical engineering viewpoints 4. Frontier of disaster-prevention research in geotechnical engineering

	5. Frontier of disaster-prevention research in structural engineering 6. Numerical simulations and visualizations in disaster science 7. Multi-disciplinarity in comprehensive disaster prevention
5. Grading	Attendance: 60% Report or examination: 40%
6. Book required / referenced	Net yet determined; follow instructions.
7. Remarks	

Name of Lecture	Action-oriented Disaster Mitigation VI
Schedule / Venue	Tuesday, 16:20-17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Fall semester (11/27, 12/4, 11, 18, 25, 1/8, 15, 22)
Instructor	Prof. Makoto Okumura, Prof. Hiroaki Maruya, Prof. Shin-ichi Egawa

1. Name of Lecture	Action-oriented Disaster Mitigation VI
2. Purpose / Abstract	To learn practical social responding actions after disaster and their problems, especially humanitarian logistics, business continuity management, and disaster medicine. Discuss the problems and improvements, based on the experiences from the GEJE, 2011.
3. Goal	Students can explain expanding process of social effects / problems in disaster. Students can explain basic concepts of counter measures for such disaster expanding process. Students can enumerate and present some problems in social responding actions in the GEJE, 2011. Students can express their suggestions improving the social responding actions.
4. Contents	(1) Humanitarian logistics (2) Fuel logistics (3) Business Continuity Plan (4) Business Continuity Management (5) Disaster Medical Activities (6) Evacuation Shelter Management (7) Discussion
5. Grading	Based on Discussion and a short report.
6. Book required / referenced	English material will be distributed.
7. Remarks	

Name of Lecture	Action-oriented Disaster Mitigation VII (Inter-disciplinary: International policy on disaster risk reduction)
Schedule / Venue	Thursday, 16:20 – 17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester (4/12、19、26、5/10、17、24、31)
Instructor	Prof. Yuichi Ono, Associate Prof. Takako Izumi, Assistant Prof. Daisuke Sasaki, Assistant Prof. Yasuhito Jibiki

1. Name of Lecture	Action-oriented Disaster Mitigation VII
2. Purpose / Abstract	1. Understanding historical background on efforts of disaster (risk) reduction by the United Nations, including Yokohama Strategy of 1994, Hyogo Frame for Action (HFA) of 2005 and Sendai Framework for Disaster Risk Reduction of 2015. 2. Comprehending significance of international efforts on disaster (risk) reduction, practically understanding current situation and challenges, and developing students' capacity to become effective players immediately.
3. Goal	1. Understanding the meanings and background of disaster (risk) reduction. 2. Examining international organizations' efforts on disaster (risk) reduction along with concerns of each students, and delivering oral presentations in English about their efforts. 3. Making lists of activities related to disaster (risk) reduction by major international organizations, and having oral presentations about these activities in English.

4. Contents	* The class contents will not change drastically, but the class schedule can revise. #1. Guidance #2. Perspectives and concepts to explore the Sendai Framework for Disaster Risk Reduction. #3. Historical backgrounds behind the adoption of the Sendai Framework for Disaster Risk Reduction. #4. Large variety of stakeholders in the international disaster risk reduction implementation. #5. Statistical analysis of the international disaster risk reduction. #6. Current situations and challenges of policies in international disaster (risk) reduction by the United Nations #7. Oral presentations by students and discussions
5. Grading	Students will be comprehensively graded by both output quality and active involvements in the class.
6. Book required / referenced	Asia-Pacific Disaster Report, 2010 & 2012 ESCAP and ISDR.
7. Remarks	The lectures will be held in English.

Name of Lecture	Action-oriented Disaster Mitigation VIII
Schedule / Venue	Thursday, 16:20-17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester (6/7, 14, 21, 28, 7/5, 12, 19)
Instructor	Prof. Takeshi Sato, Lecturer Miwa Kuri

1. Name of Lecture	Action-oriented Disaster Mitigation VIII
2. Purpose / Abstract	This course is focused on the contact point between science and society; Risk assessment, risk management, and information transfer for emergency judgment for disaster.
3. Goal	Knowledge acquisition for the practice of telling the scientific events in place to carry out the social decision-making to the goal.
4. Contents	1 Recognition and expectation for science and technology in society 2 History scientific communication: Age of trance science 3 Science in action with scientific uncertainty: Hazard/ Risk assessment/ Risk management 4 Role and utilization of education for disaster risk reduction 5 Safety management in school 6 Indefinite science and science in operation at the research site 7 Scientific communications for disaster science: the accuracy of the science in the field, of social fairness handling 8 Practice planning for global safety (Oral Examination)
5. Grading	Total evaluate of attendance, reports, and oral exam.
6. Book required / referenced	4-5: Reference materials is distributed in the lecture, 1-3, 6-8: Reference book 1) "Age of trans-science" by Tadashi Kobayashi 2) "Science communication theory" by Yūko Fujigaki, Hirono Yoshiyuki, others.
7. Remarks	

Name of Lecture	Top Leader's Special Lecture I トップリーダー特別講義 I
Schedule / Venue	To be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring / Fall
Instructor	杉本諭　教授、石田壽一　教授、 升谷五郎　教授、和田仁　名誉教授

1．Name of Lecture	Top Leader's Special Lecture I
2．Purpose / Abstract	地球規模の課題（環境、エネルギー、物質資源、安全等）へ取り組むことによる持続可能社会の実現と少子高齢化の下での真に豊かな成熟社会の創造を目指す人材となるために、現在世界で活躍するトップリーダー達から学ぶ。
3．Goal	この授業では主に以下のような能力を修得することを目標とする。 ・世界が直面する課題や情勢を俯瞰・理解する。 ・強い問題意識、広い視野、長期展望を涵養する。 ・国の礎としてこれからの日本を支え、世界のトップリーダーになるという気概と意欲を持てる。
4．Contents	この授業は、各方面で現在トップリーダとして活躍し実績をあげた講師陣から、大学から社会に巣立つ多くの学生に向け、世界のトップリーダになるという気概を持つ大切さ、実現するために必要なものは何か、真に豊かな社会とは何か、等様々な視点に基づいた講義を行う。専門にとらわれず学部および大学院生としての知識を広げる講義内容である。 月曜日 4 講時（14:40～16:10）に以下のとおり開講する。 第 1 回：5 月 21 日（月）「始まっている帝国主義の時代」 岡本 行夫（外交評論家、MIT 国際研究センターシニアフェロー、東北大学特任教授） 第 2 回：6 月 18 日（月）「スケールシフトで考える」 岩渕 明（岩手大学学長、東北大学大学院工学研究科修了） 第 3 回：7 月 23 日（月）「震災を人災にしないために」 奥山 恵美子（前仙台市長） 第 4～7 回：担当講師と調整中のため、決まり次第お知らせします。
5．Grading	・講義開始時に、出席票を兼ねる小レポートの用紙を配布するので、後日提出すること。 ・レポート提出率（提出回数/講義回数）)×(レポートの内容による素点の平均)＝評価点とする。
6．Textbook / referenced	講義のなかで適宜紹介する。
7．Remarks	

Name of Lecture	Practice on Global Safety Ⅰ、Ⅱ、Ⅲ、Ⅳ
Schedule / Venue	
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	
Instructor	

1. Name of Lecture	Practice on Global Safety Ⅰ、Ⅱ、Ⅲ、Ⅳ
2. Purpose / Abstract	This unit will be given when the students attend activities related to global safety such as symposia and research meetings, research and training outside the university, observation and use of advanced facilities. Discussions and information exchanges with researchers, bureaucrats and corporate leaders are also welcome.
3. Goal	The students who take this course are expected to acquire practical experiences, take a wider view and to make a network of personal contacts. They will understand how the academics can be applied to real world situations.
4. Contents	A plan document in a given format should be submitted to and approved by curriculum coordinators beforehand. After each activity, a report in a given format should be submitted. Total 36 hours activity corresponds to 1 unit. When one activity does not reach this number of hours, it can be combined with others. Whole day activity should include more than 30 min lunch break. The number of activity in each day will be capped at 10 hours.
5. Grading	The reports will be graded. At most two units of Practice on Global Safety can be regarded as units of Action-oriented Disaster Mitigation I-VIII. Note that at least two units should be taken from Action-oriented Disaster Mitigation I-VIII.
6. Book required / referenced	
7. Remarks	

Name of Lecture	Earthquakes and Volcanoes
Schedule / Venue	Monday, 16:20-17:50 / Earth Science Building #503
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Norihito Umino　Prof. Emeritus Takeyoshi Yoshida

1. Name of Lecture	Earthquakes and Volcanoes
2. Purpose / Abstract	This course is one of the general education courses offered in the Leading Graduate School Program and aims to give lectures on generation mechanism of earthquakes and volcanic eruptions.
3. Goal	Understand generation mechanisms of earthquakes and volcanic eruptions. Study characteristics of disasters caused by earthquakes and volcanic eruptions.
4. Contents	This lecture will be given by Profs. T. Yoshida and N. Umino in Graduate School of Science. Topics to be covered are: Mechanisms of earthquakes and volcanic eruptions. Validity of seismology and volcanology toward natural disaster mitigation. Laws of natural disaster mitigation and some precedents.
5. Grading	Based on attendance in class.
6. Book required / referenced	No required textbook. Handouts of each lecture will be provided in the classroom.
7. Remarks	Contact address: leading_jimu_sci@gcoe.es.tohoku.ac.jp

Name of Lecture	Disaster Control System
Schedule / Venue	Friday, 14:40 -16:10 / Lecture Room 203 in Education and Research Building of Civil Engineering and Architecture
Category	Multidisciplinary Subject
Credit(s)	2
Course	Safety and Security Engineering
Semester	Fall semester
Instructor	Prof. Fumihiko Imamura, Prof. Shinichi Koshimura, Lecturer Ikuo Abe (Tokoha Univ.)

