

[Title]			[Instructor]		
Environmental Statistics			Eiji Haramoto / Kei Nishida / Takashi Nakamura / Tadashi Toyama / Tatsuru Kamei		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR510	2	Civil and Environmental Engineering	1st Semester	Fri./I	Japanese English
[Outline and purpose]					
The purpose of this class is to understand the basics of environmental statistics which is essential in environmental science researches. This class contains a variety of topics, such as basic statistics, probability distribution, analysis of variance, regression analysis, and multivariate analysis. Japanese and overseas students study together through group work. English is potentially used.					
[Objectives]					
- To be able to explain theoretically about the results of statistical analysis for environmental datasets using appropriate statistical method(s).					
[Requirements]					
Basic knowledge on statistics and water quality is desirable.					
[Evaluation]					
Quiz and assignments: 50% Attitude in the class: 25% Presentation and discussion: 25%					
[Textbooks]					
Nothing special					
[References]					
Nothing special					
[Schedule]					
<ol style="list-style-type: none"> 1. Introduction (Nishida, Haramoto, Toyama, Nakamura, and Kamei) 2. Basic statistics: arithmetic/geometric mean, variance, and standard deviation (Haramoto) 3. Basic statistics: moving average and correlation coefficient (Haramoto) 4. Basic statistics: Spearman's rank correlation coefficient (Haramoto) 5. Probability distribution and analysis of variance: probability distribution (Nishida) 6. Probability distribution and analysis of variance: Monte Carlo simulation (Nishida) 7. Probability distribution and analysis of variance: t-test and analysis of variance (Nishida) 8. Regression analysis: simple regression analysis and least-squares method (Nakamura) 9. Regression analysis: correlation coefficient and coefficient of determination (Nakamura) 10. Regression analysis: multiple regression analysis (Nakamura) 11. Multivariate analysis: cluster analysis (Toyama) 12. Multivariate analysis: multivariate analysis and : principal component analysis (Toyama) 13. Practice for statistics analysis-1 (Kamei) 14. Practice for statistics analysis-1 (Kamei) 15. Summary of the class (Nishida, Haramoto, Toyama, Nakamura, and Kamei) 					

[Title]			[Instructor]		
Life and Health			Eiji Haramoto / Kei Nishida / Naoki Kondo / Zentaro Yamagata / Atsuhito Nakao / Masaaki Kitajima		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR512	2	Civil and Environmental Engineering	Intensive	/	Japanese English
[Outline and purpose]					
<p>This class is designed to provide you with a basic knowledge on the assessment of population health and health risks in the environmental context of river basins in developing countries, and its application to actual environmental interventions. The primary methodology you learn in this course is from epidemiology but this course also covers a variety of disciplines including environmental engineering, immunology, microbiology, and public health policy. You learn about the hazardous factors in physical and social environment and their potential adverse impacts on health, and the methods for the identification and quantification of those health risks. We wrap up the course with the discussion on how to apply the scientific evidence to the real world, introducing some examples such as the Health Impact Assessment framework and some interdisciplinary approaches to the management of environment and population health.</p>					
[Objectives]					
<ul style="list-style-type: none"> - Environmental engineering: To understand the basics on environmental hazards. - Health risk: To understand the basics on health risk analysis. - Immunology: To understand the basics of human immunology and the immunological responses to the pathogenic substances in the water. - Preemptive medicine and epidemiology: To understand the basics of preemptive medicine and epidemiology. - Public health: To understand the basics on health impact assessment. - Wastewater-based epidemiology: To understand the basics of Wastewater-based epidemiology. 					
[Requirements]					
Chemistry, biology, statistic, and mathematics at university basic course level.					
[Evaluation]					
<p>Quiz and assignments: 50%</p> <p>Attitude in the class: 50%</p>					
[Textbooks]					
Nothing special					
[References]					
Nothing special					
[Schedule]					

1. Environmental Engineering 1 (Haramoto)
2. Environmental Engineering 2 (Haramoto)
3. Environmental Engineering 3 (Haramoto)
4. Health Risk 1 (Nishida)
5. Health Risk 2 (Nishida)
6. Immunology 1 (Nakao)
7. Immunology 2 (Nakao)
8. Preemptive medicine and epidemiology 1 (Ooka)
9. Preemptive medicine and epidemiology 2 (Ooka)
10. Public health 1 (Kondo)
11. Public health 2 (Kondo)
12. Public health 3 (Kondo)
13. Wastewater-based epidemiology 1 (Kitajima)
14. Wastewater-based epidemiology 2 (Kitajima)
15. Group discussion and summary (Haramoto)

