

Academic Year (April - March of the next year)	2025
Course Number	DMP5001E
Course Name	Master Thesis Seminar
Instructor	KITA Saeko, ITO Mai, FUJII Yushiro／北 佐枝子, 伊藤 麻衣, 藤井 雄士郎
Email Address	
Term／Day／Period	Fall through Summer 秋－夏
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

In this course, students tackle specific research subjects applying knowledge, analysis techniques, etc. acquired in this course and all other lectures. Students will meet regularly with course advisors to formulate and discuss their research topics, and the advisors will determine the supervisors based on the students' research interests. All students are requested to make a research proposal and to write a research report and its synopsis. They are also requested to make presentations in the interim presentation meetings to manage their research progress and evaluate the research achievements.

[Course Goals]

Students can:

- (1) understand more advanced and practical knowledge and skills in corresponding the specific course of Seismology, Earthquake engineering, or Tsunami Disaster Mitigation, and
- (2) determine the individual study topics and prepare the research reports, and
- (3) improve their professional skills and complete the research reports aimed at solving problems in their own countries.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them.

2. Course Outline :

[Seismology]

- (1)-(3) Tsunami and Earthquake
- (4)-(6) Earthquake Geology
- (7)-(9) Lessons from the Great East Japan Earthquake of March 11, 2011/Education of Tsunami Disaster Reduction and International Tsunami Warning System
- (10)-(10) Seismicity analysis using machine learning
- (11)-(13) Ground motion prediction using machine learning/Machine Learning and Tsunami Simulation Synergy for Disaster Management

(14)-(16) Observation Visit (Liquefaction Prevention District, Chiba-city)
(17)-(19) Surface Waves
(20)-(22) Scattering and Attenuation
(23)-(31) Earthquake Source Process
(32)-(34) Presentation of interim results

[Earthquake Engineering]

(1)-(3) Finite Element Method II
(4)-(9) Structural Response Analysis
(10)-(12) Dynamic Soil Structure Interaction
(13)-(24) RC Structures II, III, IV
(25)-(30) Masonry Structures I, II
(31)-(33) Presentation of interim results

[Tsunami Disaster Mitigation]

(1)-(3) Tsunami and Earthquake
(4)-(6) Tsunami Magnitude and Catalogue
(7)-(15) Tsunami Simulation
(16)-(19) Lessons from the Great East Japan Earthquake of March 11, 2011/Introduction of Tsunami Disaster Mitigation
(20)-(22) Tsunami Damage Survey
(23)-(25) Earthquake Geology
(26)-(28) Earthquake Monitoring Observation
(29) Seismicity analysis using machine learning
(30)-(32) Ground motion prediction using machine learning/Machine Learning and Tsunami Simulation Synergy for Disaster Management
(33)-(35) Presentation of interim results

[Works for Master Report]: common for all courses above

Execution of research under your supervisor (analysis, experiment, field survey, observation, etc.)

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Also, be sure to have an overview of the lectures related to the research topics that students will learn in advance. After the lectures, they review the contents and submit the assigned reports by the due date. Students can deeply learn about the individual research themes by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Performance and attitude in every practical class (10%), presentation (50%), report (10%) and discussion (30%) in the interim preparation of individual study will be evaluated: 100%

[Grading Criteria]

Below are examples of grading criteria. Please set the criteria that meet your course / course goals.

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

OR

Pass: Achieved the goal

Fail: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Lecture notes and necessary materials are provided.

The supervisors will indicate the literatures the students should survey concerning the research subjects.

4-2:Others

N/A

5. Software Used in Lectures :

FORTRAN, Python, Cygwin, Generic Mapping Tools (GMT), QGIS, R

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

The template for the report will be provided. Students have to make the report following it.

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2000E
Course Name	Disaster Management Policies A: from Regional and Infrastructure Aspect
Instructor	CHIBANA Takeyoshi／知花 武佳
Email Address	
Term／Day／Period	Fall 秋
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

This course deals with the various aspects of disaster management policies from the viewpoint of infrastructure development. It emphasizes understanding the mechanism of natural disasters and measures against it. The course consists of four parts:

- I) Introductory lecture to overlook disaster management policies
 - II) Lectures in specialized fields on practical measures against natural disasters
 - III) Site-visiting in central Tokyo
 - IV) Presentations by students and overall discussions
- The 3rd and 4th are jointly managed with DMP(B).

[Course Goals]

Students can gain a broad understanding of key disaster management concepts, including policies and institutions, technical measures, and characteristics of natural dynamics, and will also be able to articulate these concepts.

Disaster Management Policy Program (DMP)

Seismology, Earthquake Engineering and Tsunami Disaster Mitigation Course

DP.2 Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies

DP.3 Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

DP.4 Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

DP5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

Water-related Disaster Management Course

DP2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies

DP3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

DP4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

DP5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

[Topics]

I . Introduction

1. Characteristics of Natural Disasters

II . Disaster Management in Individual Fields (by various experts)

2. Heavy Rain, Snow and Other Disasters in Road Systems, etc.

3. Flood Management in Japan 1

4. Flood Management in Japan 2

5. Japanese Railway and Natural Disaster ~Cases and Countermeasures~

6. Japanese Railway and Natural Disaster ~History and Mechanisms of Damage~

7. Coastal Disaster Management

8. Flood Disaster and Poverty

III. Site-Based Study in Tokyo Metropolitan District

9. Site-Based Study 1) (Together with DMP(B))

10. Site-Based Study 2) (Together with DMP(B))

11. Site-Based Study 3) (Together with DMP(B))

IV. Presentations and Discussion

12. Esquisse (Presentation Workshop) (Together with DMP(B))

13. Presentation and Discussion 1) (Together with DMP(B))

14. Presentation and Discussion 2) (Together with DMP(B))

15. Presentation and Discussion 3) (Together with DMP(B))

[Out-of-class Learning]

Students are expected to read the materials provided in advance and familiarize themselves with the lecture content prior to attending class.

