[Title]			[Instructor]		
Fundamental Management in Civil Engineering			Takeyasu Suzuki et. al.		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC501	2	Civil and Environmental Engineering	1st Semester	Mon.／II	Japanese

[Outline and purpose]

Environment, region, project, etc., civil and environmental engineers are required to manage various objects. Students learn about the objects and their characteristics required as construction engineers in management techniques spanning the fields of economic management, human resource management, information management, safety management and social environmental management. In addition, by inviting external lecturers who are familiar with this field in practice and receiving explanations such as how management methods are applied to actual problems, students can acquire knowledge that can use management methods more practically. This is a lecture specialized for students who intend to find employment in the field of civil engineering and will be held only in Japanese

[Objectives]

1. Students can explain basic matters of civil management.
2. Student can understand the operation in practical affairs of civil management and can express their opinion.

[Requirements]

Must acquire civil and environmental engineering

[Evaluation]

Confirm the mastery of basic knowledge of civil management by examination: 20%
Confirm the level of comprehension of each lecture by each lecturer: 80%

[Textbooks]

Nothing special

[References]

Nothing special

[Schedule]

1. What is the civil management (Prof. Takeyasu Suzuki)
2. Comprehensive technical management (economic management, human resource management, information management, safety management, social environmental management) (Prof. Takeyasu Suzuki)
3. Civil Management at the construction site (project management) (Mr. Tomohiko Yazaki)
4. Construction site (concrete example of comprehensive technical supervision) (Mr. Tomohiko Yazaki)
5. Civil Management at the construction site (management as director) (Mr. Tomohiko Yazaki)
6. Construction consultant's civil management (project management) (Mr. Ken Nakazawa)
7. Construction consultant (concrete example of comprehensive technical supervision) (Mr. Ken Nakazawa)
8. Construction consultant (management as president) (Mr. Senior Nakazawa)
9. Civil management of the Ministry of Land, Infrastructure, Transport and Tourism (Project Management) (Director of Kofu River National Highway Office)
10. Civil management of the Ministry of Land, Infrastructure, Transport and Tourism (a concrete example of comprehensive technical supervision) (Director of Kofu River National Highway Office)
11. Civil management of the Ministry of Land, Infrastructure, Transport and Tourism (Management as the Office Director) (Director of Kofu River National Highway Office)
12. International Project (Project Management) (Mr. Hidehito Nakano)
13. Overseas project (concrete example of comprehensive technical supervision) (Mr. Hidetoshi Nakano)
14. Overseas project (Overseas project management) (Mr. Hidehito Nakano)

15. Evaluation and summary (Prof. Takeyasu Suzuki)
The 3rd through the 14th are intensive lectures by part-time lecturers. Adjust the convenience of part-time lecturers and students, each lecturer will give three lectures for one day.

[Title]			[Instructor]		
Social Practice of Civil Management and Engineering			each academic supervisor		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC502	2	Civil and Environmental Engineering	2nd Semester	Wed.／V	Japanese English

[Outline and purpose]

Practical training to enhance the experience to work with the workers/people who are engaging social/local project.

[Objectives]

To learn the practical aspect of civil/environmental management and communication.

[Requirements]

Nothing special

[Evaluation]

Report (50%), Evaluation by the Counterpart (Project Manager)(50%)

[Textbooks]

To be designated by each instructor, if necessary.

[References]

Nothing special

[Schedule]

1. Basic survey on the project
2. To learn about present situation of the project
3. Analysis of present situation of the project
4. Clarification of the problem of the project
5. Survey required to solve the problem of the project
6. Listing up of solutions of the project problem
7. Selection of effective solution methods
8. Join the project(1) Understanding of present situation
9. Join the project(2) Explanation of pre-survey
10. Join the project(3) Clarification of problem
11. Join the project(4) Discussion
12. Join the project(5) Presentation of solution
13. Join the project(6) Scenario making
14. Join the project(7) Final decision
15. Presentation

[Title]			[Instructor]		
Disaster Management and Engineering			Takeyasu Suzuki / Yasunori Hada / Kazuaki Ohtsuki		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC503	2	Civil and Environmental Engineering	1st Semester	Fri.／II	Japanese

[Outline and purpose]

Regarding countermeasures against natural disasters, lectures are given not only from the hardware aspects but also the software aspects such as legal system and regional disaster management plan. Students can learn the system as disaster management and engineering, the role of various stakeholders, and how construction engineers can contribute to disaster prevention and damage reduction.