1. Name of Lecture	Disaster Control System
2. Purpose / Abstract	The state of arts on the countermeasure in Japan. Including the history of damage and issues to improve is introduced. And mitigation/information system for disaster risk reduction is discussed. More, comparison of disasters, statistics data, and mitigation map for the practical disaster mitigation is introduced in the lecture.
3. Goal	Understand the mechanism of natural disaster, category and definition and mitigation technology, and able to discuss the issues on the problem in application at the present and in the future.
4. Contents	1 Introduction 2 Natural disaster and the countermeasure in Japan 3 Earthquake and geo-and soil disasters 4 Tsunami and storm surge disaster 5 Landslide disaster 6 Emergent Response system for disaster 7 Disaster information and transmission system 8 Disaster information and popurality 9 Issues on disaster information 10 Understanding the disaster characteristics

	11 DIG and regional mitigation map 12 Major disasters in the past in term of disaster information 13 Presentation of the practice problem
5. Grading	Report, presentation and final examination
6. Book required / referenced	水谷武司：自然災害と防災の科学、東京大学出版会 東京大学新聞研究所：災害と情報、東京大学出版会
7. Remarks	

Name of Lecture	Hydrology
Schedule / Venue	Thursday, 14:40-16:10 / Graduate School of Environmental Studies Lecture Room 3
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Prof. So Kazama, Assoc. Prof. Daisuke Komori, Assoc. Prof. Gregory Trencher

1. Name of Lecture	Hydrology
2. Purpose / Abstract	This lecture focuses to study hydrology based on physical (Hydrological processes, Hydrological model) and statics approaches (Frequency analyses, Temporal and spatial analyses) for analyzing the problems by changes in the distribution, circulation, or temperature of the earth's waters, and to provide guidance for the planning and management of watershed environment. Finally, we will have a discussion about human security on watershed environment and water.
3. Goal	The goal expected is to understand water role for various phenomena, human activities and nature, and is for students to have comprehensive aspect for water.
4. Contents	1. Introduction 2. Atmospheric processes 3. Surface and subsurface flow 4. Rainfall and evapotranspiration 5. Storage and dams 6. Ecology and Water 7. Watershed management 8. Water Law (River Law in Japan) and water policy 9. Water conflict 10. World food security under the changing climate 11.Climate/social change impacts on watershed

	environment 12. Water disasters and Human Security I 13. Water disasters and Human Security II 14. Presentation 15. Presentation
5. Grading	Reports and presentation.
6. Book required / referenced	Applied Hydrology by Ven Te Chow , David R.maidment , Larry W Hydrology An Introduction by Wilfried Brutsaert
7. Remarks	

Name of Lecture	Behavioral Analysis
Schedule / Venue	Friday 10 : 30-12 : 00 / Lecture Room 203, Education and Research Building of Civil Engineering and Architecture
Category	Multidisciplinary Subject
Credit(s)	2
Course	Natural Disaster Science/ Safety and Security Engineering
Semester	Fall semester
Instructor	Makoto Okumura (IRIDeS)

1. Name of Lecture	Behavioral Analysis
2. Purpose / Abstract	To learn theoretical bases, estimation method, application examples of the statistical models frequently used for behavior analysis; Generalized linear model (GLM). Applications to risk related cognition and behavior will be focused. It include PC exercise using R language.
3. Goal	Students will be able to formulate, to estimate on data and to discuss the result with confidence of statistical knowledge. That methods will be applied to analyze human behavior, especially risk-related matters.
4. Contents	1. Basic concepts of statistics and behavior analysis 2. R language software and descriptive statistics 3. Inferential statistics and estimation 4. Inferential statistics and statistical test 5. Linear Regression and descriptive statistics 6. Linear Regression and inferential statistics 7. GLM (Generalized linear models): Introduction 8. GLM: Estimation in R 9. GLM: Statistical tests 10. Applications of GLM 11.12.13. Risk Recognition and related behavior 14,15. Presentation of their own topic application
5. Grading	Presentation and short report on their own subject.
6. Book required / referenced	English material will be distributed.
7. Remarks	

Name of Lecture	Maintenance Engineering
Schedule / Venue	Thursday, 10:30-12:00 / Lecture Room 203 in Education and Research Building of Civil Engineering and Architecture
Category	Multidisciplinary Subject
Credit(s)	2
Course	Security and Safety Engineering
Semester	Fall semester
Instructor	Prof. Makoto Hisada, Associate Prof. Hiroshi Minagawa

1. Name of Lecture	Maintenance Engineering
2. Purpose / Abstract	This lecture includes a basic introduction, the current status and future view of maintenance engineering for infrastructures. In addition to this, this lecture focuses on the methodology of assessment, investigation, inspection and monitoring, repair and strengthening for concrete structures.
3. Goal	
4. Contents	1. Base of maintenance engineering (1) 2. Base of maintenance engineering (2) 3. Deterioration factors and mechanism (1) – Current status of maintenance 4. Deterioration factors and mechanism (2) – Deterioration prediction and performance verification 5. Deterioration factors and mechanism (3) 6. Assessment, Investigation, Inspection and monitoring (1) 7. Assessment, Investigation, Inspection and monitoring (2) 8. Assessment, Investigation, Inspection and monitoring (3) 9. Repair and Strengthening (1) 10. Repair and Strengthening (2) 11. Repair and Strengthening (3) 12. Asset management and life cycle (1) 13. Asset management and life cycle (2) 14. Asset management and life cycle (3) 15. Summary
5. Grading	Report and attendance
6. Book required / referenced	Joint Task Committee on Maintenance Engineering, JSCE: Infrastructure Maintenance Engineering, University of Tokyo Press, 2004 Concrete Committee, Japan Society of Civil Engineers: Standard Specification for Concrete Structures -2007, Maintenance, Japan Society of Civil Engineers, 2007 Japan Society of Civil Engineers: Challenge to introduction of asset management, Gihodoshuppan, 2005
7. Remarks	

Name of Lecture	Mechanical Reliability Design for Safe Energy Systems
Schedule / Venue	Monday, 10:30-12:00 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Prof. Hideo Miura, Prof. Toshiyuki Hashida, Prof. Kazuhiro Ogawa, Assoc. Prof. Ken Suzuki, Assoc. Prof. Kazuhisa Sato

1. Name of Lecture	Mechanical Reliability Design for Safe Energy Systems
2. Purpose / Abstract	Considering the complicated energy supply balance all over the world, design, control, and evaluation methods of integrity of materials and structures used in various energy plants are discussed from the view point of the atomic scale mechanisms of performance and long-term reliability of materials.
3. Goal	Students are expected to understand the dominant physical and chemical factors of performance and reliability of materials. Based on the physical bases, it is important to learn the way of thinking for proposing methodology of prediction and prevention of fractures of materials and structures in order to assure the safe and reliable operation of energy plants.
4. Contents	1) Introduction 2) Integrity of nuclear and thermal power plants (2 times) 3) Integrity of geothermal plants (2 times) 4) Integrity of solar and fuel cell power plants (2 times) 5) Methods for integrity design (2 times) 6) Survey research on assigned issues (private activity) 7) Presentation of the research results (every student) 8) Summary
5. Grading	Summation of the evaluations of presentation and written reports on the assigned issues
6. Book required / referenced	Reference materials are introduced and distributed in each lecture.
7. Remarks	Students are expected to attend all the lectures.

Name of Lecture	Robotics for Safe and Dependable Society
Schedule / Venue	Intensive course during July 30 to August 10, 2018 Detailed schedule and class room are announced later.
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive course
Instructor	Prof. Kazuya Yoshida and other professors

1. Name of Lecture	Robotics for Safe and Dependable Society
2. Purpose / Abstract	Lectures on robotics for safe and dependable society are given in the following aspects: ・Robotics for Disaster Response ・Field and Space Robotics ・Robotics as Systems Integration ・Robotics for Life Innovation ・Sensor and Vision Systems for Recognition and Environmental Measurement
3. Goal	After the series of lectures, students obtain appropriate knowledge on the current issues and state-of-the-art technologies of robotics for safe and dependable society.
4. Contents	Fifteen hours of lectures are planned in the following topics: ・Robotics for Disaster Response ・Field and Space Robotics ・Robotics as Systems Integration ・Robotics for Life Innovation ・Sensor and Vision Systems for Recognition and Environmental Measurement
5. Grading	Attendance and deliverables
6. Book required / referenced	Handout will be given at the beginning of each lecture
7. Remarks	All lectures are taught in English

Name of Lecture	Aerospace Safety
Schedule / Venue	3-day intensive course/ Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	2
Course	Security and Safety Engineering
Semester	Spring semester (7/30, 31, 8/3)
Instructor	Prof. Goro Masuya

1. Name of Lecture	Aerospace Safety
2. Purpose / Abstract	Aerospace vehicles are typical examples of man-made object for which safety should be highly esteemed. In this lecture, we understand their characteristic features and the philosophy and standard to establish their safety and reliability. We examine the samples of real aerospace incidents, accidents and mishaps to analyze their trend, and identify the mechanical, structural, human-related, and organizational factors of accidents. In addition, we learn the methods to estimate causes of accident and to mitigate it.
3. Goal	・To understand characteristics of aerospace transportation and aerospace vehicles. ・To understand aerospace safety standards. ・To understand how mishaps were produced, transferred and resulted in loss of safety and finally accident from examples of aerospace accidents. ・To learn counterplan for mishaps from example of aerospace developments.
4. Contents	1st day: Characteristics of aerospace transport, safety and its regulation of aviation 2nd day: Safety and regulation of space transportation and aerospace facilities 3rd day: Samples of aerospace accidents and counterplan to them
5. Grading	Evaluate by attendance to the lecture, answer to the questions in the lecture, and report on topics shown at the end of lecture.
6. Book required / referenced	There is no required text book. Printed copies of slides used (in English and Japanese) are distributed at the class. References are announced at the class.
7. Remarks	None

Name of Lecture	Introduction to Environmental Studies
Schedule / Venue	
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	
Instructor	Staff of the Graduate School of Environmental Studies

1. Name of Lecture	Introduction to Environmental Studies
2. Purpose / Abstract	
3. Goal	
4. Contents	
5. Grading	
6. Book required / referenced	
7. Remarks	For the details, please refer the syllabus of Graduate School of Environmental Studies.

Name of Lecture	Strategy for Energy and Resources （国際資源エネルギー戦略論）
Schedule / Venue	Tuesday 8:50-10:20 / Graduate School of Environmental Studies Lecture Room 1
Category	Multidisciplinary Subject
Credit(s)	2
Course	Natural Disaster Science/Safety and Security Engineering
Semester	Spring
Instructor	Assoc. Prof. Gregory TRENCHER, Assoc. Prof. Guido GRAUSE, Lecturer Kyle BAHR

1. Name of Lecture	Strategy for Energy and Resources
2. Purpose / Abstract	What should be done in order to attain a sustainable world? To achieve this it is essential that future leaders can grasp the current situation of energy and resources, and think about the outlook for the future with a global perspective. In this class students will learn to identify and systematically evaluate the advantages and disadvantages of the development and consumption of energy and resources such as fossil fuels, nuclear, hydrogen, energy recovery from waste, and the recycling of metals, plastic and other valuable materials in addition to emerging technologies.
3. Goal	
4. Contents	Week 1: Global state of coal energy Week 2: Japanese energy policy and coal stakeholder positions in Japan Week 3: Overview of nuclear energy Week 4: Fukushima disaster and radiation impacts Week 5: Hydrogen: Japan's vision of a hydrogen society Week 6: Renewable Energy: an overview Week 7: Geothermal: Usage decisions and technical challenges Week 8: Geothermal: Social Challenges Week 9: Sustainable mining: Oxymoron or inevitibility? Week 10: Class debate: Sustainable mining, geothermal development

	Week 11: Introduction to resource management Week 12: Fossil fuels Week 13: Biotic resources and land use Week 14: Abiotic resources Week 15: New concept of integrated resource management
5. Grading	Attendance - 20% Class mini-tests - 50% Group research report - 30%
6. Book required / referenced	Handout will be given at each lecture.
7. Remarks	

Name of Lecture	Risk Assessment and Management
Schedule / Venue	Monday 13:00-14:30 / Engineering Laboratory Complex Building 101
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Makoto Takahashi, Assoc.Prof. Daisuke Karikawa

1. Name of Lecture	Risk Assessment and Management
2. Purpose / Abstract	This lecture is intended to provide the basic concept of risk and its application to real world problems. The principle of probabilistic risk assessment (PRA) will also be provided combined with the concept of human reliability assessment(PRA).
3. Goal	To obtain essential knowledge and skill to deal with the risk in the socio-technical systems.
4. Contents	The problem of technological risk and its perception by society are considered to be quite important for the social acceptance. In this lecture, the risk related to socio-technical system will be discussed with emphasis on the nuclear power plant. (1)Essence of Risk (2) Risk management based on system engineering approach (3) Probabilistic Risk Assessment(PRA) (4) Human Reliability Analysis (HRA) (5) Safety System of Nuclear Power Plant (6) Lessons using PC-based nuclear power plant simulator Practical lessons will be given to provide practical knowledge on the safety system of nuclear power plant using PC-based nuclear power plant simulator
5. Grading	Evaluated based on submitted reports
6. Book required / referenced	
7. Remarks	

Name of Lecture	Introduction to Economics of Innovation and Entrepreneurship A
Schedule / Venue	10:30-16:10, on 6, 13, and 27th October 2018 at Room 817, Engineering Laboratory Complex Building (C10), Aobayama Campus.
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	
Instructor	Associate Prof. Nobuya Fukugawa

1. Name of Lecture	Introduction to Economics of Innovation and Entrepreneurship A
2. Purpose / Abstract	1. Goal Students will be able to understand the significance and determinants of innovation and entrepreneurship from both theoretical and historical perspectives. 2. Pedagogy To help students obtain an understanding of a specific topic, economic concepts are related to a real world by anecdotal and statistical evidences taken from various regions, industries, and firms. To help students grasp a whole picture, concept maps are used to visualize the relationships among economic concepts.
3. Goal	See above.
4. Contents	1. Theoretical part which introduces economic framework to understand the significance of innovation and entrepreneurship in the knowledge-based economy 2. Historical part which comprises my lecture on the emergence of key industries and students' presentations on a specific industry based on reading assignment

5. Grading	Attendance and the quality of presentation
6. Book required / referenced	None. See below.
7. Remarks	Students are advised to download a handout which will be uploaded on my website (https://sites.google.com/site/nfukugawa/) before the course starts so as to confirm the aim and contents of the course.