3 . Grading :

Final Group Presentation and Contribution to Discussion (70%)

Final Report (30%)

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4 . Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Necessary materials will be provided by instructors.

4-2:Others

None

5 . Software Used in Lectures :

None

6 . Auditing ; Allow or Not Allow :

Allow

7 . Note :

None

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2010E
Course Name	Disaster Management Policies B: from Urban and Community Aspect
Instructor	TAMURA Hideyuki／田村 英之
Email Address	
Term／Day／Period	Fall 秋
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

This course aims to deepen understanding of disaster risk management with a particular focus on the implementation of concrete policy actions related to urban, housing, and community aspects. It aims to equip master's students with the skills necessary to apply sophisticated, context-specific strategies that address social, economic, and environmental conditions in various countries. The course will critically analyze:

- Detailed implementation strategies of disaster management policies
- In-depth case studies of significant global disasters
- Urban Disaster risk management approaches in Japan
- Evaluation of policies and regulations to secure building safety

[Related Diploma Policy]

Disaster Management Policy Program (DMP)

Seismology, Earthquake Engineering and Tsunami Disaster Mitigation Course

DP.2 Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies

DP.3 Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

DP.4 Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

DP5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

Water-related Disaster Management Course

DP2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies

DP3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

DP4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

DP5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

[Course Goals]

Students will gain an in-depth understanding of key disaster management concepts, including the use of tools for data management and analysis, policy development, and risk communication, and will also be able to articulate these concepts.

2. Course Outline :

1. Disasters in the World, Basics of Disaster Risk Management
2. Lessons from 2011 Tohoku and 1995 Kobe ,Basics of Disaster Risk Management, Development of disaster risk management
3. Urban disaster risk management policy, Building / housing policy and disaster management
4. Special Lecture "Augmented Reality disaster management training"
5. Special Lecture "Weather and Disasters"
6. Special Lecture "Build back better"
7. Special Lecture "Sediment-related Disasters"
8. Special Lecture "OpenStreetMap"
9. Esquisse (Presentation Workshop) (Together with DMP(A))
10. Presentation and Discussion 1) (Together with DMP(A))
11. Presentation and Discussion 2) (Together with DMP(A))
12. Presentation and Discussion 3) (Together with DMP(A))
13. Site-Based Study 1) (Together with DMP(A))
14. Site-Based Study 2) (Together with DMP(A))
15. Site-Based Study 3) (Together with DMP(A))

[Out-of-class learning]

Students are expected to read the materials provided in advance and familiarize themselves with the lecture content prior to attending class.

3. Grading :

Final Presentation(70%) and Contribution to Discussion(30%)

[Evaluation Criteria]

Student's achievement of the Course Goals is:

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Necessary materials will be provided by instructors.

5. Software Used in Lectures :

None

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

None

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3201E
Course Name	Earthquake Phenomenology
Instructor	KITA Saeko／北 佐枝子
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn the techniques and methods necessary as determinations of earthquake parameters and understanding earthquake phenomena. Practical training of determinations of hypocenter and magnitude, and earthquake observations are included. Students are expected to acquire the techniques and methods for earthquake observation, identification of seismic phases, analyses of local earthquakes, magnitude calculation, seismicity and earthquake early warning systems through lectures and practical trainings.

[Course Goals]

Students can:

- (1) understand outlines, techniques and methods necessary for earthquake observation and obtaining earthquake parameters.
- (2) acquire knowledge of earthquake observation, determinations of hypocenter and magnitude, and earthquake early warning systems and warning dissemination.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

- (1-6) Earthquake Observation I
- (7-9) Earthquake Observation II
- (10-15) Local Earthquake Analysis I
- (16-18) Local Earthquake Analysis II
- (19-24) Teleseismic Phases and Magnitudes
- (25-27) Earthquake Early Warning I
- (28-30) Earthquake Early Warning II
- (31-36) Crustal Deformation

[Out-of-class Learning]

After the lecture, review the content and submit the assigned report by the due date. Students can learn about earthquake phenomenology by reviewing lecture notes and related research papers, and prepare

themselves in relation to their own research objectives.

3. Grading :

Class discussions (30%) and reports on practices (70%) will be evaluated.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3211E
Course Name	Characteristics of Earthquake Disasters
Instructor	HARA Tatsuhiko／原 辰彦
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn knowledge of theories essential for seismological data processing, earthquake monitoring, real-time source parameter determination, broadband moment magnitude, and understand effects of surface geology on seismic motion. Underground shear wave velocity structures give large influences on seismic wave propagation and amplification, and dynamic behavior of soft sedimentary layers near the earth's surface. Students also learn about seismic tomography.

[Course Goals]

Students can:

- acquire knowledge of theories essential for seismological data processing
- acquire knowledge of earthquake monitoring and real-time determination of source parameter,
- acquire knowledge of broadband moment magnitude
- understand the effects of surface geology on seismic motion and
- acquire knowledge of seismic tomography

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-12) Data Processing

- Least squares method (Introduction to inverse problem, Straight line fitting, General linear least squares, Linear inversion under constraints, Iterative procedure to solve non-linear problem)
- Processing of discrete time series (Linear system, Discrete Fourier transform (DFT), Fast Fourier transform (FFT), Digital filters)

(13-18) Effect of Surface Geology on Seismic Motion

- Site effects in seismic design
- Site effects and seismic bedrock
- Calculation of 1D site effects
- 2/3D site effects
- Site effects in strong motion records
- Application of microtremors in estimation of site effects