[Objectives]

To explain the system of disaster management and engineering, the role of various stakeholders, and how construction engineers can contribute to disaster management and damage reduction.

[Requirements]

Basics of Soil Mechanics, Hydraulics and Disaster Engineering 1 are required.
Comprehensive River Engineering and Disaster Engineering 2 are desirable.

[Evaluation]

Report on the contents of the lesson: 70%
Attitude in the class and presentation and discussion: 30%

[Textbooks]

Takeyasu Suzuki, Disaster Management and Engineering, Riko-Tosho. (in Japanese)

[References]

Tadashi Suetsugi, Damage Reduction Manual, Gihodo-Shuppan Press. (in Japanese)

[Schedule]

1.Introduction - What is Disaster Management and Engineering (Prof. Takeyasu Suzuki)
2.Earthquake Damage and Disaster Management (Prof. Takeyasu Suzuki)
3.Damage due to Heavy Rainfall and Disaster Management (Prof. Takeyasu Suzuki)
4.Role of ICT as a Countermeasure (Prof. Takeyasu Suzuki)
5.Community Disaster Management Plan (Prof. Takeyasu Suzuki)
6. Facts of flood disaster in Japan (Assist. Prof. Kazuaki Ohtsuki)
7. Processes and mechanism of flood disaster(Assist. Prof. Kazuaki Ohtsuki)
8. Prevention and mitigation of flood disaster (Assist. Prof. Kazuaki Ohtsuki)
9. Case study (1) (Assist. Prof. Kazuaki Ohtsuki)
10.Case study (2) (Assist. Prof. Kazuaki Ohtsuki)
11.Disaster Reduction Measures in Urban City 1(Assoc. Prof. Yasunori Hada)
12.Disaster Reduction Measures in Urban City 2 (Assoc. Prof. Yasunori Hada)
13.Disaster Reduction Measures in Lifeline Utilities (Assoc. Prof. Yasunori Hada)
14.Evolving Disasters (Assoc. Prof. Yasunori Hada)
15.Case Study on Serious Event in Future Mega Disasters (Assoc. Prof. Yasunori Hada)

[Title]			[Instructor]		
Continuum Mechanics of Solids for Civil Engineers			Junji Yoshida/ Shigehiko Saito/ Kennosuke Sato/ Satoshi Goto		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC505	2	Civil and Environmental Engineering	1st Semester	Mon.／I	Japanese English

[Outline and purpose]

We will study continuum mechanics of solids and soils for civil engineers to use for design and development of civil structures. This course provides fundamentals as follows: continuum mechanics (definition of stress and strain, equilibrium equations, and linear elastic solids), theory of plasticity (elasto-plastic constitutive equations, failure criteria, and stress invariants), mass transfer and chemical reactions in porous materials, mechanics and mechanical models of soil liquefaction during earthquake and slope stability on rainfall and earthquake-induced landslides.

[Objectives]

- to understand the definition of stress and strain
- to explain stress and strain tensors
- to understand fracture of material based on the elasto-plastic mechanics of materials
- to understand mass transfer with chemical reactions in porous materials
- to understand the soil behavior during earthquake and mechanical model of soil slope stability

[Requirements]

Fundamental knowledge of material mechanics and soil mechanics given in undergraduate courses.

[Evaluation]

Report on the contents of the lesson: 30%
Term examination : 70%

[Textbooks]

[References]

James K. Mitchell, Kenichi Soga: Fundamentals of soil behavior 3rd ed,, John Wiley & Sons,2005
Idriss,I.M. and Boulanger, R.W.: Soil liquefaction during earthquakes, Earthquakes Engineering Research Institute, 2008.
J. Michael Duncan, Stephen G. Wright, Thomas L. Brandon, Soil strength and slope stability 2nd ed, Wiley,2014.

