[Title]			[Instructor]		
Advanced River Basin Management			Tadashi Suetsugi		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329410	2	River Basin Environmental Science Civil and Environment Engineering	2nd Semester	Mon.／II	Japanese／English

[Outline and purpose]

The aim of the lecture is to learn basic and quantitative methods of management and assessment for river channel and basin. The lecture is divided into two halves. The first half focuses on learning physical processes occurring in river channels and a basic framework for river channel design which are core components of river channel management. It includes the topics of flood generation and propagation, debris flow and river bed variation as well as current issues and latest research results on hydraulic engineering. The second half focuses on learning a framework of river basin management for secure and comfortable social systems. It includes a basic concept and current status of river basin management, a hydraulic method for assessing flooding risks, relationship between flood disaster and landuse and an economic method for estimating costs and benefits caused by river basin management. The lecture is mainly given in Japanese while English is also used when needed.

[Objectives]

1. To understand processes of mountain formation and sediment yield from the viewpoint of earth science.
2. To understand a method for calculating river bed variation based on sediment hydraulics.
3. To understand methods of river channel design and management.
4. To understand a basic concept and costs/benefits of river basin management.
5. To understand a method for assessing river basin management based on hydraulics and economics.

[Requirements]

Basic knowledge on open channel hydraulics, river engineering, hydrology, probability theory and statistics.

[Evaluation]

Quiz, assignments and presentation: 50%
Questions and answers in the lectures: 50%

[Textbooks]

Necessary materials for the lecture will be provided.

[References]

芦田和男・江頭進治・中川　一, 21 世紀の河川学, 京都大学学術出版会 (ISBN:9784876987658) (in Japanese)
森杉壽芳編, 社会資本整備の便益評価, 勁草書房 (ISBN:4326548061) (in Japanese)
末次忠司, 河川技術ハンドブック, 鹿島出版会 (ISBN:9784306024229) (in Japanese)

[Schedule]

1. River basin management and mountain formation (Suetsugi)
2. Sediment yield and topography (Suetsugi)
3. Characteristics of river channel and flood (Suetsugi)
4. Rainfall characteristics (Suetsugi)
5. Anthropogenic change and river (Suetsugi)
6. River channel and basin management (Suetsugi)
7. Summary of the first half (Suetsugi)
8. River basin management and its current status (Ichikawa)
9. Assessing flood risks (1) (Ichikawa)
10. Assessing flood risks (2) (Ichikawa)
11. Relationship between flood disaster and landuse (Ichikawa)
12. Assessing costs and benefits of river basin management (Ichikawa)
13. Future direction of river basin management (1) (Ichikawa)
14. Future direction of river basin management (2) (Ichikawa)
15. Summary of the second half (Ichikawa)

[Title]			[Instructor]		
Advanced Hydraulics and Hydrology			Hiroshi Ishidaira		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329425	2	River Basin Environmental Science Civil and Environmental Engineering	1st Semester	Thu.／I	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]

Midterm exam: 45%
Final exam: 45%
Quiz and assignments: 10%

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

1. Introduction
2. Basic equations of fluid motion
3. Equations for 1-dimensional open channel flow
4. Midterm exam
5. Kinematic wave models and numerical solution method
6. Storage type water dynamics model
7. Final exam

[Title]			[Instructor]		
Advanced Water Environment Assessment			Yasushi Sakamoto / Futaba Kazama / Kei Nishida/ Eiji Haramoto		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329430	2	River Basin Environmental Science Civil and Environmental Engineering	2nd Semester	Fri.／II	Japanese ／ English

[Outline and purpose]

Environmental issues and the applied methodologies are outlined specifically on terrestrial environments such as groundwater, river or lake. We welcome and encourage those who are not familiar with water quality studies but need the knowledge of them in the future.

[Objectives]

Understanding the on-going issues widely, assessing data properly, proposing practical solution or reaching a preparatory stage capable of them.

[Requirements]

Basics of water quality, hydrology, geochemistry and ecology. Knowledge on the environmental policy outline in the home country.