- Microtremor array exploration for subsurface S-wave velocity
- Inversion of subsurface S-wave velocity from earthquake records
- (19-23) Determination of Broadband Moment Magnitude
- Basic concept of broadband moment magnitude (M_{wp})
- Procedure of determination of M_{wp}
- Practices to determine M_{wp}
- Various magnitude scales (e.g., mb, M_s , M_w , M_m , M_{ww} , M_{wpd})
- (24-26) Seismic Tomography
- Introduction
- Principle of seismic tomography
- Basic theory:
- Classification of seismic tomography
- Applications: Subduction-zone dynamics
- (27-29) Study Tour of Earthquake Monitoring
- (30-32) Real Time Determination of Source Parameter
- Real time Monitoring
- Necessary Condition for Processing System
- Earthquake Detection
- Automatic Phase Picking
- Hypocenter Determination
- Magnitude Determination
- Earthquake Early Warning

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the covered subjects by searching lecture notes and related research papers, and prepare themselves to have courses related to earthquake hazard assessment.

3. Grading :

Report assignments (60%) and examinations (40%) will be evaluated.

One report assignment will be given after the sixth class of Data Processing. One examination will be held after the last class of Data Processing. One report assignment will be given after the last class of Determination of Broadband Moment Magnitude.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

Python, Fortran, Cygwin, SAC (Seismic Analysis Code), MS-Excel

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3240E
Course Name	Earthquake Hazard Assessment A
Instructor	NAKAGAWA Hiroto／中川 博人
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students understand fundamental ideas on earthquake hazard evaluation for specific locations when earthquakes and soil conditions are given. The students are expected to acquire knowledge of relevant topics such as geotechnical site investigation, strong earthquake motion observation, simulation of seismic ground motion, and seismic micro zonation. The students also learn about recent studies on strong earthquake ground motions and seismic hazard analysis to mitigate future earthquake disasters.

[Course Goals]

Students can:

- (1) understand fundamental ideas on earthquake hazard evaluation for specific locations
- (2) acquire knowledge of geotechnical site investigation, soil dynamics, and strong earthquake motion observation
- (3) learn about recent studies on strong earthquake ground motions and seismic hazard analysis to mitigate future earthquake disasters.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-3) Soil Test and Survey

- Basic Properties of Soil
- Planning for Geotechnical Investigation
- Geophysical prospecting
- Drilling and Sampling
- Sounding

(4-9) Strong Earthquake Motion Observation

- History of strong motion observation
- Current situation
- Strong motion network of Building Research Institute
- Application of strong motion data

(10-12) Simulation of Seismic Ground Motion

- Review of Seismic Provisions in the Building Standard Law of Japan
- How to define and generate the design earthquake ground motions for buildings in Japan

(13-18) Seismic Micro Zonation

- Understanding nonlinearity of the site amplification
- Practice of 1D equivalent linear response analysis
- Understanding nonlinear stress-strain relation model
- Remote Sensing Technology

(19-24) Strong Ground Motion Study I

- Ground motion prediction equation
- Probabilistic seismic hazard analysis
- Hand calculation of seismic hazard curve
- Seismic hazard map

(25-30) Strong Ground Motion Study II

- Recent studies on strong ground motions
- Empirical Green's function method
- Recipe for predicting strong ground motion

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about earthquake hazard assessments by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Reports on practices (100%) will be evaluated. The reports will be assigned after the lectures of Strong Ground Motion Studies I and II.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Academic Year (April - March of the next year)	2025
Course Number	DMP3401E
Course Name	Structural Analysis
Instructor	OTSUKA Yuri／大塚 悠里
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed to teach students the fundamental concepts and principles of structural analysis, such as displacement and stress methods using matrix formulation. In the first part, students are expected to acquire knowledge of the basic concepts of the finite element method, focusing on solving static linear problems using isoperimetric element models. In the second part, students are expected to acquire knowledge of the member models and basic concepts of the direct stiffness method for the non-linear frame analyses of buildings. In the third part, students learn to evaluate the seismic responses of buildings following the instructions of computer programs. In the fourth part, students learn the basis for understanding the dynamic behaviors of soils and foundations.

[Course Goals]

Students can:

- (1) understand the outlines and significance of structural analysis, mainly focusing on building structures,
- (2) acquire knowledge of seismic evaluation and elasto-plastic analysis techniques of buildings,
- (3) comprehend how to evaluate the seismic response of buildings using computer software,
- (4) acquire basic knowledge to understand the dynamic behaviors of soils and foundations.

[Related Diploma Policy (DP)]

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-14) Structural Analysis

- Fundamental concepts and principles of structural analysis
- Displacement method by matrix formulation
- Force method by matrix formulation
- Exercise for the displacement method and the force method

(15-23) Finite Element Method I

- Elasto-plastic analysis of structure
- Exercises for elasto-plastic analysis of structure
- Basic concept of the finite element method
- Exercises using computer software for static linear problems
- Nonlinear member models for frame analysis of buildings

- Evaluation of earthquake responses of buildings
- (24-30) Soil Mechanics
- Basic characteristics of soils
 - State of stress and strains in soils
 - Fluid Flow in Soil
 - Consolidation theory
 - Shear strength of soil
 - Stability problems in geotechnical engineering

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about structural analysis by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Examination results (50%) after the end of the structural analysis (14th class) and the exercise reports required after every 3rd class (50%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3440E
Course Name	Earthquake Risk Assessment
Instructor	AZUHATA Tatsuya／小豆畑 達哉
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn fundamental theories and concrete technologies to mitigate seismic disasters due to the collapse of buildings. In the first part, students are expected to acquire knowledge of structural reliability, seismic evaluation methods for existing buildings and various techniques for retrofitting vulnerable ones. Those are countermeasures that should be done before an earthquake. In the second part, students are expected to acquire knowledge of quick inspection and damage classification methods for damaged buildings and various techniques for repairing them. Those are countermeasures that should be taken after an earthquake. The quick inspection lectured in this course also covers the structural health monitoring based on the system identification theory.