[Schedule]

1. Introduction of continuum mechanics (Assoc. Prof. Yoshida)
2. Stress and its properties (Assoc. Prof. Yoshida)
3. Definition of strain and its physical meanings (Assoc. Prof. Yoshida)
4. Linear elastic solids (Assoc. Prof. Yoshida)
5. Linear elastic solids and boundary value problems (Assoc. Prof. Yoshida)
6. Basic concept of elasto-plastic constitutive equations (Prof. Saito)
7. Stress invariants and failure of materials (Prof. Saito)
8. Failure criteria (Prof. Saito)
9. Strain hardening and perfect plasticity (Prof. Saito)
10. Structural analysis using elasto-plasticity (Prof. Saito)
11. Advection and diffusion in mass transfer (Assist. Prof. Sato)
12. Mass transfer with chemical reactions (Assist. Prof. Sato)
13. Introduction of soil behavior and related constitutive models (Assoc. Prof. Goto)
14. Mechanical model of soil liquefaction during earthquakes (Assoc. Prof. Goto)
15. Mechanical model of slope stability on rainfall and earthquake-induced landslides (Assoc. Prof. Goto)

[Title]			[Instructor]		
Infrastructure Maintenance Engineering			Satoshi Goto / Shigehiko Saito / Junji Yoshida / Kazuaki Ohtsuki		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC506	2	Civil and Environmental Engineering	2nd Semester	Mon.／II	Japanese English

[Outline and purpose]

Civil infrastructure is a public material that supports life and economic activities, and it is important to continuously maintain and manage these at the minimum burden. In this lecture, we will learn fundamental knowledge on maintaining and managing and life expectancy for civil infrastructure such as concrete structures, road bridges, geotechnical structures, and river administrative facilities. Specifically, we will learn about the characteristics of deterioration / transformation of civil infrastructure and the inspection method. In addition, we will also learn about performance evaluation and long-life plan that are used in practice.

[Objectives]

It is possible to understand the inspection / performance evaluation method for each facility, judge the health of the facility by using the inspection / performance evaluation method, and propose the measures for prolonging the life.

[Requirements]

Before the lecture it is desirable to look at books etc. concerning maintenance of civil infrastructure

[Evaluation]

Report on the contents of the lesson: 75%
Attitude in the class and presentation and discussion: 25%

[Textbooks]

Nothing special

[References]

T., Suetsugi: Facts of maintenance and management of structures in river, KAJIMA INSTITUTE PUBLISHING CO., LTD., 2009. (in Japanese) (ISBN : 978-4-306-02411-3)

[Schedule]

1. Introduction - Maintenance of infrastructure facilities (Prof. Saito)
2. Deterioration and Inspection Method of Concrete Structure (Prof. Saito)
3. Performance Evaluation Method of Concrete Structure (Prof. Saito)
4. Maintenance of road bridge (steel bridge) (Assoc. Prof. Yoshida)
5. Maintenance of bridge attachments (Assoc. Prof. Yoshida)
6. Maintenance of paved road surface (Assoc. Prof. Yoshida)
7. Maintenance of geotechnical structure (outline) (Assoc. Prof. Goto)
8. Maintenance of geotechnical structure (slope structure) (Assoc. Prof. Goto)
9. Maintenance of geotechnical structure (embankment structure) (Assoc. Prof. Goto)
10. Issues of maintenance of river administrative facility (Assist. Prof. Ohtsuki)
11. Planning for maintenance of river administrative facility (Assist. Prof. Ohtsuki)
12. Deterioration and inspection of river administrative facility (Assist. Prof. Ohtsuki)
13. Exercises on Performance Evaluation and Longevity Improvement of Road Bridge (Prof. Saito)
14.Volcano Disaster Reduction Measures (Assoc. Prof. Yoshida)
15. Practice on evaluating the performance of geotechnical structure and prolonging the life, Overall evaluation / summary (all members) (Assoc. Prof. Goto)

* Preview: Keep track of related books and information etc.
* Review: organize the contents learned in the lecture, especially important items

[Title]			[Instructor]		
Practical Urban Planning			Kuniaki Sasaki /Nobuyuki Ishii/ Shinichi Muto		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC507	2	Civil and Environmental Engineering	1st Semester	Fri.／I	Japanese

[Outline and purpose]

Students will learn basic ways of thinking and concrete plans about community building and urban planning as activities of area improvement. Through the case studies with concrete themes, such as landscape urban planning, traffic urban planning and sightseeing urban planning in particular, students will acquire the knowledge of their expected roles and practical methods.