[Evaluation]

- Reporting assignments (50%): Appropriateness of the theme and logicality of the structure
- Presentation etc. (50%): Understanding through the class work

[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]

A. 1st-5th week: Basics of water quality analysis (Sakamoto)
A-1 Runoff process and water quality: runoff processes, runoff components, relation between runoff and water chemistry, variations of water quality in runoff
A-2 Vertical infiltration of soil waters and transport of solutes: principle of transport, basic equations of water and solute under unsaturated condition.
A-3 Groundwater flow and transport of solutes: basic concept, model of groundwater, issues on real flow, groundwater pollution.
B. 6th-10th week: Water quality and human activity (Kazama)
B-1 Outline of water environment management.
B-2 Case studies of groundwater, lake water and river water quality management in Japan and other countries.
C. 11th-15th week: Basics of data analysis (Nishida)
C-1 Error & reliability of data
C-2 Correlation & cause-effect relation
C-3 Regression & stratification

[Title]			[Instructor]		
Advanced Course on Hydrometeorology			Kazuyoshi Souma		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329445	2	River Basin Environmental Science Civil and Environmental Engineering	1st Semester	Thu.／II	Japanese/ English

[Outline and purpose]

Target of lecture is that students learn the elements of meteorology and practical knowledge about disaster reduction caused by extreme weather by developing the contents of applied fluid dynamics, hydrology at undergraduate course. In this lecture, Japanese will be mainly used but English explanations can be added.

[Objectives]

To understand and explain about the cause of meteorological phenomena which causes disasters (especially extratropical cyclones and atmospheric instability), and practical knowledge about disaster reduction (especially weather forecast and measures against heavy rainfall).

[Requirements]

Understanding of basic contents of hydrology at undergraduate course

[Evaluation]

Examination： 60%
Attendance and presentation： 40%

[Textbooks]

Nothing

[References]

小倉義光, 一般気象学【第２版】, 東京大学出版会, ISBN:4130627066
新田尚：気象予報士試験「実技編」、オーム社、2006 年（in Japanese）ISBN：4274202283

[Schedule]

1. Extreme weather which causes disaster
2. Synoptic scale whether and surface weather chart
3. The genesis and development of extratropical cyclones 1
4. The genesis and development of extratropical cyclones 2
5. Atmospheric instability 1
6. Atmospheric instability 2
7. The development of tropical cyclones
8. Monsoon
9. Climate change
10. Shortage of water, design rainfall for river planning
11. Wheather observations and predictions
12. Rainfall - runoff process in river planning
13. Occurrence of flood and flood disaster
14. Measure against torrential rainfall disaster
15. Examination

[Title]			[Instructor]		
Advanced Remote Sensing and GIS			Hiroshi Ishidaira / Hiroshi Kobayashi		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329450	2	River Basin Environmental Science	2nd Semester	Wed.／II	Japanese ／English*

[Outline and purpose]

This course provides basic theories and techniques to analyze environmental information, including remote sensing, GIS.
*Japanese and oversea students study together through work group on some topics. English is potentially used. (Lecture in English will be given by Hiroshi Ishidaira.)

[Objectives]

To understand the principles of remote sensing and GIS.
To understand the potential use of remote sensing and GIS on environmental analysis.

[Requirements]

Basic skills of computing.

[Evaluation]

1. Report: 40%
2. Attendance and Attitude: 30%
3. Summary report: 30%

[Textbooks]

Using original documents.

[References]

[Schedule]

1. Introduction
2. Basic concept of remote sensing
3. Remote sensing for atmosphere
4. Remote sensing for ocean
5. Exercises in analysis of remote sensing data (1)
6. Exercises in analysis of remote sensing data (2)
7. Remote sensing for land
8. Exercises in analysis of remote sensing data (3)
9. Exercises in analysis of remote sensing data (4)
10. Basic concept of GIS
11. Application of GIS for environmental analysis
12. Spatial analyses with GIS (1)
13. Spatial analyses with GIS (2)
14. Spatial analyses with GIS (3)
15. Summary

[Title]			[Instructor]		
Advanced Water Environment Analysis			Kei Nishida / Eiji Haramoto		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329460	2	River Basin Environmental Science	1st Semester	Fri.／I	Japanese ／English

[Outline and purpose]

Basics of environmental measurements are learned to understand what the obtained information means. Basics of data processing are also learned by using monitoring results from a model basin. Japanese and oversea students study together through work group on some topics. English is potentially used.