[Course Goals]

Students can:

- (1) understand the outlines and significance of earthquake risk assessment, mainly focusing on building structures,
- (2) acquire knowledge of seismic evaluation and retrofit techniques of existing buildings and
- (3) quick inspection and damage classification of damaged buildings and repair techniques for them.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-6) Structural reliability

- Basics of reliability and statistics
- Reliability-based limit state design

(7-24) Seismic evaluation methods and Seismic retrofits of existing buildings

- Evaluation concepts and methods
- Rehabilitation strategy
- Case studies

(25-27) Quick inspection, damage classification, and repairing of damaged buildings

- Outline and role of quick inspection
- Outline and role of damage evaluation
- Rehabilitation Technique Examples

(28-30) System identification

- Theory and methods of system identification
- Identification of structural characteristics of buildings

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report and materials for the presentation by the due date. At the presentation, everyone will be asked to present their ideas on seismic evaluation and retrofits of existing buildings. Students can learn about earthquake risk assessments by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Students will be evaluated based on their presentations and presentation materials at the presentation session held after the first part, (1-6) and (7-24), has been completed (70%). And the report will be assigned and evaluated after the second part has been completed, (25-27) and (28-30), (30%).

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3601E
Course Name	Theory of Tsunami
Instructor	FUJII Yushiro／藤井 雄士郎
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn basic theories of tsunami and acquire the techniques needed for tsunami simulation which are essential to forecast tsunami heights or to prepare a tsunami hazard map around a coastal region. In the first part, students are expected to acquire the knowledge of data processing, theoretical topics of fluid mechanics for tsunami, tsunami source, tsunami generation and propagation. In the second part, students are expected to acquire the skills to estimate tsunami source and calculate the tsunami propagation through hands-on practices by using Unix emulator on Windows PC or Linux WS.

[Course Goals]

Students can:

- (1) understand outlines, knowledge and methods necessary for tsunami theory,
- (2) acquire knowledge of data processing, fluid mechanics, and hydrodynamics and
- (3) techniques, principles and methods for estimating tsunami source, simulating tsunami generation and propagation.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1)-(12) Data Processing

- Least squares method

Introduction to inverse problem, Straight line fitting, General linear least squares, Linear inversion under constraints, Iterative procedure to solve non-linear problem

- Processing of discrete time series

Linear system, Discrete Fourier transform (DFT), Fast Fourier transform (FFT), Digital filters

(13)-(27) Hydrodynamics for Tsunami

- Basic Equations of Hydrodynamics
- Influence the rotation of the Earth
- Small Amplitude Wave Theory
- Energy Transport and Group Velocity of Waves
- Linear Long Wave

- Eigenvalue Oscillation in a Bay
- Generation of Tsunami
- Tsunami approaching a coast
- Edge waves
- Non-Linear Wave Theory
- KdV Equation and the theory of Solitons
- Tsunamis ascending in a river

(28)-(32) Tsunami Source

- Tsunami Travel Time (TTT) with Generic Mapping Tools (GMT)

Arrival times of observed tsunami waveforms, Data processing for bathymetry data, How to use of the TTT software, Visualization of refraction diagram for tsunami, Estimation of tsunami source

(33)-(35) Geology for Tsunami

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Also, be sure to have an overview of the data processing, hydrodynamics that you will learn in advance. After the lecture, review the content and submit the assigned report by the due date. Students can learn about tsunami theory by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Class discussions in every practical class (20%), reports on practices after the last class of Hydrodynamics for Tsunami (60%), and performance in the examinations after the last class of Data Processing (20%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and necessary materials are provided.

5. Software Used in Lectures :

FORTRAN, Python, Cygwin, Tsunami Travel Time (TTT) Software Package, Generic Mapping Tools (GMT), MS-Excel

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Academic Year (April - March of the next year)	2025
Course Number	DMP3610E
Course Name	Tsunami Hazard Assessment
Instructor	SHIBAZAKI Bunichiro／芝崎 文一郎
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

To manage tsunami risk and administer tsunami disaster prevention, it is essential for students to prepare a tsunami hazard map that identifies the areas that are likely to flood and sustain damage under different tsunami scenarios.

The objective of this course is to study the knowledge and the techniques necessary for assessing the hazards of a tsunami by numerical simulations of tsunami propagation and inundation, preparing a tsunami hazard map, planning for evacuation, and educating the residents about disaster prevention in case of a tsunami.

[Course Goals]

Students can:

- (1) acquire knowledge of tsunami propagation and inundation and skills for their numerical simulations
- (2) acquire the knowledge of tsunami hazard map and evacuation planning
- (3) understand the method of Tsunami Damage Survey
- (4) acquire knowledge of tsunami education

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1)-(3) Tsunami Hazard Assessment —Theory of Tsunami Propagation and Inundation Simulation

- Shallow water theory
- Tsunami propagation model and finite difference method
- Numerical model of tsunami (TUNAMI-N1, Linear model)
- Numerical model of tsunami (TUNAMI-N2, Non-linear model)
- Practice to run the model

(4)-(9) Numerical Simulation of Tsunami Inundation and Its Application

- Theory of the long-wave model
- Finite difference method for the long-wave model
- Simulation exercises for tsunami propagation and inundation

(10)-(14) Tsunami Hazard Map and Evacuation Planning

- Tsunami Hazard Mapping

Academic Year (April - March of the next year)	2025
Course Number	DMP3221E
Course Name	Earthquake Circumstance
Instructor	SHIBAZAKI Bunichiro／芝崎 文一郎
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students understand earthquake circumstances, such as earthquake mechanisms and generation processes of earthquakes. First, basic lectures on practical mathematics for seismology are given. Then, lectures and practices on earthquake focal mechanisms and moment tensors are given to help understand earthquake circumstances. Finally, the current research of earthquake generation and forecasting is introduced to understand earthquake circumstances.