[Objectives]

Students are expected to learn details of various community building and urban planning methods, to understand the reasons for either their success or failure, and to present important points and improvement ideas indicating specific numerical values and so on.

[Requirements]

[Evaluation]

By the presentation and proposal of group and individual work

[Textbooks]

[References]

[Schedule]

1st Introduction
2nd survey method for transportation oriented planning
3rd The survey method for investigating the transportation planning
4th Practical data analysis and estimation method
5th Policy analysis using the estimated models
6th Presentation of the policy analysis
7th Landscape and urban planning and design
8th Landscape law suit
9th Limitation of the Landscape Act
10th Research of methods of landscape urban planning and design
11th Proposal of methods of landscape urban planning and design
12th Cost benefit analysis for practical urban planning
13th Estimation of residential and commercial location
14th evaluation of practical urban planning
15th Presentation of simulating results

[Title]			[Instructor]		
Environmental Preservation Engineering			Hidehiro Kaneko / Kazuhiro Mori		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC508	2	Civil and Environmental Engineering Course	2nd Semester	Wed.／I	English／Japanese

[Outline and purpose]

This class deals with process and general techniques relating to waste management and water quality control. Specific problems will be solved using skills and knowledge studied in the class.

[Objectives]

1. To understand basic concept, technologies and skills to propose a solution on waste management as a base of sustainable and affluent societies.
2. To understand basic concept, technologies and skills to propose a solution on water quality management as a base of sustainable and affluent societies.

[Requirements]

Basic knowledge of chemistry, biology and environmental engineering

[Evaluation]

1. Reports and/or short examination; Understanding level of the contents in each part will be evaluated.; 100%

[Textbooks]

[References]

[Schedule]

Part I: Waste management (Kaneko)
1.History of waste management
2.Establishment of recycling-based society
3.Waste management technologies(1):Collection and transport
4.Waste management technologies(2)Incineration techniques
5.Waste management technologies(3)Other processing technology
6.Waste management technologies(4)Final disposal
7.Waste management technologies(5)Measuring analysis
8.Exercise for waste management

Part II: Water quality management and environmental remediation (Mori)
9.Basic concept for water quality management
10.Water purification technologies(1):Physicochemical treatment
11.Water purification technologies(2):Biological treatment
12.Basic concept for environmental remediation
13.Enviromental remediation technologies(1):Bioremediation
14.Enviromental remediation technologies(2):Phytoremediation
15.Exercises for water purification and bioremediation

[Title]			[Instructor]		
Environmental Statistics			Kei Nishida / Eiji Haramoto / Takashi Nakamura / Tadashi Toyama		
[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 oversea 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]

1. Introduction (Nishida, Haramoto, Toyama, Nakamura)
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. Basic statistics: practice (Haramoto)
6. Probability distribution and analysis of variance: probability distribution and Monte Carlo simulation (Nishida)
7. Probability distribution and analysis of variance: t-test and analysis of variance (Nishida)
8. Probability distribution and analysis of variance: practice (Nishida)
9. Regression analysis: simple regression analysis, least-squares method, correlation coefficient, and coefficient of determination (Nakamura)
10. Regression analysis: multiple regression analysis (Nakamura)
11. Regression analysis: practice (Nakamura)
12. Multivariate analysis: cluster analysis (Toyama)
13. Multivariate analysis: multivariate analysis and : principal component analysis (Toyama)
14. Multivariate analysis: practice (Toyama)
15. Summary of the class (Nishida, Haramoto, Toyama, Nakamura)

* This class will be generally provided using Zoom but some lectures may be provided via face-to-face.

[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]

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.

[Objectives]

- 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.
- Epidemiology: To understand the basic epidemiologic designs, index on population health and health risks, the concept of bias and confounding, and basics in biostatistics.
- 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]

Quiz and assignments: 50%
Attitude in the class: 50%

[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. Epidemiology 1 (Yamagata)
9. Epidemiology 2 (Yamagata)
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. Wastewater-based epidemiology 3 (Kitajima)

* This class will be generally provided using Zoom but some lectures may be provided via face-to-face.