[Title]			[Instructor]		
River Basin Planning and Design			Shinichi Muto/Yutaka Ichikawa/ Kazuyoshi Souma		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR513	2	Civil and Environmental Engineering	2nd Semester	Tue./II	Japanese English
[Outline and purpose]					
In this lecture, students will learn the integrated river basin management and regional planning to solve the local water issues. This lecture deals with the management of floods / sediments within basin, water hazard risk estimation for disaster reduction, and environmental assessment / cost-benefit analysis for river basin environment and water resources. The lecture is mainly given in English.					
[Objectives]					
<ul style="list-style-type: none"> -To understand how to manage water quantity, quality, and environment within river basin (basic knowledge of Hydraulic Engineering). -To understand how to evaluate water hazard risk (basic knowledge of Hydraulic Engineering). -To understand how to carry out cost-benefit analysis for river basin management (basic knowledge of regional planning). 					
[Requirements]					
Basic knowledge of environmental sciences (Hydrologic cycle, Hydrospheric Science), or engineering (Hydrology, Water Resources Engineering, River Engineering, Infrastructure Planning and Management).					
[Evaluation]					
Report: 70% Attendance and Attitude: 30%					
[Textbooks]					
[References]					
[Schedule]					
<ol style="list-style-type: none"> 1. Introduction 2. Concept of river basin management in Japan 3. Examples of river basin management in Japan 4. The way to make river management plan in Japan 5. Discussion for making river management plan: setting of objectives 6. Discussion for making river management plan: planning strategy 7. Sustainable river basin management to achieve SDGs 8. Flooding simulation for water hazard risk estimation: basic equations 9. Flooding simulation for water hazard risk estimation: numerical solutions 10. Flooding simulation for water hazard risk estimation: practices 11. Applications of water hazard risk estimation 12. Cost-benefit analysis for river basin management 13. Cost-benefit analysis based on economic equilibrium models 14. Practice of cost-benefit analysis for river basin management 15. Presentations of cost-benefit analysis for river basin management 					

[Title]			[Instructor]		
Advanced Hydrology and Water Resources			Hiroshi Ishidaira / Kazuyoshi Souma /Keiichi Masutani		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR506	2	Civil and Environmental Engineering Special Educational Program on River Basin Environmental Science	1st Semester	Thu./II	Japanese/ English
[Outline and purpose]					
The aim of the lecture is to learn the elements of hydrology and water resources to understand the water cycle and river basin environments. The lecture starts by describing basic equations of fluid motion and water dynamics modeling through lectures and exercises. The lecture deals with not only the natural water cycle but also artificial control including reservoirs and irrigations. The lecture also deals with the current problems and prospects of water resources, including water environments and water usage. The lecture is mainly given in English.					
[Objectives]					
1. To be able to explain basic equations of fluid motion and their derivation (basic knowledge of Hydraulic Engineering). 2. To be able to explain elements of water dynamics model (basic knowledge of Hydraulic Engineering). 3. To be able to explain the current problems and prospects of water resources, including water environments and water usage (basic knowledge of Hydraulic Engineering).					
[Requirements]					
Basic knowledge on hydraulics, hydrology and calculus.					
[Evaluation]					
Report: 80% Attendance and Attitude: 20%					
[Textbooks]					
[References]					
[Schedule]					
1. Introduction 2. Basic theory (physics) of material transport 3. Basic theory (physics) of water flow 4. Routing of channel flow 5. Evapotranspiration: Estimation methods 6. Evapotranspiration: Observation methods 7. Vertical movement of soil water 8. Ground water flow 9. Exercises about evapotranspiration and soil water movement 10. River basin hydrological model: conceptual model and lumped model 11. River basin hydrological model: distributed model 12. Modeling of water use and water control 13. Water resources in Japan 14. Water resources in the world 15. Summary					