[Course Goals]

Students can:

- (1) acquire knowledge of theories essential for mathematics for seismology
- (2) acquire knowledge of fundamental theories of earthquake focal mechanisms and moment tensors and
- (3) understand earthquake generation and forecasting

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-16) Mathematics for Seismology

- Ordinary Differential Equations
- Fourier Series, Fourier Transform
- Wave Equations
- Matrix Algebra, Eigenvalue Problem, Diagonalization
- Vector Analysis

(17-24) Earthquake generation and forecasting I, II

- Earthquake kinematics and dynamics
- Stress drop estimation
- Earthquake preparation process
- Earthquake cycles and long-term forecasting
- Earthquake cycles and long-term forecasting
- Intermediate-term prediction

(25-30) Earthquake Focal Mechanism

- Terms and parameters of seismic fault
- Radiation Pattern
- Focal mechanism diagram
- Determination of focal mechanism by P-wave first motion method

(31-36) Analysis of Moment Tensors

- Forward modeling and inversion
- Double couple model
- Moment tensor
- Theory of moment tensor inversion
- Practice in moment tensor inversion

(37-45) Earthquakes and Plate Tectonics

- History of plate tectonics
- Modern concept of plate tectonics
- Plate boundaries
- Plate kinematics * including practices of plate motion calculation
- Plate models
- Applications to earthquakes and tectonics

Examination/report

Class discussions in every practical class (20%), performance in examinations after the last class of Mathematics for Seismology

(40%), and reports on practices after the last class of Earthquake Focal Mechanism (20%) and Analysis of Moment Tensors (20%) will be evaluated.

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the covered subjects by reviewing lecture notes and related research papers and preparing themselves for courses related to earthquake circumstances.

3. Grading :

Class discussions in every practical class (20%), performance in examinations after the last class of Mathematics for Seismology (40%), and reports on practices after the last class of Earthquake Focal Mechanism (20%) and Analysis of Moment Tensors (20%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

FORTRAN, Python, Cygwin, Generic Mapping Tools (GMT), MS-Excel

6 . Auditing ; Allow or Not Allow :

Not Allow

7 . Note :

Back

- Tsunami Evacuation Planning
- Tsunami Evacuation Simulation
- Case studies and Workshop
- (15)-(17) Seismic Micro-Zonation (Remote Sensing Technology)
 - Geomorphologic Classification
 - Amplification Capability Estimation from Geomorphologic Units
 - Remote Sensing Technology and Damage Estimation
 - Interferometric SAR (InSAR) Technology for DEM Generation
- (18)-(23) Tsunami Hazard Assessment - Tsunami Disaster Prevention Administration
- (24)-(25) Tsunami Disaster Mitigation Policy and Risk Management in Japan
- (26)-(31) Study Trip to Kansai
 - Disaster Reduction and Human Renovation Institution in Kobe
 - Tsunami Educational Center in Hirogawa town.
 - Observation of Hiromura Bank
- (32)-(34) Scenario Earthquakes
- (35)-(36) Education of Tsunami Disaster Reduction and International Tsunami Warning System

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the covered subjects by searching lecture notes and related research papers, and prepare themselves to have courses related to tsunami hazard assessment.

3. Grading :

Class discussions and performance in reports during or after the class of "Tsunami Hazard Assessment—Theory of Tsunami Propagation and Inundation Simulation"(25%), "Numerical Simulation of Tsunami Inundation and Its Application" (25%), "Tsunami Hazard Map and Evacuation Planning" (25%), and "Study Trip to Kansai" (25%), will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

FORTRAN, Python, Cygwin, Generic Mapping Tools (GMT), MS-Excel
Numerical model of tsunami (TUNAMI-N1, N2)

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Academic Year (April - March of the next year)	2025
Course Number	DMP3231E
Course Name	Information Technology Related with Earthquakes and Disasters
Instructor	ITO Eri／伊藤 恵理
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn the basics of information technology related to earthquakes and disasters and acquire the ability to utilize them through a series of lectures and practices. First, students will understand important Unix/Linux commands and obtain basic knowledge of shell scripting. Students also learn major computer languages in seismological research (Fortran90 and Python), mapping tool (Generic Mapping Tools; GMT), and basic theories of seismic waves.

[Course Goals]

Students can:

- understand the features and uses of Linux and operate Linux by using commands.
- understand the structure of shell scripts.
- create maps and scientific figures using GMT.
- write computer programs for simple numerical calculations.
- understand basic theories of seismic waves.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-27) Computer

- Unix/Linux
- GMT
- Fortran
- Python

(28-45) Theory of Seismic Waves

- Basic Elasticity Theory
- Elastic wave equation; P and S waves
- Reflection and refraction of plane elastic waves on a horizontal boundary
- Introduction to surface

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand

the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the subjects covered by searching lecture notes and related textbooks and preparing themselves for Linux, computer programs, and seismic wave theories.

3. Grading :

Report assignments (50%) and examinations (50%) will be evaluated. Lectures of Computer will include report assignments and quizzes. Exams will be administered after the completion of Lectures of Theory of Seismic Waves.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and necessary materials are provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3250E
Course Name	Earthquake Hazard Assessment B
Instructor	HAYASHIDA Takumi／林田 拓己
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	3

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn microtremor observation techniques and data processing procedures, seismic reflection methods, design earthquake ground motion, and nonlinearity of the site amplification to understand methodologies of earthquake hazard evaluation for specific locations when an earthquake environment is given.