[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]

-To understand how to manage water quantity, quality, and environment within river basin.
-To understand how to evaluate water hazard risk
-To understand how to carry out cost-benefit analysis for river basin management

[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]

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 mechanism and modeling of water flows. The lecture starts from describing basic equations of fluid motion, followed by 1-dimensional water flow equations and storage type water dynamics modeling. The lecture deals with not only theoretical description of water flow modeling but also its numerical solution technique. The topics treated in the lecture are crucial for understanding water flows and river basin environmental science. The lecture is mainly given in Japanese while English is also used when needed.

[Objectives]

1. To understand basic equations of fluid motion and their derivation.
2. To understand 1-dimensional open channel flow equations and their derivation.
3. To understand kinematic wave model equations and their derivation.
4. To understand storage type water dynamics model and their derivation.
5. To understand basic of numerical solution technique for water flow models.

[Requirements]

Basic knowledge on hydraulics, hydrology and calculus.

[Evaluation]

Report: 40%
Final exam: 40%
Attendance and Attitude: 20%

[Textbooks]

[References]

[Schedule]

1. Introduction
2. Basic equations of fluid motion
3. Basic equations of material transport
4. Runoff process and water quality
5. Vertical movement of soil water and solute transport
6. Groundwater flow and solute transport
7. River flow process
8. Evapotranspiration: theory
9. Evapotranspiration: model
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 Environment Assessment			Eiji Haramoto / Kei Nishida / Takashi Nakamura / Futaba Kazama		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR507	2	Civil and Environmental Engineering	2nd Semester	Fri.／II	English／Japanese

[Outline and purpose]

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]

- 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 of microbiological indicators (Haramoto)
4 Methods for microbial risk assessment (Haramoto)
5 Future of microbiological indicators (Haramoto)
6 Outline and future of living environmental items (Nishida)
7 Basics of health risk calculation (Nishida)
8 Basics of loading calculation (Nishida)
9 Basics of isotopic fractionation calculation (Nishida)
10 Outline of Environmental isotopes (Nakamura)
11 Examples and future of isotope monitoring (Nakamura)
12 Environmental assessments by isoscape (Nakamura)
13 Outline of governmental procedures for setting water quality standards (Kazama)
14 Examples of governmental procedures for setting water quality standards (Kazama)
15 Management of water quality and activities of citizens (Kazama)
* This class will be generally provided using Zoom but some lectures may be provided via face-to-face.

[Title]			[Instructor]		
Advanced Environmental Treatment Technology			Futaba Kazama / Kazuhiro Mori / Tadashi Toyama		
[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), heavy metals and persistent organic pollutants. In this lecture, we will learn the technologies for energy/material recovery from solid waste/wastewater.

[Objectives]

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 purification technology for heavy metal pollution.
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 methodology for social implementation of environmental technology in Asia.

[Requirements]

It is desirable that you should have basic knowledge of chemistry, biology and environmental engineering.

[Evaluation]

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]

1. History, background and current situation of environmental pollution (Kazama, Mori, Toyama)
2. Purification technology for organic pollution: Source and type of pollution, current situation (Mori)
3. Purification technology for organic pollution: Basic of technology, leading-edge technology, future development (Mori)
4. Purification technology for nutrients (nitrogen and phosphorus) pollution: Source and type of pollution, current situation (Toyama)
5. Purification technology for nutrients (nitrogen and phosphorus) pollution: Basic of technology, leading-edge technology, future development (Toyama)
6. Purification technology for heavy metal pollution: Source and type of pollution, current situation (Kazama)
7. Purification technology for heavy metal pollution: Basic of technology, leading-edge technology, future development (Kazama)
8. Purification technology for persistent organic pollutants Source and type of pollution, current situation (Toyama)
9. Purification technology for persistent organic pollutants Basic of technology, leading-edge technology, future development (Toyama)
10. Technology for energy/material recovery from wastes: Basic of issue, current situation (Mori, Toyama)
11. Technology for energy/material recovery from wastes: Basic of technology, leading-edge technology, future development (Mori, Toyama)
12. Environmental treatment technology practice: Design, set-up and operation of reactor (Kazama, Mori, Toyama)
13. Environmental treatment technology practice: Chemical and biological analyses for reactor evaluation (Kazama, Mori, Toyama)
14. Methodology for social implementation of environmental technology in Asia: Extraction and identification of issue, discussion (Kazama, Mori, Toyama)
15. Methodology for social implementation of environmental technology in Asia: Presentation and discussion

(Kazama, Mori, Toyama)

[Title]			[Instructor]		
Seminar in Civil and Environmental Engineering IA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC601	1	Civil and Environmental Engineering	1st Semester		Japanese English

[Outline and purpose]

Training in order to acquire the skills required for clarifying the research/project theme is done under the supervisor group. Seminar will be held periodically and presentation and discussion will be made among supervisors and students. By doing so, skills of analysis and communication are trained, and acquire the practical and international viewpoint.