[Objectives]

- Master the basics of experimental methods and how to finalise the data
- Master the basics of sorting monitoring data and estimate environmental loads
- Develop leadership, cooperativeness, internationality

[Requirements]

Basic knowledge on water chemistry, microbiology, hydrology is desirable.

[Evaluation]

Attitude in the class: 70%
Presentation and discussion: 30%

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

Data creation
1 Nutrients
2 Indicator microorganisms
3 Microbiological analysis (total coliform, E. coli)
4-5 Chemical analysis (total nitrogen, nitrate)
6-7 Finalizing data (error, dilution factor, calibration, detection limit)
8 Data summary, presentation, discussion
Data processing
9 Download hydrologic/water quality data
10 Temporal variation
11 Interpolation of data
12-13 Estimation of N load
14 Data summary, presentation, discussion
15 Overall summary

[Title]	[Instructor]
Integrated Medicine and River Basin Engineering	Jun Arita / Zentaro Yamagata / Atsuhito Nakao / Naoki Kondo / Yasuhiro Tanaka / Eiji Haramoto

[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329470	2	River Basin Environmental Science	Full year	Intensive class	Japanese

[Outline and purpose]

This course 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, molecular biology, physiology, 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]

- 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.
- Environmental engineering: To understand the basics on waterborne infectious diseases, the relationship between microbial indicators and waterborne pathogens, and advantages and disadvantages of these indicators.
- Microbiology: To explain the basic concept of the analysis of microbial community structure and its advantages and disadvantages.
- Immunology: To understand the basics of human immunology and the immunological responses to the pathogenic substances in the water.
- Physiology: To describe the effects of environmental pollution on the biofunctional systems and its mechanisms.
- Environmental medical engineering: To understand the concept of genetic technological biosensors and its applications.

[Requirements]

Biology and mathematics at university basic course level.

[Evaluation]

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

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

1. Epidemiology 1: Study designs for population health risks assessments (Naoki Kondo).
2. Epidemiology 2: 1)indicators of population health and their measurement, 2) Ethical issues in epidemiologic studies (Zentaro yamagata)
3. Sanitary engineering: Evaluations of pollutants and pathogens in the water environment (Eiji Haramoto).
4. Microbiology: microbial community structure analysis using gene-molecular techniques (Yasuhiro Tanaka).
5. Immunology: the immune responses to water pollution (Atsuhito Nakao).
6. Physiology: impacts of environmental hazardous pollutants in the environment (Jun Arita).
7. Environmental engineering: environmental monitoring by the biosensing technique using gen technology (Masanori Kitamura).
8. Public Health 1: Basics in genetic medicine. 1) applications of the result of risk factor assessment studies and health communications. 2)gene-environment interactions (Zentaro Yamagata).
9. Public Health 2: Health Impacts Assessment (Naoki Kondo).

English is potentially used.

[Title]			[Instructor]		
River Basin Research Training			Each academic supervisor		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329480	1	River Basin Environmental Science	Intensive	／	Japanese

[Outline and purpose]

It is necessary to secure the wide knowledge by attending outside meeting and joint research. In this training, attendance and training are conducted following as: attendance to academic conference or research group designated by teachers, short term exchange training at domestic or foreign organization (Nepal, Thailand, China et al.) and attendance to joint research with outside organizations.

[Objectives]

1)to explain the research subject at academic conference and research meeting
2)to exchange the academic opinion at high level
3)to play the role at the joint activity with outside organization by cooperating with other members

[Requirements]

To secure the enough expert knowledge to present at outside conference and carry out the joint activity

[Evaluation]

Presentation : 100%

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

Student reports the research result at the end of 1st semester of 2nd grade and result is evaluated by a group of academic supervisors.

[Title]			[Instructor]		
Applied Disaster and Crisis Management			Takeyasu Suzuki / Yasunori Hada et. al.		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
324100	2	Human Oriented Engineering, Civil and Environmental Engineering, River Basin Environmental Science	Intensive	／	Japanese

[Outline and purpose]

This course gives basic knowledge on disaster and crisis management. Practical exercises and group works for obtaining skills for disaster and crisis management are also included. This course provides qualifications of candidacy for an exam of Japan Bousaisi Organization, NPO.