[Title]			[Instructor]		
Advanced Water Quality Assessment			Eiji Haramoto / Kei Nishida / Takashi Nakamura / Masaya Yasuhara / Nobuhito Ohte		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR507	2	Civil and Environmental Engineering	2nd Semester	Fri./II	English/ Japanese
[Outline and purpose]					
[Advanced Water Quality Assessment] Environmental issues and the applied methodologies are outlined specifically on terrestrial environments such as groundwater, river or lake. Natural and human-induced water contents, estimations of pollutant load and health risk/guideline, modeling water quality incorporated with infiltration/flow/runoff processes are discussed. English is potentially used.					
[Objectives]					
<ul style="list-style-type: none"> - Understanding basic concept of water quality control and calculation of guideline values - Understanding basic concept of water quality modelling and capable of introducing the equations 					
[Requirements]					
Basics of water quality is desirable.					
[Evaluation]					
Quiz and assignments: 70% Attitude in the class: 30%					
[Textbooks]					
Not designated. Related literatures or research examples will be introduced when necessary.					
[References]					
Not designated. Related literatures or research examples will be introduced when necessary.					
[Schedule]					
1 Introduction (Nishida, Haramoto, and Nakamura) 2 Outline of health-related items (Haramoto) 3 Outline and future of microbiological indicators (Haramoto) 4 Methods for microbial risk assessment (Haramoto) 5 Outline and future of living environmental items (Nishida) 6 Basics of health risk calculation (Nishida) 7 Basics of loading calculation (Nishida) 8 Basics of isotopic fractionation calculation (Ohte) 9 Examples of isotopic fractionation calculation (Ohte) 10 Outline of Environmental isotopes (Nakamura) 11 Environmental assessments by isoscape (Nakamura) 12 Examples and future of isotope monitoring (Yasuhara) 13 Future of isotope monitoring (Yasuhara) 14 Group discussion (Nishida, Haramoto, and Nakamura) 15 Presentation (Nishida, Haramoto, and Nakamura)					

[Title]			[Instructor]		
Advanced Environmental Treatment Technology			Tadashi Toyama / Tatsuru Kamei		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR508	2	Civil and Environmental Engineering Special Educational Program on River Basin Environmental Science	2nd Semester	Thu./II	English/ Japanese
[Outline and purpose]					
The purpose of this lecture is to learn the purification/remediation technologies for polluted soil and water. They include physicochemical technology, biological technology, and ecological technology for removal of organic compounds, nutrients (nitrogen and phosphorus), microplastic, and persistent organic pollutants. In this lecture, we will learn the technologies for energy/material recovery from solid waste/wastewater.					
[Objectives]					
<ol style="list-style-type: none"> 1. To understand the history, background, and current situation of environmental pollution. 2. To understand the purification technology for organic pollution. 3. To understand the purification technology for nutrients (nitrogen and phosphorus) pollution. 4. To understand the current situation of microplastic pollution and countermeasure. 5. To understand the purification technology for persistent organic pollutants. 6. To understand the technology for energy/material recovery from wastes. 7. To understand the decentralized water/wastewater technology. 8. To understand the methodology for SDGs achievement using environmental technology. 					
[Requirements]					
It is desirable that you should have basic knowledge of chemistry, biology and environmental engineering.					
[Evaluation]					
<ol style="list-style-type: none"> 1. Reports and/or short examination; evaluation point is theoretical consideration of environmental technology; 70% 2. Lecture attendance; evaluation point is active participation/attitude; 30% 					
[Textbooks]					
[References]					
[Schedule]					
<ol style="list-style-type: none"> 1. History, background, and current situation of environmental pollution (Toyama, Kamei) 2. Purification technology for nitrogen and phosphorus pollution: Source and type of pollution, current situation (Kamei) 3. Purification technology for nitrogen and phosphorus pollution: Leading-edge technology, future development (Kamei) 4. Decentralized water/wastewater treatment technology: Basic of technology for decentralized system (Kamei) 5. Decentralized water/wastewater treatment technology: Leading-edge technology, future development (Kamei) 6. Microplastic pollution: Source and type of pollution, current situation (Kamei) 7. Microplastic pollution: Countermeasure, future development (Kamei) 8. Purification technology for organic pollution: Source and type of pollution, current situation (Toyama) 9. Purification technology for organic pollution: Basic of technology, leading-edge technology, future development (Toyama) 10. Purification technology for persistent organic pollutants: Source and type of pollution, current situation (Toyama) 11. Purification technology for persistent organic pollutants: Basic of technology, leading-edge technology, future development (Toyama) 12. Technology for energy/material recovery from wastes: Basic of issue, current situation (Toyama) 13. Technology for energy/material recovery from wastes: Basic of technology, leading-edge technology, future development (Toyama) 14. Methodology for SDGs achievement using environmental technology: Presentation and discussion (Toyama) 15. Summary of Environmental Treatment Technology (Toyama, Kamei) 					