[Course Goals]

Students can:

- (1) acquire knowledge of microtremor observation techniques and data processing procedures
- (2) acquire knowledge of principles of seismic reflection methods
- (3) understand methodology of how to generate design earthquake ground motion for engineering purpose
- (4) understand nonlinearity of the site amplification

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-3) Microtremor Observation I

- Explanation of microtremors observation system/equipment
- Explanation of microtremors observation technique and data analysis
- Practice for microtremors measurement
- Practice for the analysis of microtremors data

(4-6) Microtremor Observation II

- Passive source exploration: Horizontal-to-vertical (H/V) spectral ratio
- Passive source exploration: Spatial autocorrelation (SPAC) method
- Active source exploration: Multichannel analysis of surface waves (MASW)

(7-12) Geophysical Prospecting

- Seismic refraction exploration
- Seismic refraction analysis

(13-15) Simulation of Seismic Ground Motion

- Seismic provisions in the building standard law of Japan

- Define and generate design earthquake ground motions for buildings

(16-23) Seismic Micro-Zonation

- Geomorphologic classification
- Amplification capability estimation from geomorphologic units
- Remote sensing technology and damage estimation
- Interferometric SAR (InSAR) Technology for DEM Generation
- Nonlinearity of site amplification during strong ground motions

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the covered subjects by searching lecture notes and related research papers, and understand methodologies of earthquake hazard evaluation for specific locations.

3. Grading :

Report assignments after Microtremor Observation II lecture (100%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

Excel, FORTRAN, Python

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3410E
Course Name	Ground Vibration and Structural Dynamics
Instructor	NAKAGAWA Hiroto／中川 博人
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	3

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn fundamental theories to understand the dynamic behaviors of grounds and structures. In the first part, the students are expected to acquire basic theories of dynamic behaviors of structures based on SDOF (Single-Degree-Of-Freedom) and MDOF (Multi-Degree-Of-Freedom) systems. In the second part, the students are expected to acquire knowledge of the dynamic response of structures through practice in computer programming of typical structural dynamics calculations based on the SDOF system. Also, the students understand the ground vibration through practice on microtremor observations.

[Course Goals]

Students can:

- (1) acquire basic theories of dynamic behaviors of structures based on SDOF and MDOF systems
- (2) acquire knowledge of the dynamic response of structures through practice in programming
- (3) understand the ground vibration through practice on microtremor observations.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-12) Structural Dynamics I

- Free vibration of SDOF system
- Forced vibration of SDOF system
- Free vibration of MDOF system
- Forced vibration of MDOF system

(13-21) Structural Dynamics II

- Fortran 95 programming
- Response of SDOF system
- Response spectrum
- Fourier spectrum

(22-23) Microtremor Observation II

- Explanation of microtremor observation methods
- Practice on microtremor observations in the field

– Introduction of data processing procedures using observed data

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about ground vibration and structural dynamics by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Examination (40%) on the Structural Dynamics I and reports on practices (60%) will be evaluated. The examination will be held at the end of the lecture of the Structural Dynamics I. The reports will be assigned after each lecture.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3421E
Course Name	Seismic Structures
Instructor	WATANABE Hidekazu／渡邊 秀和
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn the seismic design of structures based on their elastic-to-plastic behaviors under earthquakes and the required performance. Students are expected to acquire knowledge of the mechanical properties of the materials, elastic-to-plastic behaviors of structural members and joints, seismic behaviors of the entire structures and their failure characteristics through the seismic experiences, results of structural experiences, and theoretical approaches. Students will also learn the various design factors that dominate the seismic behavior of structural members and systems based on the seismic design methods used in practice. Through the structural test for RC members, students will observe the actual structural performance in the course.

[Course Goals]

Students can:

- (1) understand the outline of seismic design of structures based on their elastic-to-plastic behaviors under earthquakes and the required performance,
- (2) acquire knowledge of structural performance, failure properties and design procedure of RC members and
- (3) acquire knowledge of design procedure for steel members and connections.
- (4) acquire knowledge of the seismic design method for foundation structure.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (3) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-3) RC Structures I

Design practice for reinforced concrete members and evaluation of the structural performance. The failure properties of reinforced concrete members predicted by the equations are as follows.

- (1) Crack of concrete
- (2) Yield of reinforcement
- (3) Ultimate strength for flexure and shear, etc.

(4-13) Steel Structures

- Outline of steel structures in Japan
- Materials

- Basic items for structural design of steel structure
- Design of tension members
- Design of compression members
- Design of beams
- Design of beam-columns
- Bolted connections
- Welded connections
- Beam-to-column connections
- Column-to-footing connections

(14-23) Structural Testing I, II

Outline of Structural Testing

- Objectives of Dynamic and Static Testing
- Relationships Between Structural Test, Structural design, Analysis and Earthquake Damages
- Tests for Materials, Structural Members and Full-scale Structures
- Testing Facilities
- Specimens
- Loading
- Measuring

Practice of Structural Static Testing

- Test Specimens
- Loading Setup
- Measuring Setup and Data Acquisition System
- Installing Technique of Strain Gauges
- Static Loading Test of RC elements
- Comparison between the Results of Design, FEM Analysis and Test
- Technical Report

(24-33) Foundation Engineering I, II, III

Foundation Engineering I -Design and Construction of Foundation-

- Kinds of bridge foundations (including construction method)
- Fundamental issues for foundation design
- Performance requirements of bridge and foundation design
- Foundation design respect to variable actions (including level 1 earthquake)
- Seismic foundation design respect to level 2 earthquake
- Maintenance and retrofit of bridge foundation

Foundation Engineering II -Introduction to Building Foundations-

- The function of building foundations
- Different types of foundations used in practice
- Bearing capacity of foundations and its determination
- Foundation settlement and its determination
- Design and construction of pile foundations
- Various loading tests for evaluating the load bearing behavior of piles
- Lessons from observation of damages to building foundations

Foundation Engineering III -Landform, Soil Condition and Natural Disasters-

- Introduction
- Foundation and soil
- Type of foundations
- Foundation design
- Construction of piles
- Pile damage during earthquake
- Liquefaction

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about seismic structures by searching lecture notes and related research papers and preparing themselves in relation to their own research objectives.