[Objectives]

1. to understand fundamental mechanisms on natural disasters.
2. to understand fundamental knowledge on disaster and crisis management
3. to acquire facilitation skill through practical exercises

[Requirements]

Nothing in particular

[Evaluation]

End-of-term examination: 100%

[Textbooks]

Textbook is not designated.

[References]

Nothing special.

[Schedule]

1. Natural disasters in Yamanashi (earthquake)
2. Natural disasters in Yamanashi (windstorm and flood)
3. Earthquake disaster
4. Windstorm and flood disaster
5. Sediment disaster
6. Volcanic disaster
7. Disaster information and management
8. Crisis management and BCP
9. Meteorological information
10. Regional Disaster Management
11. Exercise (1)
12. Exercise (2)
13. Exercise (3)
14. Exercise (4)
15. Summary and final examination

[Title]			[Instructor]		
Advanced Water Quality Management Engineering			Kimiaki Hirayama		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
324170	2	Civil and Environmental Engineering River Basin Environmental Science	1st Semester	Mon.／III	Japanese

[Outline and purpose]

Concentration in water changes due to mass transfer with many factors. Pollutants coming into a river through a branch diffuse in a lateral direction and undergo cleaning processes. With an idea of transport phenomena whole image of this kind of phenomena can be properly understood. The idea of transport phenomena is presented and application of the idea to water quality issues is learned.

[Objectives]

To understand the idea of flux and apply it to build balance equations.
To explain difference in transport mechanisms between in laminar and turbulent flow.
To evaluate mass transport coefficients in rivers

[Requirements]

Interests in rivers and knowledge of differentiation are preferred.

[Evaluation]

Daily efforts (20%), Reports (80%)

[Textbooks]

No textbook is specified.
Handouts necessary for the class are distributed.

[References]

Nothing special.

[Schedule]

1. Introduction
2. Definition of flux
3. Mass, momentum and energy; quantity and quality index
4&5. Velocity induced flux
6&7. Gradient induced flux
8&9. Balance equation
10&11. Flux in turbulent flow
12. Diffusion and dispersion
13&14 Mass flux coefficients in rivers
15. Review and summary

[Title]			[Instructor]		
Advanced Sanitary Engineering			Hidehiro Kaneko		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
324160	2	Civil and Environmental Engineering River Basin Environmental Science	1st Semester	Wed.／I	Japanese

[Outline and purpose]

Sanitary engineering includes water supply, sewerage system and waste management. These are essential for the healthy and comfortable society and their proper management is important. The purpose of this course is to learn basic knowledge about waste management and consider about proper waste management in present society.

[Objectives]

1. To understand the history and future direction of waste management.
2. To learn basic knowledge concerning legal system for waste management.
3. To learn basic knowledge concerning technology applied for waste management
4. To understand the method to evaluate waste quality.

[Requirements]

Nothing

[Evaluation]

Presentation 40%
Final Examination 40%
Discussion 20%

[Textbooks]

新版・ごみ読本，廃棄物学会編，中央法規出版（in Japanese）

[References]

Many books concerning waste management have been published Please find and read suitable ones as you desire.

[Schedule]

1. History of Waste Management
2. What are the Waste Management Problems?
3. Law for Waste Management (1): Structure of Legal System, Public Cleansing Law
4. Law for Waste Management (2): Laws for Recycling(1)
5. Law for Waste Management (2): Laws for Recycling(2)
6. Waste Management Technology (1): Collection and Transportation
7. Waste Management Technology (2): Outline of Incineration
8. Waste Management Technology (3): Environmental Protection and Energy Recovery at Incineration
9. Waste Management Technology (4): Vitrification
10. Waste Management Technology (5): Resource recovery
11. Waste Management Technology (6): Landfill
12. Waste Quality Analysis
13. What is Risk Communication?
14. Group Discussion about the Topic of the Day.
15. Examination and Summary

[Title]			[Instructor]		
Advanced Environmental Biology			Tadashi Toyama		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
324210	2	Civil and Environmental Engineering River Basin Environmental Science	2nd Semester	Thu.／IV	Japanese

[Outline and purpose]

In this lecture, I will explain the basics of (1) environmental evaluation by using biotic reactions and functions, (2) solutions to environmental problems by using biotic reactions and functions, (3) production and recycle of energy or products by using biotic reactions and functions. Also, we will discuss the building of a sustainable and recycling social system with bio-environmental engineering.