Name of Lecture	Economics of Entrepreneurship
Schedule / Venue	10:30-16:10, 3-5 November 2018 Engineering Laboratory Complex Building 8-817
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive course
Instructor	Associate Prof. Nobuya Fukugawa

1. Name of Lecture	Economics of Entrepreneurship
2. Purpose / Abstract	1. Goal Students will be able to understand the significance and determinants of entrepreneurship and the role of the government to promote entrepreneurial activities from the viewpoint of economic theory. 2. Pedagogical method To help students obtain an understanding of a specific topic, economic concepts are related to a real world by anecdotal and statistical evidences taken from various regions, industries, and firms. To help students grasp a whole picture, concept maps are used to visualize the relationships among economic concepts.
3. Goal	See above.
4. Contents	1. Why innovation and entrepreneurship? 2. Definition of entrepreneurship 3. Determinants of entrepreneurship 4. Entrepreneurship policy
5. Grading	TBA
6. Book required / referenced	None. See below.

7. Remarks	Students are advised to download a handout which will be uploaded on my website (https://sites.google.com/site/nfukugawa/) before the course starts so as to confirm the aim and contents of the course.

Name of Lecture	Project Management
Schedule / Venue	Not yet determined
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive Course in 1st Semester
Instructor	Prof.Akio Nagahira et al.

1. Name of Lecture	Project Management
2. Purpose / Abstract	The lecture of project management deals with the planning, execution, and controlling of projects based on the PDCA cycle as planning (Plan), execution (Do), check (Check) and correction (Action).
3. Goal	The goal is to understand the technique of the systematic project management, and the knowledge to raise an outcome of a project and the practice ability.
4. Contents	This lecture is focused on the management and implementation of the following topics: building a project organization and operation, establishment of WBS (Work Breakdown Structure), securement of human and material resources, estimate of a cost, job allocation to a team member, progress management, operational directionality maintenance, cost benefit analysis, project control, project management engineering, and project evaluation.
5. Grading	written examination
6. Book required / referenced	A Guide to the Project Management Body of Knowledge (PMBOK Guide) Fifth Ed.
7. Remarks	

Name of Lecture	Bioethics and Environmental Ethics
Schedule / Venue	Tuesday, 13:00 -14:30 / Arts and Letters Building R919
Category	Multidisciplinary Subject
Credit(s)	2
Course	Human Science
Semester	Spring semester
Instructor	Prof. Kiyotaka Naoe

1. Name of Lecture	Bioethics and Environmental Ethics
2. Purpose / Abstract	Promoting the understanding of ethical issues in medicine, technology and environment. Developing a cross-cultural understanding of bioethical, environmental ethical issues.
3. Goal	Students are expected to show a good understanding of the ethical issues in medicine and environment. They should also develop critical thinking skills and cultural understanding in the field of medicine, environment and technology.
4. Contents	How to understand the concept of dignity has become an increasingly important in many fields: medicine, environmentology, robotics and so on. This course provides an overview of the history of the concept of dignity, and its availability in concrete cases. This course is centered on a lecture and a questions and answers session. The contents and schedule are as shown below: 1. Introduction: What is dignity? 2. Dignity in bioethics (2) 3. Dignity in bioethics (2) 4. Dignity of human embryo 5. Dignity in terminal care (1) 6. Dignity in terminal care (2) 7. Dignity with death and comfortable death (1)

	8. Dignity with death and comfortable death (2) 9. Dignity of disability person 10. Values of nature 11. Values of environment. 12. Robot and human dignity 13. Dignity for robots 14. Review (1) 15. Review (2) (The contents and schedule are subject to change depending on circumstances.)
5. Grading	Participation in classroom discussions 20% Writing reports of lectures 80%
6. Book required / referenced	Yasushi, Kato (ed.), Dynamism in the Concept of Dignity, 2017 (in Japanese) Siep, Ludwig et.al., Bio-und Umwelt Ethik in Deutschland, 2001 (in Japanese translation) Human Dignity and Bioethics: Essays Commissioned by the President's council on Bioethics, 2008
7. Remarks	

Name of Lecture	Sociology of Risk and Disaster Reduction
Schedule / Venue	Monday, 16:20-17:50 / Arts and Letters Building R431
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Yoshimichi Sato

1. Name of Lecture	Sociology of Risk and Disaster Reduction
2. Purpose / Abstract	We learn to apply sociological theories and methodology to mitigate the risks caused by natural disasters.
3. Goal	We need the perspective of social sciences as well as those of natural sciences and engineering to mitigate the risks of natural disasters. This course examines how to reduce the risks and prevent disasters with the help of sociological theories and methodology.
4. Contents	This course covers the following topics: 1) Reexamination of the philosophy of preventing disasters. 2) Social capital and disaster recovery 3) Firefighting organizations 4) Community 5) Volunteers
5. Grading	Term paper (60%) and attendance (40%)
6. Book required / referenced	Textbooks 1) Naoki Yoshihara (ed.), 2008, Sociology of Preventing Disaster, 2nd edition, Toshin-do. 2) Daniel P. Aldrich, 2012, *Building Resilience: Social Capital in Post-Disaster Recovery*, University of Chicago Press.
7. Remarks	Office hour: Wednesday, 4:20-5:50 pm (Need to make an appointment beforehand.)

Name of Lecture	Regional Planning
Schedule / Venue	6th class hour, Mon./ Faculty of Economics Bldg., 1st floor, Seminar Room 3
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Satoru MASUDA
1. Name of Lecture	Regional Planning
2. Purpose / Abstract	The lecture of this year deals with the theory and practice of urban and regional planning and related fields, including technological, social, economic and political aspects of planning and land-use management. Selection of the textbooks to read in turns is determined in accordance with the student's research field, topics and interest. Most of the course materials and communications are in Japanese so that the student who could understand the following contents are eligible to attend this course.
3. Goal	・都市計画・地域開発・まちづくり・地域デザイン等に関わる多様な論点と、その理論的背景を理解する ・計画実践例の展開過程を追い、計画・実施主体や方法論の特徴を地域特性との関係から把握する ・上記の理論化と政策立案・施策実施との関係性を理解する
4. Contents	６．に示した文献の他、参加者からの提案も踏まえて、初回に教科書・参考書の候補を持ち寄り、その中から選定する。各回の講義は、報告者と討論者を中心とする輪講形式で行う。報告者は文献内容の要約紹介を、討論者は内容に対するコメントと関連事例の報告をそれぞれ担当する。各回の分担は第２回講義開講時に決定し、報告者は発表の前週にレジメを、討論者は当日コメントを準備しておくこと。レジメ作成では、地図・統計表・その他関連資料を自ら発掘し添付することが望ましい。 ・報告者は予習の上、発表前週の講義修了時にレジメを印刷・配布すること。 ・討論者は前週に配られたレジメを予習し、コメント等を準備しておくこと。

	・他の参加者は、レジメ読了の上、講義に参加すること。
5. Grading	平常の報告・討論（講義への貢献 50%）とレポート（学期末他 50%）により評価する。
6. Book required / referenced	・F.コトラー・J.ボーエン・J.マーキンズ（2003）『コトラーのホスピタリティ&ツーリズム・マーケティング』、ピアソン・エデュケーション（白井・平林訳） ・大野健一（2013）『産業政策のつくり方』、有斐閣 ・小田清（2013）『地域問題をどう解決するのか：地域開発政策概論』、 日本経済評論社 ・木下斉（2018）『福岡市が地方最強の都市になった理由』、PHP 研究所 ・飯田・木下・川崎・入山ほか（2016）『地域再生の失敗学』、光文社新書- 2016/4/19 ・日本建築学会編（2004～）『まちづくりの方法』まちづくり教科書シリーズ 1～10、丸善 ・浅野・海道・中西・秋田ほか（2017）『都市縮小時代の土地利用計画：多様な都市空間創出へ向けた課題と対応策』、学芸出版社(・専門性をつなぐ参画のしくみ研究会編（2016）『都市をつくりかえるしくみ』、 彰国社） ・辻哲夫・田城孝雄・内田要編（2017）『まちづくりとしての地域包括ケアシステム：持続可能な地域共生社会をめざして』、東京大学出版会 ・岡本正（2014）『災害復興法学』、慶應義塾大学出版会 ・藤田昌久・浜口伸明・亀山嘉大（2018）『復興の空間経済学：人口減少時代の地域再生』、日経新聞出版社 ・日本建築学会（2014）『コンパクト建築設計資料集成：都市再生』、丸善 ・Adam Sheppard and Nick Smith (2013) *Study Skills for Town and Country Planning*, SAGE など 参考書は、各自発掘し講義で紹介のこと。季刊まちづくり、日経グローカル、日経 MJ 誌等も参照。
7. Remarks	日本語でのコミュニケーションが出来ることを除き、特に履修の条件はない。オフィスアワーは相談の上決定する。 講義内容や文献等に関して質問がある場合は、事前にメール（s.masuda@tohoku.ac.jp）で連絡の上、研究室（川内南・経済学研究棟 513 号室）まで。

Name of Lecture	Nonprofit Organization
Schedule / Venue	Monday 13:00-14:30 / Lecture Room 2 (Econ), Multidisciplinary Research Building 2F, Kawauchi-Minami Campus
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Fall
Instructor	Prof. Yuko NISHIDE

1. Name of Lecture	Nonprofit Organization
2. Purpose / Abstract	This course aims at acquiring basic knowledge and ideas on nonprofit organizations striving to solve various social problems and to create social values, and social capital. Topics relating to nonprofit organizations, their organization management are discussed through lectures, student presentations and discussions.
3. Goal	On successful completion of the course, students may expect to – understand the basic concepts, role and development of nonprofit organizations – understand management and leadership of nonprofit organizations – comprehend the state and challenges facing nonprofit organizations – think through how to solve such problems and make recommendations
4. Contents	The following topics relating to nonprofit organizations and social capital are examined through lectures, student presentations and discussions: – Theory, Significance, International and Regional Comparison – Historical development, state and challenges – Management (mission, HRM, funding, accountability) – Cross-sector Partnership (Nonprofits, Business, Government, University)