[Title]			[Instructor]		
Seminar in River Basin Environmental Science IA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR601	1	Special Educational Program on River Basin Environmental Science	1st Semester	Mon./V	Japanese/English
[Outline and purpose]					
The purpose of this practice is to secure necessary basic knowledge and technique for research. Survey, experiment and analysis concerning research subject et al. are conducted under the guidance of a group of academic supervisors. And presentation and discussion are conducted. Student must belong to a seminar group (Hydrology and hydraulic, water quality, microbiology) composed of graduate students, researchers and teachers and it's better to attend other seminar.					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Reviewing lecture relating research at undergraduate course					
[Evaluation]					
Integrated evaluation including interim presentation : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Seminar in River Basin Environmental Science IB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR602	1	Special Educational Program on River Basin Environmental Science	2nd Semester	Mon./V	Japanese/English
[Outline and purpose]					
The purpose of this practice is to secure necessary basic knowledge and technique for research. Survey, experiment and analysis concerning research subject et al. are conducted under the guidance of a group of academic supervisors. And presentation and discussion are conducted. Student must belong to a seminar group (Hydrology and hydraulic, water quality, microbiology) composed of graduate students, researchers and teachers and it's better to attend other seminar.					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Reviewing lecture relating research at undergraduate course					
[Evaluation]					
Integrated evaluation including interim presentation : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Seminar in River Basin Environmental Science IIA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR603	1	Special Educational Program on River Basin Environmental Science	1st Semester	Fri./V	Japanese/English
[Outline and purpose]					
The purpose of this practice is to secure necessary advanced knowledge and technique for research. Survey, experiment and analysis concerning research subject et al. are conducted under the guidance of a group of academic supervisors. And presentation and discussion are conducted. Student must belong to a seminar group (Hydrology and hydraulic, water quality, microbiology) composed of graduate students, researchers and teachers and it's better to attend other seminar.					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Reviewing lecture relating research at undergraduate course					
[Evaluation]					
Integrated evaluation including interim presentation : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Seminar in River Basin Environmental Science IIB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR604	1	Special Educational Program on River Basin Environmental Science	2nd Semester	Fri./V	Japanese/English
[Outline and purpose]					
<p>The purpose of this practice is to secure necessary advanced knowledge and technique for research. Survey, experiment and analysis concerning research subject et al. are conducted under the guidance of academic supervisor and a group of academic supervisors. And presentation and discussion are conducted. Student must belong to a seminar group (Hydrology and hydraulic, water quality, microbiology) composed of graduate students, researchers and teachers and it's better to attend other seminar.</p>					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Reviewing lecture relating research at undergraduate course					
[Evaluation]					
Integrated evaluation including interim presentation : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Research Work in River Basin Environmental Science IA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR605	2	Special Educational Program on River Basin Environmental Science	1st Semester		Japanese/ English
[Outline and purpose]					
Student carry out research activity such as investigation of research background according to research style under the guidance of a group of academic supervisors about each research subject selected					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Various knowledge relating research					
[Evaluation]					
Integrated evaluation including attitude at seminar : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Research Work in River Basin Environmental Science IB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR606	2	Special Educational Program on River Basin Environmental Science	2nd Semester		Japanese/ English
[Outline and purpose]					
Student carry out research activity such as investigation of research background according to research style under the guidance of a group of academic supervisors about each research subject selected					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Various knowledge relating research					
[Evaluation]					
Integrated evaluation including attitude at seminar : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Research Work in River Basin Environmental Science IIA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR607	2	Special Educational Program on River Basin Environmental Science	1st Semester		Japanese/ English
[Outline and purpose]					
Student carry out research activity such as investigation of research background according to research style under the guidance of a group of academic supervisors about to each research subject selected					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Various knowledge relating research					
[Evaluation]					
Integrated evaluation including interim presentation : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Research Work in River Basin Environmental Science IIB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR608	2	Special Educational Program on River Basin Environmental Science	2nd Semester		Japanese/ English
[Outline and purpose]					
Student carry out research activity such as investigation of research background according to research style under the guidance of a group of academic supervisors about to each research subject selected					
[Objectives]					
Ultimate target that a group of academic supervisors decided					
[Requirements]					
Various knowledge relating research					
[Evaluation]					
Integrated evaluation including presentation of research result at master course : 100%					
[Textbooks]					
Textbooks that a group of academic supervisors designates					
[References]					
References that a group of academic supervisors designates					
[Schedule]					
Contents that a group of academic supervisors designates					