3. Grading :

Students will be evaluated based on reports such as the one below. These reports will be set at the end of each lecture.

Reports on the RC Structures I (33%)

Reports on the Steel structures (33%)

Reports on the Structural Testing I, II (33%)

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3431E
Course Name	Seismic Evaluation and Seismic Design Code
Instructor	AZUHATA Tatsuya／小豆畑 達哉
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	4

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn holistic information from conceptual matters to detail in knowledge and techniques on seismic codes, earthquake design forces based on the response spectra, dynamic aseismic designs, design methodologies for seismic isolation and response control systems. Students are expected to comprehend the specific meanings of these topics well through practical study like code comparison. This course shows students not only conventional techniques but also newly developed techniques related to the "Seismic Evaluation and Seismic Design Code."

[Course Goals]

Students can:

- (1) understand the outlines, conventional and newly developed techniques related to seismic evaluation and seismic design code,
- (2) acquire knowledge of earthquake design forces and dynamic aseismic design, and
- (3) design methodologies for seismic isolation and response control systems.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-12) Seismic design codes

- Introduction of the seismic codes in the world
- Design of non-structural elements
- Damage control design
- Code comparison

(13-15) Design earthquake motion and seismic force

- Response design spectra and seismic forces

(16-21) Dynamic aseismic design

- Nuclear power plants
- Super high-rise buildings

(22-27) Seismic isolation

- Features of seismic Isolation
- Effect on seismically isolated buildings during earthquakes

(27-30) Structural response control

- Basic theory
- Passive and active response control devices

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit materials for the presentation by the due date. At the presentation, everyone will be asked to present their thoughts on seismic evaluation and seismic design code, and their level of understanding will be evaluated. Students can learn about seismic evaluation and seismic design code by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Students will be evaluated based on their presentation and presentation material at the presentation session held after all lectures have been completed (100%).

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3620E
Course Name	Tsunami Countermeasures
Instructor	FUJII Yushiro／藤井 雄士郎
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	3

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn the techniques and methods necessary as tsunami countermeasures. In the first part, students are expected to acquire the knowledge of tsunami force, various tsunami protection facilities, and tsunami refuge buildings. Through field studies students will also observe the actual tsunami protection facilities in the course. In the second part, students are expected to acquire the techniques and methods for tsunami observation, tsunami early warning systems and warning dissemination.

[Course Goals]

Students can:

- (1) understand outlines, techniques and methods necessary for tsunami countermeasures,
- (2) acquire knowledge of tsunami force, various tsunami protection facilities, and tsunami refuge buildings and
- (3) techniques, principles and methods for tsunami observation, tsunami early warning systems and warning dissemination.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1)-(3) Tsunami Observation

- Sea Level Observation Method
- Tidal Data Analysis

Ocean Tide Component Removal, Filtering, Tsunami Measurement

- Tidal Station Tour
- Practice on Tsunami Measurement

(4)-(6) Tsunami Early Warning System and Warning Dissemination

- Outline of Tsunami Warning Service

National Tsunami Warning Service, International Tsunami Information Service

- Tsunami Estimation

(7)-(9) Tsunami Force and Tsunami Resistant Structure

- Tsunami mitigation

- Design formula of tsunami force
- Experiment of tsunami force in a large flume
- Tsunami observation and GPS buoy system
- (10)-(12) Tsunami Load and Structural Design of Tsunami Shelter
- (13)-(21) Damage and Recovery Process in Noto Region
- Crustal Deformation at Kaiso Fishing Port
- Damage and Underground Structure around Wajima
- Traces of the Tsunami and Evacuation Conditions at Suzu
- Disaster Response at Nanao
- (22)-(24) International Seminar for Disaster Management

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Also, be sure to have an overview of the tsunami countermeasure facilities that you will visit in advance. After the lecture, review the content and submit the assigned report by the due date. Students can learn about tsunami countermeasures by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Class discussions in every practical class (30%) and reports on practices after the last class of Damage and Recovery Process in Noto Region (70%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5310E
Course Name	Case Study (Practice for Earthquake Disaster - Recovery Management Policy I)
Instructor	ITO Mai／伊藤 麻衣
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	1

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn research ethics and literacy, overviews of earthquakes and disasters, or overviews of seismology and earthquake engineering, which are necessary for beginning research on earthquake disaster prevention. The students are expected to present at two colloquiums to prepare for their individual study. At the Colloquium I, students will present their country report to show the current condition of their country and their organizations activity on earthquake disaster prevention, etc. Then, students will discuss them with other students and professors. For the Colloquium II, students will review technical/scientific papers related to their research topics recommended by their advisor. Through the colloquiums, students are expected to obtain the skill to convey their points to audiences accurately.

[Course Goals]

Students can:

- (1) learn research ethics and literacy, overviews of earthquakes and disasters, or overviews of seismology and earthquake engineering according to their specialty,
- (2) receive advice and comments on their individual study topics through discussions,
- (3) develop presentation skills.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

1. Research ethics and literacy

- Overview of research ethics
- How to write a scientific report

(2-4) Overviews of earthquakes and disasters, or overviews of seismology and earthquake engineering according to student's specialty

- Basic concepts of earthquake engineering and damage aspects by past earthquakes
- Features of strong ground motion and strong motion estimation

(5-6) Colloquium I

- Presentation of country report

(7-8) Colloquium II

- Reviewing technical/scientific papers related to the individual study topics

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Prior to the colloquiums, read the research papers related to your individual study, prepare a presentation material and discuss it with your advisor. After the colloquiums, consider topics and direction of individual study in response to questions and comments received at colloquiums.