	– Advocacy, Public Policy and Social Impacts
5. Grading	Presentations (40%) Research paper (30%) Participation (discussions and minute paper) (30%)
6. Book required / referenced	How to get a copy of the textbook and/or reading list is announced at the first class. Suggested reading list (tentative): Akingbola, Kunle (2015) *Managing Human Resources for Nonprofits,* Routledge. Cnaan, Ram A. and Vinokur-Kaplan, Diane, eds. (2015) *Cases in Innovative Nonprofits: Organizations that Make a Difference,* SAGE Publications. Crutchfield, Leslie R. and Grant, Heather M. (2012) *Forces for Good: The Six Practices of High-Impact Nonprofits,* Jossey-Bass. Nishide, Yuko (2009) *Social Capital and Civil Society in Japan,* Tohoku University Press. Osborne Stephen P. (2013) *Voluntary and Not-for- Profit Management,* SAGE. Ott, Steven J. and Dicke, Lisa A. eds. (2016a) *The Nature of the Nonprofit Sector, 3rd edition,* Westview Press. Ott, Steven J. and Dicke, Lisa A. eds. (2016b) *Understanding Nonprofit Organizations:* *Governance, Leadership and Management, 3rd edition,* Westview Press. Perry, James L. ed. (2009) *The Jossey-Bass Reader on Public and Nonprofit Leadership,* John Wiley & Sons, Inc.
7. Remarks	The first session is held on October 15 (no class on Oct.1). 【Language】This course is conducted in English 【Contact】E-mail: yuko.nishide.c8@tohoku.ac.jp 【Office Hour】by appointment through email

Name of Lecture	Aging Economy
Schedule / Venue	Tuesday, 16:20-17:50 / Graduate School of Economics and Management Room No.12
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Prof. Hiroshi Yoshida

1. Name of Lecture	Aging Economy
2. Purpose / Abstract	(1) The effect of aging on public finance, social welfare, public pension, and long term nursing care; (2) Demand for children, labor supply, generational equity. We discuss these issues basing on the theory of Neoclassical economics.
3. Goal	You will have the ability for analyzing the issues of aging using modern economic theory.
4. Contents	(1) Economics of population aging, demand for children, economics of gender; (2) Generational equity using the *Generational Accounts*; (3) Economics of Household, time allocation, life time optimization; (4) Economic effect of public pension.
5. Grading	Written exam, at the end of the semester. You can refer text and your notebook.
6. Book required / referenced	**Text: "Kourei Syakai no Keizai Bunseki; Economic analysis of Aging" in Japanese.** This text will be sold in the bookstore at the COOP shop in Kawauchi campus in autumn.
7. Remarks	(1) You should have the basic knowledge of macro economics, microeconomics, econometrics. (2) Office hour; 13:00-14:30 every Tuesday. (You have to reserve in advance.) (3) The lecture will be provided partly in English. (4) You can see the exam of last year at my office room.

	・Preparation and review Homework will be provided in the lecture.

Name of Lecture	Science and Society
Schedule / Venue	Intensive Course (PM of April 20th and AM of April 21st) Venue to be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester
Instructor	Associate Prof. Tsuyoshi Hondou

1. Name of Lecture	Science and Society
2. Purpose / Abstract	What is scientific proof? What is scientific correctness? Understanding of incertitude about those questions is basis for constructive discussion between science and society. We will discuss how these issues are related to the issues between science and society.
3. Goal	Understanding of incertitude of "scientific proof" and "scientific correctness", as basis for constructive discussion with society. Understanding of condition needed for integrity of scientific research and for proper institutional design of science.
4. Contents	Lecture and workshop style. Variety of scientific incertitude will emerge by the workshop. Participants are requested to submit reports after the intensive course.
5. Grading	Participation (50%), Report (50%)
6. Book required / referenced	・Andy Stirling : "Keep it complex", Nature, 468 1029 (2010)
7. Remarks	This class will be provided also for students at the Graduate School of Science. If schedule of this class partially overlaps with that of other class, students are allowed to attend this class partially. For detail, contact with an instructor in advance.

Name of Lecture	Science Communication
Schedule / Venue	Intensive Course (May 25th PM ～ May 26th) Venue to be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester
Instructor	Guest Lecturer: Kohta JURAKU (Associate Professor, Tokyo Denki University) Associate Prof. Tsuyoshi HONDOU

1. Name of Lecture	Science Communication
2. Purpose / Abstract	Theme: High-level Radioactive Waste and Communication for Science, Technology and Public Policy As its very particular characteristics among many technological risk issues, high-level radioactive waste (HLW) management requires extraordinarily deliberate considerations to be dealt with appropriately. Very long time-scale, such as hundred thousand years and million years, is often discussed as if it is usual thing. Safety *without* maintained by stringent continuous oversight, so-called 'Passive safety,' is preferred to realize a safe disposal of HLW, contrary to our common sense. Furthermore, it is many things to do with the controversy over nuclear utilization, which is highly politicized and polarized. All of these factors make the issue 'difficult' to be sorted out. However, the HLW management issue occupies an important position among public policy and could not be neglected, because we already have the wastes and their risks, which must be treated properly. In this class, from the perspective of sociology of science and technology and other related scholarship in science and technology study field (for example, a series of works

	centering on the incertitude of scientific knowledge and its implications for public policy), the guest lecturer, Prof. Kohta Juraku will share his expertise as a researcher who has studied this issue and involved in the national Governmental policy process. Importance and difficulty of communication on the issues centering around public policy, technology and its risk are to be recognized. Possible ideas to tackle them will be broadly discussed with the students.
3. Goal	Understanding the importance of communication centering around public policy, technology and its risk, their difficulty to be tackled, and possible way to cope with them. Understanding the outline of and the relevant issues to HLW management.
4. Contents	Intensive course Friday afternoon and Saturday morning. Schedule to b e announced. - Discuss the outline of and the relevant issues to HLW management. - Discuss methodology, expertise and practical lessons for communication for science, technology and public policy. Students are encouraged to read materials related to HLW issue in advance.
5. Grading	Participation (50%), Report (50%)
6. Book required / referenced	To be announced at the class
7. Remarks	This class will be provided also for students at the Graduate School of Science. If schedule of this class partially overlaps with that of other class, students are allowed to attend this class partially. For detail, contact with an instructor in advance.

Name of Lecture	Disaster Management Laws
Schedule / Venue	Thursday, 13:00-14:30 / Extended Education & Research Building in Katahira Campus
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring Semester
Instructor	Prof. Akio Shimada, Prof. Hiroaki Maruya

1. Name of Lecture	Disaster Management Laws
2. Purpose/ Abstract	Considering the revision and establishment of laws after the Great East Japan Earthquake (GEJE), we will lecture which points were improved in current disaster management laws and what should be improved in future.
3. Goal	Overview the legal system of disaster management, and understand the present problems; i What kind of concept current legal system is based on. ii The problems which have not been tackled by current legal system. iii Desirable shape of legal system.
4. Contents	(1) Amendment of Disaster Countermeasure Basic Act (Revised in 2012 and 2013) (2) The Disaster Relief Act and its problems (3) A legal system and its problems on disaster recovery (4) A legal system and its problems on disaster restoration (5) A legal system and its problems on disaster mitigation, We will refer to the real situations of application in the GEJE. (7 classes for (1) and 8 classi for (2) – (5)) About the key issues, we plan to exchange opinions interactively during class.
5. Grading	By degree of participation in discussion and evaluation of final report.
6. Book required / referenced	Reference : Akio Shimada "Practice Improving Area Disaster Management Ability –Lessons and Problems of the Great East Japan Earthquake", Gyosei Osato Ikuta "Bousai Hou (DM Law)", Sinzansha Yasutaka Abe "Laws and Policies for the Great Earthquake" Nippon Hyoron Sha Bousai Gyosei Kenkyukai " Article by Article Commentary of Disaster Management Law 3rd ed., 2016, Gyosei
7. Remarks	Email Address of Professors : shimada@law.tohoku.ac.jp maruya@irides.tohoku.ac.jp

Name of Lecture	Cognitive Psychology
Schedule / Venue	Wednesday 13:00 - 14:30 / GSIS Mid Lecture Room (2F)
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Fall semester
Instructor	Associate Prof. Kazumichi Matsumiya, Associate Prof. Yuichi Wada

1. Name of Lecture	Cognitive Psychology
2. Purpose / Abstract	The aim of this lecture is to introduce you to cognitive science. Cognitive science is a mixture of cognitive psychology, neuroscience, engineering (especially, AI), linguistics and philosophy. Our specialty is psychophysics, cognitive psychology and neuroscience. Therefore, most of the topics will be research works in those fields.
3. Goal	To understand mechanisms of human cognitive functions, and to learn how to quantitatively measure human responses.
4. Contents	1. Perceptual functions on the basis of human actions 2. Perception and action 3. Multisensory perception 4. Perceptual plasticity, and memory 5. Thought and intelligence For these topics, we introduce examples of psychophysical experiments and consider psychological mechanisms underlying human behaviours.
5. Grading	Submission of reports
6. Book required / referenced	
7. Remarks	

Name of Lecture	Natural Disaster Science Special Training
Schedule / Venue	Summer vacation period or after September
Category	Training Subject (Convergence Lab.)
Credit(s)	2
Course	All
Semester	Spring / Fall
Instructor	Prof.Takeshi Kakegawa, Prof. Michihiko Nakamura, Prof. Yasufumi Iryu, Assistant Prof. Shin Ozawa, Guest Lecturer Ryoichi Yamada

1. Name of Lecture	Natural Disaster Science Special Training
2. Purpose / Abstract	You choose ether one from the list. All are designed to understand natural disaster and benefits from nature.
3. Goal	Understanding natural phenomena (volcanic activity, marine process etc.) scientifically, and discuss how to co-exists with nature safely.
4. Contents	You choose either one: Class 1: Exercise for chemical analysis for natural hazard materials (volcanic eruptions, meteorite impacts, deformed rocks by earthquake). One day trip to active volcano will be included. Class 2: Field excursion for natural disaster (volcanic hazard, induced earthquakes) and benefit from nature (geothermal energy, petroleum production, heavy metal resources). Travel fees will be covered by this project. The excursion will be done during weekends of October and November (three trips are schedules). Class 3: Field excursion (Okinawa area) to observe geological records of past global warming and climate change. Travel fees will be covered by the project. The trip will be made on weekends or national holidays in Oct to Dec.
5. Grading	Attending points, reports, presentation at t symposium
6. Book required / referenced	Will be announced by each instructor. Handouts will be prepared.
7. Remarks	For further question, please contact to Prof. Takeshi Kakegawa.