[Objectives]

To acquire the skills required for clarifying the research theme during master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering.

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. Collection of possible themes
2.Classification of themes
3.Consideration on the relationship between themes
4.Explanation of selected theme
5.Consideration on the literature and data collection method
6.Literature survey for previous related research/project
7.Ummary of literature survey
8.Consideration of the relationship between literatures
9.Explanation of relationship between theme and literature
10.Further survey to obtain fundamental understanding of previous research/project
11 Summary of fundamental understandings
12.Further survey to obtain extended understanding of previous research/project
13.Summary of extended understandings
14.Setting of concrete theme
15.Presentation and discussion

[Title]			[Instructor]		
Seminar in Civil and Environmental Engineering IB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC602	1	Civil and Environmental Engineering	2nd Semester		Japanese English

[Outline and purpose]

Training in order to obtain science communication skill is done under the supervisor group. Skills of summing-up the research/project, oral presentation, composition, and discussion, which are required for engineers, will be trained.

[Objectives]

To obtain science/engineering composition technique in Japanese/English by doing preparatory research on the theme chosen in “Seminar in Civil and Environmental Engineering IA”.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering.

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. Literature survey to write introduction in Japanese
2. Composition of introduction in Japanese
3. Proposition of solving method
4. Preparatory survey based on the method in 3
5. Reconsideration of survey method
6. Preparatory survey based on the method in 5
7. Presentation of the composed article
8. Literature survey to write conclusions of the theme
9. Composition of conclusions in Japanese
10. Literature survey to write the introduction in English
11. Classification/filing of literature
12. Composition of introduction in English
13. Literature survey to write conclusions in English
14. Classification/filing of literature
15 Composition of conclusions in English

[Title]			[Instructor]		
Seminar in Civil and Environmental Engineering IIA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC603	1	Civil and Environmental Engineering	1st Semester		English／Japanese

[Outline and purpose]

Training in order to acquire the skills required for comprehensively evaluating the research/project theme is done under the supervisor group. Seminar will be held periodically and presentation and discussion will be made among supervisors and students. By doing so, skills of analysis and communication are trained, and acquire the practical and international viewpoint.

[Objectives]

To acquire the skills required for comprehensively evaluating the research theme during master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering.

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1.Review of the project results
2.Review of the research approaches
3.Planning of the solution methods
4.Execution of the decided approach
5.Continuation of the research
6.Summary of the project results
7.Collection of the literatures related the approach
8.Writing about the research approach
9.Collection of the English literatures related the approach
10. Arrangement of the English literatures related the approach
11.Writing about the English literatures related the approach
12.Revision of the English literatures related the approach
13.Presentation preparation of the English literatures related the approach
14. Presentation of the English literatures related the approach
15. Reconstruction of the English literatures related the approach

[Title]			[Instructor]		
Seminar in Civil and Environmental Engineering IIB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC604	1	Civil and Environmental Engineering	2nd Semester		English／Japanese

[Outline and purpose]

Training in order to acquire the skills required for finding the research/project problems is done under the supervisor group. Seminar will be held periodically and presentation and discussion will be made among supervisors and students. By doing so, skills of analysis and communication are trained, and acquire the practical and international viewpoint.

[Objectives]

To acquire the skills required for finding the research problems during master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering.