[Objectives]

1. Understanding the environmental evaluation by using biotic reactions and functions
2. Understanding the solutions to environmental problems by using biotic reactions and functions
3. Understanding the production and recycle of energy or products by using biotic reactions and functions
4. Designing a sustainable and recycling social system with bio-environmental engineering

[Requirements]

It is preferable to have knowledge of biology.

[Evaluation]

Intermediate examination (40%)
Final examination (40%)
Report (20%)

[Textbooks]

I will prepare textbooks.

[References]

[Schedule]

First half
1. The basic knowledge of biotic reactions and functions
2. Environmental evaluation by using biotic reactions and functions
3-5. Water treatment and remediation technologies by using biotic reactions and functions
6-8. Production and recycle of energy or products by using biotic reactions and functions
9-11. Green-sustainable chemistry by using biotic reactions and functions
12. Application and environmental risk of genetic recombination technology
13. A sustainable and recycling social system with bio-environmental engineering
14. Actual experience of an advanced bio-environmental technology
15. Overview

[Title]			[Instructor]		
Advanced Water Treatment Engineering			Kazuhiro Mori		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
324220	2	Civil and Environmental Engineering, River Basin Environmental Science	2nd Semester	Wed.／III	Japanese

[Outline and purpose]

In this course wastewater treatment and remediation of polluted environment using biological reaction is developed. Presentation about water treatment and exercise using personal computer is included.

[Objectives]

1. To obtain the knowledge of environmental bioprocess.
2. To obtain the knowledge of biological wastewater treatment.

[Requirements]

Basic knowledge about environmental biology and ecology is required.

[Evaluation]

Presentation (90%), Exercise (10%)

[Textbooks]

1.バイオ環境工学, シーエムシー出版, ISBN:4882318768

[References]

Nothing special.

[Schedule]

1. Pollutants in water environment
2. Natural purification and its promotion
3. Biological wastewater treatment
   1) Activated sludge process
   2) Acclimation and bio-augmentation
   3) Application of special microorganisms
   4) Nutrient removal in biological advanced treatment
4. Bioremediation
   1) Mechanism and target pollutants of bioremediation
   2) Bioremediation of organic pollutants
   3) Bioremediation of metallic pollutants
5. Phytoremediation
   1) Mechanism and target pollutants of phytoremediation
   2) Water purification by phytoremediation
   3) Phytoremediation of metallic and organic pollutants
6. Bioassay and bio-monitoring
7. Dynamics of environmental bioprocesses
   1) Modeling of environmental bioprocess
   2) Simulation of environmental bioprocess

[Title]			[Instructor]		
Advanced Agri-Environmental Systems			Junko Shindo		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329465	2	River Basin Environmental Science	2nd Semester	Mon.／III	Japanese

[Outline and purpose]

Historical changes, current status and countermeasures of environmental effects caused by food and biomass production are outlined. Data analysis method such as material balance model and basics of ecological risk analysis are learned.

[Objectives]

1. to understand the environmental effects due to agricultural practice and counter measures.
2. to learn skills of data analysis to estimate the state of environmental.

[Requirements]

Basics of environmental science, ecology, water quality and statistical analysis.