Name of Lecture	Project Based Learning for Frontier of Safety Engineering
Schedule / Venue	Monday 16:20 - 17:50 or other hours
Category	Training Subject (Convergence Lab.)
Credit(s)	2
Course	Natural Disaster Science, Safety and Security Engineering
Semester	Spring and Fall
Instructor	Corresponding instructors

1. Name of Lecture	Project Based Learning for Frontier of Safety Engineering
2. Purpose / Abstract	Through the hands-on activities, students can learn practical approaches to solve various issues, such as disaster investigation and mitigation, energy and environmental problems, and innovative technologies which are necessary for sustainable society.
3. Goal	To a given problem, students should study, discuss and develop solutions and conduct hands-on practice. Final results must be presented in a public session with professors, students and other audience.
4. Contents	Students should choose a topic from the following categories: (1) Disaster investigation lab (remote sensing, disaster assessment, etc.) (2) Disaster mitigation lab (planning for resilient cities and life lines, etc.) (3) Energy and environment lab. (4) High reliability materials and systems lab. (5) Dependable robotic systems lab. (6) Advanced (safe and reliable) aerospace systems lab (collaboration with JAXA) After the choice of the topic, each project should be conducted under the guidance of corresponding instructors.
5. Grading	Attendance and participation, plus final presentation and deliverables
6. Book required / referenced	No textbook required. Reference books/papers will be introduced by corresponding instructors.
7. Remarks	

Name of Lecture	Humanities and Social Sciences Basic Training
Schedule / Venue	Intensive Course
Category	Training Subject (Convergence Lab.)
Credit(s)	2
Course	Human Science
Semester	Intensive Course
Instructor	(1) Prof. Yoshimichi Sato, Assistant Prof. Rumi Matsuzaki (2) Prof. Makoto Okumura (3) Associate Prof. Kanako IUCHI, Assistant Prof. Maly Elizabeth, Assistant Prof. Yasuhito JIBIKI (4) Associate Prof. Akihiro Shibayama, Assistant Prof. Sébastien Boret

1. Name of Lecture	Humanities and Social Sciences Basic Training *Selecting from the following training theme. (1) Summer School under Themes of Risk, Safety, Security, and Inequality (2) Multi-User Gaming Simulation Lab (3) International Policy of Disaster Risk Reduction in developing countries (4) Disaster Archives Lab
2. Purpose / Abstract	(1) To understand the problems related to risk, safety, security, and inequality in contemporary society from various aspects. (2) To investigate the social dilemmatic situation in disaster responses, via exercise of Multi-User Gaming Simulator (MUGS) in IRIDeS. (3) To examine function of governmental agencies which are in charge of reconstruction, in the context of practice for disaster risk reduction. (4) In order to provide a flexible and rapid response to natural hazards, disaster prevention and disaster reduction are clearly indispensable. We have collected have gathered every possible memory,

	records, case studies and findings in connection to the Great East Japan Disasters. Within all this information, however, only a handful has become lessons learned for the mitigation of future disasters. The aim of this course is to provide its participants with the capacity to understand and document the lessons learned from natural disasters drawing from the testimonies and other records of the Great East Japan earthquake. In addition, participants will attend practical classes using JDArchive system of the Reischauer Japan Research Institute of Harvard University – crossed search of earthquake records and system presentation.
3. Goal	(1) To acquire skills to give a presentation under the themes of risk, safety, security, and inequality in English. (2) To acquire skills to use MUGS, investigate the dilemmatic problem and to present some countermeasure to solve the problem. (3) To obtain views on roles of government agencies in developing countries, in the reconstruction phase after mega natural disasters. (4) To reveal lessons learned from natural disasters and acquire the ability to understand, organize and analyze.

4. Contents	(1) Students will give presentations and discuss with students and professors of Stanford University in June or July at Tohoku University. The orientation meeting and selection will be held on April 13th from 13:00 to 14:30 in Room 621, Arts and Letters Building. (2) After a guidance of usage of MUGS and lecture on System Dynamics modeling in May, MUGS exercise will be done at IRIDeS in June. Report of the exercise and proposal of countermeasure is required at end of July. (3) To understand progress and difficulties of governmental agencies which are specifically responsible for the reconstruction. The OPARR (Office of the Presidential Assistant for Rehabilitation and Recovery) in the Philippines, BRR (Indonesian Agency for Recovery and Reconstruction) in the case of Indian Ocean Tsunami, and Reconstruction Agency in Japan will be dealt for comparison. Interviews with relevant government officials will be implemented, and also the field visits to the Philippines or Indonesia will be considered. The schedule will be determined in an orientation meeting, and the orientation will be organized in the beginning of April (to be confirmed). (4) It will be held the lecture and exercise about "Introduction of Disaster Archives", "The Organization and Reading Comprehension of The Great East Japan Disaster Records", "The Organization and Reading Comprehension of Overseas Natural Disasters" and a few times of "JDArchive System Data Organization and Presentations". *In autumn season, you will conduct the presentation and discussion about your achievement by English at Reischauer Institute of Japanese Studies in Harvard University. *This class will be held with "Disaster Modeling Lab" organized by graduate school of science members. And, it's a possibility that contents may be modified.

5. Grading	Attendance, report, and C-Lab final presentation
6. Book required / referenced	Each instructor will introduce required books and reference books.
7. Remarks	(4) By the class, bring your notebook PC.

Name of Lecture	Global Communication Skill Training I グローバルコミュニケーションスキル研修Ⅰ（１年目研修）
Schedule / Venue	Wednesday, Schedule to be announced　/ Leading Lecture Room
Category	Training subject
Credit(s)	2
Course	All
Semester	Spring /Fall
Instructor	

１．Name of Lecture	Global Communication Skill Training I グローバルコミュニケーションスキル研修Ⅰ
２．Purpose / Abstract	グローバル環境への対応力が求められるなか、円滑な意思疎通や、論理的に話し伝える技術は必須のスキルとなる。 本授業では、国際的なトップリーダーに必要な論理的思考を身につけ、論理的に英語で伝える技術を身につけることを目的とする。英文ライティングのルールを理解し、論理的思考に重きを置いた授業を通し、総合的な英語力の養成を目指す。
３．Goal	論理的・効果的なライティング力、論理的思考を身につけるうえでの基礎を構築する。
４．Contents	・英文ライティングのルールを理解し、ロジカルシンキングの訓練を行う。パラグラフ・ライティングの理解、パラグラフのアウトラインを作成できるスキルを身につける。 ・パラグラフ構造を理解したリーディング法を実践しつつ、単語力の構築・文法の復習をする。 ・ニュース等を初見で聞き、全体をつかむスキルを習得する。 ・クイックリスポンスの実施。リスニングやリーディング教材について短いコメントを発言できるスピーキング力をつける。
５．Grading	出欠、個別レポート、授業での活動や発言等により総合的に評価する。
６．Book required / referenced	授業内で都度指示する。
７．Remarks	この科目はリーディング院生のみ履修可能
８．Question / Advisement （質問・相談）	質問や相談は、講義時間内および授業後に回答する。

Name of Lecture	Global Communication Skill Training II グローバルコミュニケーションスキル研修Ⅱ（２年目研修）
Schedule / Venue	Wednesday, Schedule to be announced　/ Leading Lecture Room
Category	Training subject
Credit(s)	2
Course	All
Semester	Spring / Fall
Instructor	担当教員

１．Name of Lecture	Global Communication Skill Training II グローバルコミュニケーションスキル研修Ⅱ
２．Purpose / Abstract	グローバル環境への対応力が求められるなか、円滑な意思疎通や、論理的に話し伝える技術は必須のスキルとなる。 本授業では、国際的なトップリーダーに必要な論理的思考を身につけ、論理的に英語で伝える技術を身につけることを目的とする。英語圏でのロジック展開をふまえた英語文書の作成・理解、コミュニケーション力の習得を目指す。
３．Goal	論理的・効果的なライティング力、論理的思考を身につけるなかで、より実践的なスキルの習得を目指す。
４．Contents	・英語圏でのロジック展開にそって、エッセイのアウトライン～作成・発表できるスキルを習得する。英語論文作成の基礎を理解する。 ・パラグラフにくわえ、英文全体の構造を理解したリーディング法を習得する。単語力の構築・文法の復習も行う。 ・ニュースやプレゼンテーションなどを初見で聞き、意味と意図を理解できるスキルを習得する。 ・クイックリスポンスの実施。リスニングやリーディングで扱った教材に関し、グループ討議するスキルを身につける。
５．Grading	出欠、個別レポート、授業での活動や発言等により総合的に評価する。
６．Book required / referenced	授業内で都度指示する。
７．Remarks	この科目はリーディング院生のみ履修可能
８．Question / Advisement (質問・相談)	質問や相談は、講義時間内および授業後に回答する。

Name of Lecture	International Internship Training
Schedule / Venue	
Category	Training Subject
Credit(s)	2
Course	All
Semester	Spring / Fall
Instructor	

1. Name of Lecture	International Internship Training
2. Purpose / Abstract	When students have attended any lectures or practiced in a foreign academic organization or science program, one or two credits are given to them according to the content and the period.
3. Goal	To obtain knowledge and communication skills unavailable in Japan, and to develop a network of international contacts.
4. Contents	A plan document in a given form should be submitted to and approved by the curriculum organizer beforehand. Within 1 month after the internship, a report (in a free form) should be submitted.
5. Grading	Grading is based on the report.
6. Book required / referenced	
7. Remarks	

Name of Lecture	International Seminar of Global Disaster Mitigation I, II
Schedule / Venue	
Category	Major General Subject
Credit(s)	1 (each)
Course	All
Semester	
Instructor	

1. Name of Lecture	International Seminar of Global Disaster Mitigation I, II
2. Purpose / Abstract	This unit will be given to attendance and discussion in the international meetings, symposium, seminars and lectures in English by invited and visiting lecturers.
3. Goal	The students are expected to learn current topics on disaster mitigation and acquire the skills of discussion and cross-cultural communication in English.
4. Contents	Since the seminars and lectures by invited and visiting lecturers are not always preplanned, students should give attention to the announcements. The international meetings, symposia etc. sponsored, cosponsored and joint-hosted by the G-Safety program are regarded as a part of this course. The other meetings etc. should be registered beforehand by submitting a given format to the curriculum organizers. A report (in a free format) should be submitted to their supervisors after each attendance within 1 month. The "attendance card" are given out in the orientation.
5. Grading	Based on number of attendance, questions and discussions in the seminar. Total 15 hours (900 min) correspond to 1 unit. The number of attendance and questions can be carried over the next semester. Be sure to submit the attendance card to the curriculum organizer when you need units.
6. Book required / referenced	
7. Remarks	

Name of Lecture	Master Course Seminar
Schedule / Venue	
Category	Major General Subject
Credit(s)	Refer the relevant syllabus
Course	All
Semester	Spring / Fall
Instructor	

1. Name of Lecture	Master Course Seminar
2. Purpose / Abstract	This seminar encourages the deepening of the global safety expertness and the applying of broad knowledge to each research work.
3. Goal	
4. Contents	
5. Grading	Credit for the Master Course Seminar shall apply the credit of specific subject obtained at their own graduate schools (Graduate School of Art and Letters, Science, Engineering, Economics and Management, Information Science, Environmental Studies and Biomedical Engineering, School of Law
6. Book required / referenced	
7. Remarks	

Name of Lecture	Lecture for Leadership
Schedule / Venue	Friday, 16:20-17:50 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester　(Schedule to be announced)
Instructor	Prof. Hiroo Yugami, Prof. Fumihiko Imamura, Prof. Yoshimichi Sato, Prof. Michihiko Nakamura and invited lecturers

1. Name of Lecture	Lecture for Leadership
2. Purpose / Abstract	The proposition “What is leadership” will be discussed in various aspects. The leaders who had coped with actual disasters will be invited. The students will learn practical crisis responses from their experiences.
3. Goal	The "qualities" of a global leader will be discussed to understand how to foresight the future, persuade people and lead subordinates. Practical examples of dealing with media, advising municipalities and disseminating information to society will be introduced.
4. Contents	Lectures will be given on the “leaderships” in scenes with backgrounds of engineering, natural science, and social sciences and humanities by several professors in an omnibus form.
5. Grading	Attendance, discussion in the class and reports
6. Book required / referenced	
7. Remarks	

Name of Lecture	Top Leader's Special Lecture Ⅱ トップリーダー特別講義Ⅱ
Schedule / Venue	To be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring / Fall
Instructor	杉本諭　教授、石田壽一　教授、 升谷五郎　教授、和田仁　名誉教授