[Title]			[Instructor]		
Introduction to River Basin Environmental Science			Kei Nishida / Eiji Haramoto / Kazuyoshi Souma / Shin-ichi Muto / Sakiko Yaegashi		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR581	1	Graduate School Common Courses	Intensive	/	Japanese/ English
[Outline and purpose]					
The goal of this class is to learn about the challenges faced by Asian and African watersheds, the common vision of the SDGs that must be realized, and the basic knowledge needed to realize this vision from the viewpoints of environmental studies, public health, socioeconomics, and information science.					
[Objectives]					
<ul style="list-style-type: none"> - To be able to explain the challenges of the river basin environment and the SDGs visions to be realized. - To be able to explain the measures to realize the SDGs from the viewpoint of watershed management (flood control, water utilization, and environment). - To be able to explain the measures to realize the SDGs from the viewpoint of sanitary engineering and health risk. - To be able to explain the measures to realize the SDGs from the viewpoint of public health and epidemiology. - To be able to explain the measures to realize the SDGs from the viewpoint of environmental economics. - To be able to explain examples and basics of cost-benefit analysis applied to the realization of the SDGs. - To be able to explain the examples, challenges, and innovations of international cooperative projects in the river basin environment. - To be able to explain examples and basics of big-data analysis applied to the realization of SDGs. <p>This course is positioned as the foundation of "Implementation Methodology for River Basin Environmental SDGs".</p>					
[Requirements]					
Nothing special.					
[Evaluation]					
Quiz and assignments: 50% Attitude in the class: 20% Presentation: 30%					
[Textbooks]					
Nothing special.					
[References]					
Nothing special.					
[Schedule]					

1. challenges of the watershed environment and SDG vision to be realized (Nishida)
2. concept of watershed management (flood control, water utilization, environment) (Soma)
3. overview of sanitary engineering and health risks (Haramoto)
4. overview of public health and epidemiology (Haramoto)
5. Perspectives on Environmental Economics for Sustainable Development (Nishida)
6. overview of cost-benefit analysis in watershed management (Muto)
7. Examples of international collaborative projects in river basin environmental areas, challenges and new developments (Ogata)
8. The latest situation of river environment management (Yaegashi)

[Title]			[Instructor]		
Implementation Methodology for River Basin Environmental SDGs			Kei Nishida / Hiroshi Ishidaira / Eiji Haramoto / Tadashi Toyama / Jun Magome / Shin-ichi Muto / Takashi Miyamoto / Hiroshi Yokomichi		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR582	1	Civil and Environmental Engineering Special Educational Program on River Basin Environmental Science	Intensive	/	Japanese/ English
[Outline and purpose]					
The goal of the class is to identify issues in Asian and African watersheds from the perspectives of environmental studies, public health, socio-economics, and information science, select appropriate solutions for the region, and acquire the integrated skills and know-how to link the solutions to social implementation. The course aims to acquire practical skills not only through classroom lectures, but also through a combination of exercises and group work.					
[Objectives]					
<ul style="list-style-type: none"> - To be able to explain the basics of remote sensing and GIS. - To be able to explain the appropriate treatment of wastewater and waste and energy and resource recovery technologies. - To be able to explain the assessment of economic values of the environment and decision-making for development and conservation. - To be able to explain cost-benefit analysis using economic equilibrium models. - To be able to explain the application of medical statistics. - To be able to explain the generation of visual information by computer vision and computer graphics. - To be able to explain the basics of loading calculation. - To be able to explain methods of microbiological risk assessment. 					
This course is positioned as applied development of "Introduction to River Basin Environmental Science".					
[Requirements]					
Nothing special.					
[Evaluation]					
Quiz and assignments: 50% Attitude in the class: 20% Presentation: 30%					
[Textbooks]					
Nothing special.					
[References]					
Nothing special.					
[Schedule]					

1. basic theory and basic practice of remote sensing and GIS (Ishidaira, Magome)
2. appropriate treatment of wastewater and waste, and energy and resource recovery technology (Toyama)
3. fundamentals of material circulation and economy in sustainable society (Nishida)
4. cost-benefit analysis using economic equilibrium models (Muto)
5. application of medical statistics (Yokomichi)
6. future city and disaster prevention using next generation technology (Miyamoto)
7. Principle of pollution load generation estimation method (Nishida)
8. Methodology of microbiological risk assessment (Haramoto)