[Title]			[Instructor]		
Remote Sensing and GIS I			Keiichi Masutani / Hiroshi Ishidaira / Jun Magome		
[Code]	[Credits]	[Program]	[Semester]	[Hours]	[Language of instruction]
GTR503	1	Civil and Environmental Engineering Special Educational Program on River Basin Environmental Science	2nd Semester	Fri.／I	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.

[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: 20%
2. Attendance and Attitude: 50%
3. Summary report: 30%

[Textbooks]

Using original documents.

[References]

[Schedule]

1. Introduction
2. Basic concept of remote sensing
3. Basic theory of remote sensing
4. Exercise (1): handling of satellite images
5. Correction of satellite images
6. Exercise (2): geometric correction
7. Remote sensing for land
8. Exercise (3): normalized difference vegetation index (NDVI) and land-cover classification
9. Basic concept of GIS
10. Structure and preparation of GIS data
11. Exercise (4): visualization of GIS data
12. Spatial information analysis method
13. Exercise (5): spatial analyses with GIS
14. Exercise (6): spatial analyses with GIS
15. Summary

[Title]			[Instructor]		
Advanced Hydraulics and Hydrology I			Yasushi Sakamoto / Keiichi Masutani / Hiroshi Ishidaira / Yutaka Ichikawa		
[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.／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]

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]		
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]

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.

[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