1．Name of Lecture	Top Leader's Special Lecture Ⅱ
2．Purpose / Abstract	地球規模の課題（環境、エネルギー、物質資源、安全等）へ取り組むことによる持続可能社会の実現と少子高齢化の下での真に豊かな成熟社会の創造を目指す人材となるために、現在世界で活躍するトップリーダー達から学ぶ。
3．Goal	この授業では主に以下のような能力を修得することを目標とする。 ・世界が直面する課題や情勢を俯瞰・理解する。 ・強い問題意識、広い視野、長期展望を涵養する。 ・国の礎としてこれからの日本を支え、世界のトップリーダーになるという気概と意欲を持てる。
4．Contents	この授業は、各方面で現在トップリーダとして活躍し実績をあげた講師陣から、大学から社会に巣立つ多くの学生にむけ、世界のトップリーダになるという気概を持つ大切さ、実現するために必要なものは何か、真に豊かな社会とは何か、等様々な視点に基づいた講義を行う。専門にとらわれず学部および大学院生としての知識を広げる講義内容である。 月曜日４講時（14:40～16:10）に以下のとおり開講する。 第１回：５月 21 日（月）「始まっている帝国主義の時代」 岡本 行夫（外交評論家、MIT 国際研究センターシニアフェロー、東北大学特任教授） 第２回：６月 18 日（月）「スケールシフトで考える」 岩渕 明（岩手大学学長、東北大学大学院工学研究科修了） 第３回：７月 23 日（月）「震災を人災にしないために」 奥山 恵美子（前仙台市長） 第 4～7 回：担当講師と調整中のため、決まり次第お知らせします。
5．Grading	・講義開始時に、出席票を兼ねる小レポートの用紙を配布するので、後日提出すること。 ・レポート提出率（提出回数/講義回数）)×(レポートの内容による素点の平均)＝評価点とする。
6．Textbook / referenced	講義のなかで適宜紹介する。
7．Remarks	

Name of Lecture	Advanced Disaster Mitigation I, II
Schedule / Venue	
Category	Multidisciplinary Subject
Credit(s)	1 (each)
Course	All
Semester	
Instructor	

1. Name of Lecture	Advanced Disaster Mitigation I, II
2. Purpose / Abstract	The purpose of this course is to learn practical knowledge on solving problems with various kinds of disaster.
3. Goal	Acquisition of practical knowledge on disasters and their mitigation.
4. Contents	Untaken Action-oriented Disaster Mitigation I-VIII will be assigned. The 3-5 year students are expected to understand the contents more interdisciplinarily and to participate in the classes making more questions and comprehensive discussion.
5. Grading	
6. Book required / referenced	Will be announced by the instructor of each class.
7. Remarks	

Name of Lecture	Advanced Disaster Mitigation III
Schedule / Venue	Friday, 10:30-12:00 / Leading Lecture Room
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Yoshimichi Sato, Prof. Toshiaki Kimura, Assoc. Prof. Saku Hara, Assoc. Prof. Yoshitaka, Kanomata, Assoc. Prof. Anawat Suppasri, Assoc. Prof. Mas Erick, Assoc. Prof. Takako Izumi, Assoc. Prof. Yuichi Ebina, Assist. Prof. Sebastien Boret, Assist. Prof. Elizabeth Maly, Assist. Prof. Daisuke Sasaki

1. Name of Lecture	Advanced Disaster Mitigation III
2. Purpose / Abstract	Recent disasters show us that their impact not to only one country but internationally. Such large scale disasters should be properly mitigated using integrated disaster science discipline and collaboration from international governments and organizations. This series of lecture will provide opportunity to attendees to expand their vision on global disaster mitigation from well experienced international faculty members in various point of views.
3. Goal	To provide a chance to students knowing about disaster in global scale. After the class, students might be able to have the whole image of global disasters, role of international organizations on disaster mitigation and be able to apply this idea to their research field for disaster mitigation.
4. Contents	For engineering part, following selected topics on global disaster will be provided by international faculties 1) Disasters in Asia, Europe, North America and South America, 2) Role of mapping as tools for disaster planning, 3) International collaboration and role of international organizations on disaster mitigation and 4) Linkage

	between engineering and literature. For humanities and social science parts, following selected topics on 1) Social responsibility, 2) Science and risk communication, 3) Social capital and social inequality, 4) Religious role and 5) Economic recovery. At the end of the course, students will give group presentations and discuss in the final session.
5. Grading	Attendance, group work, and report
6. Book required / referenced	Each instructor will introduce required books and reference books.
7. Remarks	This course is conducted in English.

Name of Lecture	Special Lecture on Earth and Planetary Dynamics
Schedule / Venue	
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	
Instructor	Visiting Prof. Shunichiro Karato and other lecturers

1. Name of Lecture	Special Lecture on Earth and Planetary Dynamics
2. Purpose / Abstract	
3. Goal	
4. Contents	
5. Grading	
6. Book required / referenced	
7. Remarks	Contact : Prof. Michihiko Nakamura (Department of Earth Science), Assoc. Prof. Hironobu Iwabuchi (Department of Geophysics)

Name of Lecture	Disaster Control Engineering
Schedule / Venue	TBD
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive Course
Instructor	Prof. Osamu Nishimura, Prof.So Kazama, Prof.Shunichi Koshimura, Associate Prof. Suppasri Anawat

1. Name of Lecture	Disaster Control Engineering
2. Purpose / Abstract	The damage and impacts caused by the 2011 Tohoku earthquake disaster are revisited. The issues on reconstruction processes in the affected areas are discussed for the future disaster mitigation.
3. Goal	Understanding the mechanism of natural disaster, definition of disaster management and mitigation technology, to discuss the issues on the problem in application at the present and in the future through the experiences of the 2011 Tohoku earthquake.
4. Contents	What is the 2011 Tohoku earthquake and its disaster? Earthquakes and tsunamis in Tohoku Damages due to the earthquakes and tsunamis in the 2011 Tohoku event Recovery and reconstruction from the 2011 event Issues for reconstruction
5. Grading	Assignment and reports
6. Book required / referenced	東日本大震災を分析する I,II，明石書店
7. Remarks	

Name of Lecture	Advanced Safety Engineering of Nuclear Systems
Schedule / Venue	To be announced
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive course
Instructor	Prof. Yutaka Watanabe, Prof. Yuichi Niibori, Prof. Makoto Takahashi, Specially Appointed Prof. Takayuki Aoki

1. Name of Lecture	Advanced Safety Engineering of Nuclear Systems
2. Purpose / Abstract	The Fukushima Daiichi accident, happened in March, 2011, initiated and has continued hot discussions from the various viewpoints of utilization of nuclear energy. Most important and essential thing is "ensuring highest nuclear safety" in the field of nuclear safety. The role of nuclear energy that play for long term and stable energy supply is still important from the viewpoint of energy security, greenhouse gas reduction and economy in Japan. So we need continued efforts to enhance long-term reliability and safety of nuclear power plants (NPPs) if we continue to use them. Tohoku University established a vision of taking a lead for the Fukushima restoration and newborn and has been working on the activities for contribution to the decommissioning of Fukushima Daiichi as one of the most important tasks in the vision. An implementation of the nuclear decommissioning requires deep understanding of many things including the current status of Fukushima Daiichi, experiences of core damage accidents in the past, and technologies to be applied. The lectures of academic foundations on the followings will be made in this intensive course. + Current status of Fukushima Daiichi NPPs + Lessons learned from the core damage accidents in the past + Current status and issues of the researches for nuclear decommissioning + R&D activities for nuclear decommissioning + Approach to integrity evaluation of damaged facilities during nuclear decommissioning + Basics of nuclear fuel debris + Processing, treatment and disposal of nuclear fuel debris + Risk communications + Others The lecturers are from Tohoku University, Tepco., IRID,

	JAEA, Hitachi GE nuclear energy, Toshiba, MHI, Kajima etc.
3. Goal	The goal is to cultivate abilities and skills in graduate students so that they can acquire basic knowledge and analytical capabilities which are commonly needed by experts including electric utilities, plant vendors, researchers, personnel in regulatory body who are engaged in nuclear safety related matters.
4. Contents	1. Risk concept and basics of risk evaluation and management 2. Ideas and approaches on safety and facility management in nuclear power plants 3. History and the new regulatory requirements for countermeasures against severe accident in Japan 4. Current status on nuclear decommissioning in Japan and points of the important measures for it 5. Current status of JAPC implementation efforts for the decommissioning in Tokai gas cooled nuclear plant site 6. Lessons learned from TMI and Chernobyl and some of them applicable to Fukushima 7. Current status and perspectives of Fukushima Daiichi nuclear power plants 8. Technical strategic plan for the decommissioning of Fukushima Daiichi nuclear power plants 9. Current status of the decommissioning of Fukushima Daiichi and research tasks needed for it 10. Importance of evaluation of time-related deterioration phenomena in structural integrity management during nuclear decommissioning and its approach 11. Ideas and approaches on long-term integrity evaluation of damaged concrete structures 12. Roles of remote technologies in the decommissioning of nuclear power plants and applicable technologies 13. Development of robots for the nuclear decommissioning and examples of the applications 14. Solid-state chemistry of nuclear fuel and basics of nuclear fuel debris 15. Characterization and treatment of nuclear fuel debris 16. Radioactive waste management (Some of the above may be changed without notification.)
5. Grading	Grading is made based on reports to be submitted and performances in discussions
6. Book required / referenced	Some materials are distributed during lectures.
7. Remarks	

Name of Lecture	Industrial Engineering
Schedule / Venue	5/12(Sat.)・5/19(Sat.)・5/26(Sat) 9:00～17:00 Room # 305 Engineering Laboratory Complex Building
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring Semester
Instructor	Associate Prof. Rihito Kuroda

1. Name of Lecture	Industrial Engineering
2. Purpose / Abstract	
3. Goal	
4. Contents	Basic mission of production is a cost-effective and speedy manufacturing and sales of non-defective products, as well as to achieve a wide-variety small-volume manufacturing that is as efficient as a large-volume manufacturing. This lecture is about the industrial engineering and its management with various aspects to achieve such basic mission of production. History of industrial engineering, case study of actual industries, basic of manufacturing process and ideal manufacturing system will be covered and discussed. The purpose of this lecture is to support students those who may take on the role at future production scenes to learn basic knowledge of industrial engineering with various aspects and to deepen their consideration of manufacturing system and its further development for a construction of total optimized manufacturing system with positive economic effects.
5. Grading	
6. Book required / referenced	
7. Remarks	

Name of Lecture	Project Management
Schedule / Venue	Not yet determined
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive Course in 1st Semester
Instructor	Prof.Akio Nagahira et al.