[Evaluation]

homework：20%
midterm examination：40%
final examination：40%

[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]

A. 1st – 2nd week: Changes in food and biomass production and the environment
- Statistical data related to food and biomass production in the world
- Material budget mode

B. 3rd to 6th week: Environmental pollution caused by agriculture and countermeasures
- Fertilizer application and agriculture production, Fertilizer use efficiency
- Environmental load from expanding livestock farming and implementation of drainage regulation
- Water pollution caused by agriculture .Initiatives in EU,OECD

C. 7th – 9th: Effect of nitrogen deposition to natural ecosystems
- Ammonia volatilization and deposition
- Nitrogen saturation hypothesis

D. 10th – 12th week: GHG emission from farmland soil and mitigation
- Mechanisms of GHG production and emission in soil
-Development and evaluation of mitigation methods

E. 13th – 15th week:.Ecological risks of agricultural chemicals
- Ecological effects of pesticides
- Concept of risk, - Risk assessment methods of pesticides to aquatic organisms

[Title]			[Instructor]		
Environmental Technology and International Cooperation			Futaba Kazama / Kei Nishida /Hiroshi Ishidaira		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329495	2	River Basin Environmental Science	1st Semester	Fri.／II	Japanese/ English

[Outline and purpose]

The aims of the lecture are to learn experiences and knowledge for solving water problems including history of river basin management and solution technique for water problems and to discuss perspectives and methodology required for international cooperation.

[Objectives]

1. To form broad views on river basin environment
2. To gain perspectives on river basin management over different countries and/or local governments
3. To develop an ability to discuss solutions for water problems based on both local and global points of view

[Requirements]

Basic knowledge on hydrology, water resources engineering and environmental science. Preparation and brush-up are crucial to better understand contents of the lecture.

[Evaluation]

Quiz and assignments: 50%
Behavior in class: 25%
Presentations: 25%

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

1. Introduction
2. History of river basin management
3. Current status of water problems
4. Countermeasures against water problems
5. Perspectives required for international cooperation
6. Methodology required for international cooperation

[Title]			[Instructor]		
Internship			Each academic supervisor		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329510	2	River Basin Environmental Science	Intensive	／	Japanese

[Outline and purpose]

Purpose of internship is to understand knowledge that was studied at graduate course through guidance of technique at government office, public corporation and private company and so on. There are two types: teacher introduces training office for joint research to student (former type) and student select the training office by searching subject proposed by office (new type)

[Objectives]

1. to carry out training for more than 2 weeks as standard according to guidance of training office
2. to confirm how knowledge that was studied as expert education is utilized for real world
3. to exalt the study motivation of expert education and make use of design of career after completion of graduate course

[Requirements]

Basic knowledge as expert, common sense as businessman, consciousness for attending training

[Evaluation]

Term and attitude at training office, evaluation by training office, report and presentation : 100%

[Textbooks]

Nothing

[References]

Nothing

[Schedule]

1. Application and procedure

There are two types: teacher introduces training office for joint research to student (former type) and student selects the training office by searching subject proposed by office (new type)

(1)Former type: student offers the training office and term to teacher that was designated at each graduate course under guidance of major academic supervisor. Teacher mediates a training office and has a procedure under cooperation of academic supervisor (academic supervisor introduces and mediates training office to student).

(2)New type: student that wants to apply new type gets the information from guidance and home-page of career center and selects the training office by consulting with academic supervisor and applies to education section (professor in charge of curricular and educational affairs).

2.Training

Student has a training according to guidance of training office

3.Making a report and presentation

Detailed contents will be introduced at guidance of university.

[Title]			[Instructor]		
Practice in River Basin Environment IA			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329611	1	River Basin Environmental Science	1st Semester	Mon.／V	Japanese

[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]		
Practice in River Basin Environment IB			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329612	1	River Basin Environmental Science	2nd Semester	Mon.／V	Japanese

[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]		
Practice in River Basin Environment IIA			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329621	1	River Basin Environmental Science	1st Semester	Wed.／V	Japanese

[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]		
Practice in River Basin Environment IIB			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329622	1	River Basin Environmental Science	2nd Semester	Wed.／V	Japanese

[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 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.

[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]		
Researches in River Basin Environment IA			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329631	2	River Basin Environmental Science	1st Semester	／	Japanese

[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]		
Researches in River Basin Environment IB			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329632	2	River Basin Environmental Science	2nd Semester	／	Japanese

[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]

Researches in River Basin Environment IIA			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329641	3	River Basin Environmental Science	1st Semester	／	Japanese

[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]

Researches in River Basin Environment IIB			All teachers		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
329642	3	River Basin Environmental Science	2nd Semester	／	Japanese

[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