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1.Provide the research problems
2.Method to attempt the first problem
3. Method to attempt the second problem
4.Clarify new problems
5.Preparation of slides for a 10 minutes presentation
6. Preparation of talk for a 10 minutes presentation
7.Execution of a10 minutes presentation
8. Preparation of slides for a 3 minutes presentation
9. Preparation of talk for a 3 minutes presentation
10. Execution of 3 minutes presentation
11. Preparation of slides for a 3 minutes English presentation
12. Preparation of documents for a 3 minutes English presentation
13. Preparation of talk for a 3 minutes English presentation (the first half)
14. Preparation of talk for a 3 minutes English presentation (the second half)
15. Execution of 3 minutes English presentation

[Title]			[Instructor]		
Research Work in Civil and Environmental Engineering IA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC605	2	Civil and Environmental Engineering	1st Semester		Japanese English

[Outline and purpose]

Goal of this subject is preparation for master thesis. Find suitable research theme under the supervision of several supervisors. By collecting and reading related literatures, obtain fundamental knowledge and skill required for research.

[Objectives]

To obtain fundamental research ability required for the research in master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. How to choose research theme?
2. Collection of literature and other information related with research theme
3. How to collect literature/information?
4. Survey for previous researches in Japanese
5. Survey for previous researches in foreign languages
6. Survey for previous researches
7. Study on fundamental knowledge concerning Engineering
8. Study on fundamental knowledge concerning Natural Science
9. Study on fundamental knowledge concerning Social Science
10. Reading and explaining of collected literatures
11. Reading and explaining of collected literatures
12. Reading and explaining of collected literatures
13. Reading and explaining of collected literatures
14. Reading and explaining of collected literatures
15. Summarization

[Title]			[Instructor]		
Research Work in Civil and Environmental Engineering IB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC606	2	Civil and Environmental Engineering	1st Semester		Japanese English

[Outline and purpose]

Goal of this subject is preparation for master thesis. Find suitable research theme under the supervision of several supervisors. By collecting and reading related literatures, obtain fundamental knowledge and skill required for research.

[Objectives]

To obtain fundamental research ability required for the research in master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. How to choose advanced research theme?
2. Collection of literature and other information related with advanced research theme
3. How to collect literature/information?
4. Survey for previous researches in Japanese
5. Survey for previous researches in foreign languages
6. Survey for previous researches
7. Study on fundamental knowledge concerning Engineering
8. Study on fundamental knowledge concerning Natural Science
9. Study on fundamental knowledge concerning Social Science
10. Reading and explaining of collected literatures
11. Reading and explaining of collected literatures
12. Reading and explaining of collected literatures
13. Reading and explaining of collected literatures
14. Reading and explaining of collected literatures
15. Summarization

[Title]			[Instructor]		
Research Work in Civil and Environmental Engineering IIA			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC607	2	Civil and Environmental Engineering	1st Semester		English／Japanese

[Outline and purpose]

Goal of this subject is preparation for master thesis. Find suitable research theme under the supervision of several supervisors. By collecting and reading related literatures, obtain fundamental knowledge and skill required for research.

[Objectives]

To obtain fundamental research ability required for the research in master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. Examination of the preliminary research
2. Planning based on the preliminary research
3. Confirmation of research notes for the main research
4. Preliminary research
5. Planning for the main research based on the preliminary research
6. Preparation for the main research
7. Execution of the main research
8. Summary of the main research
9. Preparation of an interim report of the main research
10. Interim report of the main research
11. Review of the main research
12. Planning for the revised main research
13. Execution for the revised main research
14. Summary of the revised main research
15. Report of the revised main research

[Title]			[Instructor]		
Research Work in Civil and Environmental Engineering IIB			all academic supervisors		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTC608	2	Civil and Environmental Engineering	2nd Semester		English／Japanese

[Outline and purpose]

Goal of this subject is preparation for master thesis. Find suitable research theme under the supervision of several supervisors. By collecting and reading related literatures, obtain fundamental knowledge and skill required for research.

[Objectives]

To obtain fundamental research ability required for the research in master course.

[Requirements]

Fundamental skills and knowledge of civil and environmental engineering

[Evaluation]

Based on the presentation and discussion in the seminar.

[Textbooks]

To be designated by supervisors

[References]

Nothing special

[Schedule]

1. Examination of the preliminary research
2. Planning based on the preliminary research
3. Confirmation of research notes for the main research
4. Preliminary research
5. Planning for the main research based on the preliminary research
6. Preparation for the main research
7. Execution of the main research
8. Summary of the main research
9. Preparation of an interim report of the main research
10. Interim report of the main research
11. Review of the main research
12. Planning for the revised main research
13. Execution for the revised main research
14. Summary of the revised main research
15. Report of the revised main research