1. Name of Lecture	Project Management
2. Purpose / Abstract	The lecture of project management deals with the planning, execution, and controlling of projects based on the PDCA cycle as planning (Plan), execution (Do), check (Check) and correction (Action).
3. Goal	The goal is to understand the technique of the systematic project management, and the knowledge to raise an outcome of a project and the practice ability.
4. Contents	This lecture is focused on the management and implementation of the following topics: building a project organization and operation, establishment of WBS (Work Breakdown Structure), securement of human and material resources, estimate of a cost, job allocation to a team member, progress management, operational directionality maintenance, cost benefit analysis, project control, project management engineering, and project evaluation.
5. Grading	written examination
6. Book required / referenced	A Guide to the Project Management Body of Knowledge (PMBOK Guide) Fifth Ed.
7. Remarks	

Name of Lecture	R&D Management
Schedule / Venue	Intensive course (from Aug. 2, 2018 to Aug. 4, 2018)
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring-summer semester
Instructor	Prof. Hideo Miura, Prof. Yutaka Watanabe and visiting professors

1. Name of Lecture	R&D Management
2. Purpose / Abstract	The important skills for the effective and rational management of research and development in scientific and technological fields are lectured. Most important issue is how to propose a new R&D project for the human societies near future. Not only the personal skills but also the trend of the science and technology policies all over the world will be discussed. Group discussion for proposing a new R&D project is the most important part of this intensive course for training the management skill of each student.
3. Goal	Students are expected to learn the basic important way of thinking for the management of research and development project from the viewpoints of top leader, middle manager, and personal researcher. The most important issue is to be aware of indispensable skills which each student should improve during her/his student life to be a leader of a certain research project near future.
4. Contents (provisional)	1) Introduction 2) Basic concept of project management 3) Top and middle management 4) Personal management 5) R&D management in universities and industries 6) Trend of science and technology policy in Japan and other advanced countries 7) Consulting session (Q&A on lectures) 7-A: Viewpoint of a project manager

	7-B: Viewpoint of a personal researcher/engineer 8) Group discussion for proposing a new project 9) Presentation and mutual evaluation 10) Summary
5. Grading	Summation of the results of the mutual evaluation of the presentation among students and personal written reports on the assigned issues concerning about lectures
6. Book required / referenced	Reference materials are introduced in each lecture.
7. Remarks	This intensive course consists of 3 days. Group discussion often continues to midnight of the second day. Students are expected to attend the three-straight-day course fully.

Name of Lecture	Introduction to Economics of Innovation and Entrepreneurship B
Schedule / Venue	10:30-16:10, on 6, 13, and 27th October 2018 at Room 817, Engineering Laboratory Complex Building (C10), Aobayama Campus.
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	
Instructor	Associate Prof. Nobuya Fukugawa

1. Name of Lecture	Introduction to Economics of Innovation and Entrepreneurship B
2. Purpose / Abstract	1. Goal Students will be able to understand the significance and determinants of innovation and entrepreneurship from both theoretical and historical perspectives. 2. Pedagogy To help students obtain an understanding of a specific topic, economic concepts are related to a real world by anecdotal and statistical evidences taken from various regions, industries, and firms. To help students grasp a whole picture, concept maps are used to visualize the relationships among economic concepts.
3. Goal	See above.
4. Contents	1. theoretical part which introduces economic framework to understand the significance of innovation and entrepreneurship in the knowledge-based economy 2. historical part which comprises my lecture on the emergence of key industries and students' presentations on a specific industry based on reading assignment

5. Grading	Attendance and the quality of presentation
6. Book required / referenced	None. See below.
7. Remarks	Students are advised to download a handout which will be uploaded on my website (https://sites.google.com/site/nfukugawa/) before the course starts so as to confirm the aim and contents of the course.

Name of Lecture	Economics of Entrepreneurship
Schedule / Venue	10:30-16:10, 3-5 November 2018 Engineering Laboratory Complex Building 8-817
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Intensive course
Instructor	Associate Prof. Nobuya Fukugawa

1. Name of Lecture	Economics of Entrepreneurship
2. Purpose / Abstract	1. Goal Students will be able to understand the significance and determinants of entrepreneurship and the role of the government to promote entrepreneurial activities from the viewpoint of economic theory. 2. Pedagogical method To help students obtain an understanding of a specific topic, economic concepts are related to a real world by anecdotal and statistical evidences taken from various regions, industries, and firms. To help students grasp a whole picture, concept maps are used to visualize the relationships among economic concepts.
3. Goal	See above.
4. Contents	1. Why innovation and entrepreneurship? 2. Definition of entrepreneurship 3. Determinants of entrepreneurship 4. Entrepreneurship policy
5. Grading	TBA
6. Book required / referenced	None. See below.

7. Remarks	Students are advised to download a handout which will be uploaded on my website (https://sites.google.com/site/nfukugawa/) before the course starts so as to confirm the aim and contents of the course.

Name of Lecture	Bioethics and Environmental Ethics
Schedule / Venue	Tuesday, 13:00 -14:30 / Arts and Letters Building R919
Category	Multidisciplinary Subject
Credit(s)	2
Course	Human Science
Semester	Spring semester
Instructor	Prof. Kiyotaka Naoe

1. Name of Lecture	Bioethics and Environmental Ethics
2. Purpose / Abstract	Promoting the understanding of ethical issues in medicine, technology and environment. Developing a cross-cultural understanding of bioethical, environmental ethical issues.
3. Goal	Students are expected to show a good understanding of the ethical issues in medicine and environment. They should also develop critical thinking skills and cultural understanding in the field of medicine, environment and technology.
4. Contents	How to understand the concept of dignity has become an increasingly important in many fields: medicine, environmentology, robotics and so on. This course provides an overview of the history of the concept of dignity, and its availability in concrete cases. This course is centered on a lecture and a questions and answers session. The contents and schedule are as shown below: 1. Introduction: What is dignity? 2. Dignity in bioethics (2) 3. Dignity in bioethics (2) 4. Dignity of human embryo 5. Dignity in terminal care (1) 6. Dignity in terminal care (2) 7. Dignity with death and comfortable death (1)

	8. Dignity with death and comfortable death (2) 9. Dignity of disability person 10. Values of nature 11. Values of environment. 12. Robot and human dignity 13. Dignity for robots 14. Review (1) 15. Review (2) (The contents and schedule are subject to change depending on circumstances.)
5. Grading	Participation in classroom discussions 20% Writing reports of lectures 80%
6. Book required / referenced	Yasushi, Kato (ed.), Dynamism in the Concept of Dignity, 2017 (in Japanese) Siep, Ludwig et.al., Bio-und Umwelt Ethik in Deutschland, 2001 (in Japanese translation) Human Dignity and Bioethics: Essays Commissioned by the President's council on Bioethics, 2008
7. Remarks	

Name of Lecture	Sociology of Risk and Disaster Reduction
Schedule / Venue	Monday, 16:20-17:50 / Arts and Letters Building R431
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	Spring semester
Instructor	Prof. Yoshimichi Sato

1. Name of Lecture	Sociology of Risk and Disaster Reduction
2. Purpose / Abstract	We learn to apply sociological theories and methodology to mitigate the risks caused by natural disasters.
3. Goal	We need the perspective of social sciences as well as those of natural sciences and engineering to mitigate the risks of natural disasters. This course examines how to reduce the risks and prevent disasters with the help of sociological theories and methodology.
4. Contents	This course covers the following topics: 1) Reexamination of the philosophy of preventing disasters. 2) Social capital and disaster recovery 3) Firefighting organizations 4) Community 5) Volunteers
5. Grading	Term paper (60%) and attendance (40%)
6. Book required / referenced	Textbooks 1) Naoki Yoshihara (ed.), 2008, Sociology of Preventing Disaster, 2nd edition, Toshin-do. 2) Daniel P. Aldrich, 2012, *Building Resilience: Social Capital in Post-Disaster Recovery*, University of Chicago Press.
7. Remarks	Office hour: Wednesday, 4:20-5:50 pm (Need to make an appointment beforehand.)

Name of Lecture	Science and Society
Schedule / Venue	Intensive Course (PM of April 20th and AM of April 21st) Venue to be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester
Instructor	Associate Prof. Tsuyoshi Hondou

1. Name of Lecture	Science and Society
2. Purpose / Abstract	What is scientific proof? What is scientific correctness? Understanding of incertitude about those questions is basis for constructive discussion between science and society. We will discuss how these issues are related to the issues between science and society.
3. Goal	Understanding of incertitude of "scientific proof" and "scientific correctness", as basis for constructive discussion with society. Understanding of condition needed for integrity of scientific research and for proper institutional design of science.
4. Contents	Lecture and workshop style. Variety of scientific incertitude will emerge by the workshop. Participants are requested to submit reports after the intensive course.
5. Grading	Participation (50%), Report (50%)
6. Book required / referenced	・Andy Stirling : "Keep it complex", Nature, 468 1029 (2010)
7. Remarks	This class will be provided also for students at the Graduate School of Science. If schedule of this class partially overlaps with that of other class, students are allowed to attend this class partially. For detail, contact with an instructor in advance.

Name of Lecture	Science Communication
Schedule / Venue	Intensive Course (May 25th PM ～ May 26th) Venue to be announced
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring semester
Instructor	Guest Lecturer: Kohta JURAKU (Associate Professor, Tokyo Denki University) Associate Prof. Tsuyoshi HONDOU

1. Name of Lecture	Science Communication
2. Purpose / Abstract	Theme: High-level Radioactive Waste and Communication for Science, Technology and Public Policy As its very particular characteristics among many technological risk issues, high-level radioactive waste (HLW) management requires extraordinarily deliberate considerations to be dealt with appropriately. Very long time-scale, such as hundred thousand years and million years, is often discussed as if it is usual thing. Safety *without* maintained by stringent continuous oversight, so-called 'Passive safety,' is preferred to realize a safe disposal of HLW, contrary to our common sense. Furthermore, it is many things to do with the controversy over nuclear utilization, which is highly politicized and polarized. All of these factors make the issue 'difficult' to be sorted out. However, the HLW management issue occupies an important position among public policy and could not be neglected, because we already have the wastes and their risks, which must be treated properly. In this class, from the perspective of sociology of science and technology and other related scholarship in science and technology study field (for example, a series of works

	centering on the incertitude of scientific knowledge and its implications for public policy), the guest lecturer, Prof. Kohta Juraku will share his expertise as a researcher who has studied this issue and involved in the national Governmental policy process. Importance and difficulty of communication on the issues centering around public policy, technology and its risk are to be recognized. Possible ideas to tackle them will be broadly discussed with the students.
3. Goal	Understanding the importance of communication centering around public policy, technology and its risk, their difficulty to be tackled, and possible way to cope with them. Understanding the outline of and the relevant issues to HLW management.
4. Contents	Intensive course Friday afternoon and Saturday morning. Schedule to b e announced. - Discuss the outline of and the relevant issues to HLW management. - Discuss methodology, expertise and practical lessons for communication for science, technology and public policy. Students are encouraged to read materials related to HLW issue in advance.
5. Grading	Participation (50%), Report (50%)
6. Book required / referenced	To be announced at the class
7. Remarks	This class will be provided also for students at the Graduate School of Science. If schedule of this class partially overlaps with that of other class, students are allowed to attend this class partially. For detail, contact with an instructor in advance.

Name of Lecture	Advanced Theory and Practice of Risk Assessment and Management
Schedule / Venue	8:50-16:10 August22, 23, 24, 2018 / Engineering Laboratory Complex Building room 101
Category	Multidisciplinary Subject
Credit(s)	2
Course	All
Semester	
Instructor	Prof. Makoto Takahashi, Associate Prof. Daisuke Karikawa

1. Name of Lecture	Advanced Theory and Practice of Risk Assessment and Management
2. Purpose / Abstract	In this lecture, the issues of safety after the Fukushima Daiichi nuclear power station accident will be discussed from variety of view points. The topic of aviation safety as well as nuclear safety will be given from the view point of engineering and research ethics. Risk communication is also discussed as one of the important topic related to the social acceptance of risk in modern society. Specific feature of this lecture is that the lecture by one of the key persons actually experienced the Fukushima Daiichi nuclear power station accident will be given, in which realistic story of the accident will be presented.
3. Goal	To obtain knowledge and skills concerning advanced theory and practice of risk assessment and management
4. Contents	Day 1(22, Aug,2018) ・Guidance ・Risk related to nuclear system ・Risk management in aviation industry ・Resilience Engineering and Fukushima Daiichi nuclear power station accident Day 2: (23, Aug,2018) ・Science and engineering communication after Fukushima

	Daiichi nuclear power station accident ・Nuclear technology and resilience engineering Day3: (24, Aug,2018) ・True story of Fukushima Daiichi nuclear power station accident ・Risk and ethics of science and technology ・Risk and legal system ・Summary
5. Grading	Evaluated based on the report on each topic
6. Book required / referenced	
7. Remarks	

Name of Lecture	Research Integrity I
Schedule / Venue	Monday 14:40-16:10 / Arts and Letters Building R311
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring Semester
Instructor	Associate Prof. Saku HARA

1. Name of Lecture	Research Integrity I
2. Purpose / Abstract	In order to have a good overview on research integrity, students are going to participate in workshops concerning good research practices and research misconducts.
3. Goal	● To become aware of responsible research ● To understand various types research misconducts, and why they are bad ● To become aware of how to avoid research misconducts
4. Contents	Two-day workshop will take place at some weekend during semester. At that workshop, we are going to discuss what are good research practices, and deal with research misconducts.
5. Grading	Participation in Workshops (40%)、Report (60%)
6. Book required / referenced	Japan Society for the Promotion of Science Editing Committee "For the Sound Development of Science" (ed) *For the Sound Development of Science: The Attitude of a Conscientious Scientist.* 2015
7. Remarks	Be sure to attend the first session on April 9 at which we will fix schedule for workshops.

Name of Lecture	Research Integrity II
Schedule / Venue	Monday 14:40-16:10 / Arts and Letters Building R311
Category	Multidisciplinary Subject
Credit(s)	1
Course	All
Semester	Spring Semester
Instructor	Associate Prof. Saku HARA

1. Name of Lecture	Research Integrity II
2. Purpose / Abstract	In order to have a good overview on research integrity, participants are going to attend lectures on good research practices and research misconducts.
3. Goal	● To become aware of responsible research ● To understand various types research misconducts, and why they are bad ● To become aware of how to avoid research misconducts
4. Contents	Relations between research methods of sciences and humanities, evaluation systems, and research misconducts, and several topics on research integrity will be discussed in lectures. Total number of lectures is 8.
5. Grading	Participation in discussion (40%), exam (60%)
6. Book required / referenced	Japan Society for the Promotion of Science Editing Committee "For the Sound Development of Science" (ed) *For the Sound Development of Science: The Attitude of a Conscientious Scientist.* 2015
7. Remarks	Be sure to attend the first session (April 9), on which schedule for lectures will be fixed

Name of Lecture	Advanced Natural Disaster Science Special Training
Schedule / Venue	Summer vacation period or after September
Category	Training Subject (Convergence Lab.)
Credit(s)	2
Course	All
Semester	All year
Instructor	Prof.Takeshi Kakegawa, Prof. Michihiko Nakamura, Prof. Yasufumi Iryu, Assistant Prof. Shin Ozawa, Guest Lecturer Ryoichi Yamada

1. Name of Lecture	Advanced Natural Disaster Science Special Training
2. Purpose / Abstract	You choose ether one from the list. All are designed to understand natural disaster and benefits from nature.
3. Goal	Understanding natural phenomena (volcanic activity, marine process etc.) scientifically, and discuss how to co-exists with nature safely.
4. Contents	You choose either one: Class 1: Exercise for chemical analysis for natural hazard materials (volcanic eruptions, meteorite impacts, deformed rocks by earthquake). One day trip to active volcano will be included. Class 2: Field excursion for natural disaster (volcanic hazard, induced earthquakes) and benefit from nature (geothermal energy, petroleum production, heavy metal resources). Travel fees will be covered by this project. The excursion will be done during weekends of October and November (three trips are schedules). Class 3: Field excursion (Okinawa area) to observe geological records of past global warming and climate change. Travel fees will be covered by the project. The trip will be made on weekends or national holidays in Oct to Dec.
5. Grading	Attending points, reports, presentation at t symposium
6. Book required / referenced	Will be announced by each instructor. Handouts will be prepared.
7. Remarks	For further question, please contact to Prof. Takeshi Kakegawa.

Name of Lecture	Self-planned Project
Schedule / Venue	Determined by project members and their advisor(s)
Category	Training Subject (Convergence Lab.)
Credit(s)	2
Course	All
Semester	Determined by project members and their advisor(s)
Instructor	Project advisor(s)

1. Name of Lecture	Self-planned Project
2. Purpose / Abstract	Students will select a theme on safety and security relating to natural disasters, hazard protection/ mitigation technologies required to realize sustainable society, or solutions for problems of industrial risk, energy, environment and social inequality. They will learn how to plan various approaches and attain practical ability to solve compounded problems.
3. Goal	Process to determine the theme of project and solve it is highly evaluated in this course. Result of the project will be reported as a document and presented to other students and teaching staffs and discussion will be made with them from various viewpoints.
4. Contents	The project theme is either extension/combination of those studied in the C-lab of 1st/2nd year or new one. With advices from the teaching staff(s), students will propose a plan to solve the problem and carry out possible verification of the solution. Detail of the procedure will be determined by the students and the adviser(s).
5. Grading	Grading will be made by contribution to the planning and conduction of the project, its report, and final presentation as well as achievement of the project. Publication of the result and social contribution through the project will be included in grading.
6. Book required / referenced	To be announced by the project adviser(s).
7. Remarks	None

Name of Lecture	Advanced Technology Management Seminar
Schedule / Venue	Tuesday : Engineering Laboratory Complex Building 110 Friday and Saturday : Off-site training
Category	Training Subject (Global Leader Training)
Credit(s)	2
Course	All
Semester	Spring semester (5/15, 22, 25, 26, 6/5, 12, 19, 26, 7/3, 10) Fall semester (10/9, 16, 19, 20, 30, 11/6, 13, 20, 27, 12/4) (Choose either Spring or Fall semester)
Instructor	Profs. S. Kudo, S. Kato, and R. Masuzawa

1. Name of Lecture	Advanced Technology Management Seminar
2. Purpose / Abstract	The lectures are for "Career path design of doctors and Postdocs". Details are shown on the website of ILP (Innovative Leaders Platform). Researchers are required to have quality such as the power of communication and project management as well as the research competency. This class provides lectures and trainings to extend the quality. We also provide lectures consisting of Group works in which students explore literature, argue a point, and present the results. In addition, academia and/or business people are invited to give lectures on the role of doctors.
3. Goal	Understand the qualities and abilities required to live a full of self-confidence and fulfilling life as a doctor
4. Contents	9 lectures ・Orientation, Strategic career design ・Understanding of people and the power of communication (Off-site training) ・Fundamental project management ・Group work (on trans-science) x 3 ・Academia and Enterprise case study (Academia and business people presentations) ・Enterprise case study (Role of doctors in business; business people presentations) x 2
5. Grading	Need to attend 7 times or more with reporting (out of 9) for 2 credits
6. Book required / referenced	The information will be provided at the class
7. Remarks	

Name of Lecture	Overseas Training
Schedule / Venue	
Category	Training Subject (Global Leader Training)
Credit(s)	2
Course	All
Semester	
Instructor	

1. Name of Lecture	Overseas Training
2. Purpose / Abstract	Overseas training in international organizations, global enterprises, and advanced research facilities and institutions for 2 weeks to 2 months.
3. Goal	The goal of this training is to acquire global visions, communication skills in multinational society and create a broad range of international personal connections.
4. Contents	The internship plan in the specified form should be submitted in advance to ask GS professors for advice.
5. Grading	Reports should be submitted within 1 month after finishing the internship.
6. Book required / referenced	
7. Remarks	

Name of Lecture	Super Internship
Schedule / Venue	
Category	Training Subject (Global Leader Training)
Credit(s)	2
Course	All
Semester	
Instructor	

1. Name of Lecture	Super Internship
2. Purpose / Abstract	Internship (practical training, laboratory researches, etc.) in the companies, corporates and administrative agencies.
3. Goal	To learn procedures and methods of plan making, investigation research, product development, manufacturing and quality control, and to experience human relations and atmosphere of the work sites.
4. Contents	A plan document in a given form should be submitted to and approved by the curriculum organizer beforehand. Within 1 month after the internship, a report (in a free form) should be submitted.
5. Grading	Grading is based on the report.
6. Book required / referenced	
7. Remarks	

Name of Lecture	International Seminar of Global Disaster Mitigation Ⅲ
Schedule / Venue	
Category	Major General Subject
Credit(s)	2
Course	All
Semester	
Instructor	

1. Name of Lecture	International Seminar of Global Disaster Mitigation Ⅲ
2. Purpose / Abstract	This unit will be given to attendance and discussion in the international meetings, symposium, seminars and lectures in English by invited and visiting lecturers.
3. Goal	The students are expected to learn current topics on disaster mitigation and acquire the skills of discussion and cross-cultural communication in English.
4. Contents	Since the seminars and lectures by invited and visiting lecturers are not always preplanned, students should give attention to the announcements. The international meetings, symposia etc. sponsored, cosponsored and joint-hosted by the G-Safety program are regarded as a part of this course. The other meetings etc. should be registered beforehand by submitting a given format to the curriculum organizers. A report (in a free format) should be submitted to their supervisors after each attendance within 1 month. The "attendance card" are given out in the orientation.
5. Grading	Based on number of attendance, questions and discussions in the seminar. Total 15 hours (900 min) correspond to 1 unit. The number of attendance and questions can be carried over the next semester. Be sure to submit the attendance card to the curriculum organizer when you need units.
6. Book required / referenced	
7. Remarks	

Name of Lecture	International Seminar of Global Disaster Mitigation IV
Schedule / Venue	
Category	Major General Subject
Credit(s)	1
Course	All
Semester	
Instructor	

1. Name of Lecture	International Seminar of Global Disaster Mitigation IV
2. Purpose / Abstract	This unit will be given to attendance and discussion in the international meetings, symposium, seminars and lectures in English by invited and visiting lecturers.
3. Goal	The students are expected to learn current topics on disaster mitigation and acquire the skills of discussion and cross-cultural communication in English.
4. Contents	Since the seminars and lectures by invited and visiting lecturers are not always preplanned, students should give attention to the announcements. The international meetings, symposia etc. sponsored, cosponsored and joint-hosted by the G-Safety program are regarded as a part of this course. The other meetings etc. should be registered beforehand by submitting a given format to the curriculum organizers. A report (in a free format) should be submitted to their supervisors after each attendance within 1 month. The "attendance card" are given out in the orientation.
5. Grading	Based on number of attendance, questions and discussions in the seminar. Total 15 hours (900 min) correspond to 1 unit. The number of attendance and questions can be carried over the next semester. Be sure to submit the attendance card to the curriculum organizer when you need units.
6. Book required / referenced	
7. Remarks	

Name of Lecture	Doctoral Course Seminar
Schedule / Venue	
Category	Major General Subject
Credit(s)	Refer the relevant syllabus
Course	All
Semester	Spring / Fall
Instructor	

1. Name of Lecture	Doctoral Course Seminar
2. Purpose / Abstract	This seminar encourages the deepening of the global safety expertness and the applying of broad knowledge to each advanced research work.
3. Goal	
4. Contents	
5. Grading	Credit for the Doctoral Course Seminar shall apply the credit of specific subject obtained at their own graduate schools (Graduate School of Art and Letters, Science, Engineering, Economics and Management, Information Science, Environmental Studies and Biomedical Engineering, School of Law).
6. Book required / referenced	
7. Remarks	

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グローバル安全学教育研究センター
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