3. Grading :

In Colloquium I and II, all students will give presentations. Presentation (80%) and discussion (20%) will be evaluated.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5320E
Course Name	Case Study (Practice for Earthquake Disaster - Recovery Management Policy II)
Instructor	HAYASHIDA Takumi／林田 拓己
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	1

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn how to write academic papers and conduct academic research, which is important for completing a master's thesis. Students will learn about writing effective English academic papers. At the Colloquium III, students will introduce a tentative plan for their individual study. Students are expected to provide logical explanations of their research purpose and methodology and engage in discussions with other presenters. Students will also visit research institutes to learn about earthquake monitoring systems, understand the differences between their countries and Japan, and deepen the discussion.

[Course Goals]

Students can:

1. develop academic writing skills in English.
2. develop presentation skills.
3. understand earthquake monitoring systems in Japan.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-4) How to write a scientific report

- Writing science in English
- Paragraph ordering
- Preparing a cover letter
- Audience analysis
- Recommended research writing resources

(5-6) Colloquium III: Presentation of a tentative plan of individual study

- Seismology Course
- Earthquake Engineering Course
- Tsunami Disaster Mitigation Course

(7-8) Study tour of earthquake monitoring

- National Research Institute for Earth Science and Disaster Resilience

- Geospatial Information Authority of Japan

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Before the colloquium, write a manuscript on the introduction, data, and methods of the master's thesis and prepare a presentation material. After the colloquium, consider the direction of individual study in response to questions and comments received during the presentation.

3. Grading :

No assignment will be given. Performance and attitude in the presentation (55%) and discussion (15%) in the colloquium, and quality and originality of the individual study report (30%) will be evaluated after the colloquium: 100%

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5330E
Course Name	Case Study (Practice for Earthquake Disaster - Recovery Management Policy III)
Instructor	MATOBA Moeko／の場 萌子
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	1

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students visit past earthquake disaster areas and learn methodologies of reconstruction management for damaged areas and earthquake disaster mitigation through lectures and study tours.

[Course Goals]

Students can:

- (1) understand the outlines of the earthquake mechanism and building structures disaster of past Earthquake,
- (2) acquire knowledge of seismic evaluation, mainly focusing on damaged buildings and repair techniques of buildings for significant earthquakes and,
- (3) policy of reconstruction management for damaged areas and methodologies of earthquake disaster mitigation.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

- (1) Policy of Recovery Management for Earthquake Damaged Building
- (2-8) Study Tour of Past Earthquake Disaster Areas
 - Observation of damaged areas and structures in Tohoku districts
 - Seminar for Earthquake Disaster Mitigation and Reconstruction at Disaster-related institutes
 - Practice for Earthquake Countermeasures

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. Also, be sure to have an overview of the earthquake disaster reconstruction area that you will visit in advance. After the lecture, review the content and submit the assigned report by the due date. Students can learn about earthquake disaster reconstruction management by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Students will be evaluated based on a report on practices (100%) after the study tour.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5340E
Course Name	Case Study (Practice for Tsunami Disaster Mitigation Policy)
Instructor	HARA Tatsuhiko／原 辰彦
Email Address	
Term／Day／Period	Fall through Spring 秋－春
Credits	1

1. Course Description and the Learning Objectives :

[Course Description]

This course is designed so that students learn real-time determination of earthquake parameters and determination of the broadband moment magnitude through lectures, practices.

[Course Goals]

Students can:

- acquire knowledge of real-time determination of earthquake parameters
- acquire knowledge of determination of the broadband moment magnitude

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1-3) Real Time Determination of Earthquake Parameter

- Real time Monitoring
- Necessary Condition for Processing System
- Earthquake Detection
- Automatic Phase Picking
- Hypocenter Determination
- Magnitude Determination
- Earthquake Early Warning

(4-8) Determination of Broadband Moment Magnitude

- Basic concept of broadband moment magnitude (Mwp)
- Procedure of determination of Mwp
- Practices to determine Mwp
- Various magnitude scales (e.g., mb, Ms, Mw, Mm, Mww, MwPd)

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about the covered subjects by searching lecture

notes and related research papers, and prepare themselves for further understanding practices for tsunami disaster mitigation.

3. Grading :

Class discussions (20%) and report assignment (80%) will be evaluated. One report assignment will be given after the last class of Determination of Broadband Moment Magnitude.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Lecture notes and the necessary materials will be provided.

5. Software Used in Lectures :

SAC (Seismic Analysis Code), MS-Excel

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5800E
Course Name	Water-related Disaster Comprehensive Seminar
Instructor	Various／関係教員
Email Address	
Term／Day／Period	Winter through Summer 冬－夏
Credits	2

1. Course Description and the Learning Objectives :

The objective of this course is to build the capacity to propose, formulate, conduct, and produce a master's thesis. Students will regularly learn logical thinking, analytical methods, and simulation techniques with supervisors and instructors, and study Japan's practices and experiences from experts in the field to formulate and discuss their research topics, backgrounds, objectives, methodologies, results, and conclusions. Supervisors will be assigned in groups based on student's research interests and proposals. Several oral presentations and meetings (e.g. inception and interim) will be held to improve and evaluate the student's research work. The program will also provide guidance on thesis writing guidelines.

[Course Goals]

Through literature review, analysis, field experience, presentations, and discussion, students will gain a deep and broad understanding of the diverse natural and social characteristics underlying water-related disasters and foster the ability to develop, describe, and facilitate consensus-building on solutions.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

- 1) Introduction to the research activities in ICHARM (four classes)
- 2) Inception presentation and discussion (two classes)
- 3) Interim presentation and discussion (eight classes (four meetings @ two classes))
- 4) Thesis writing seminar (one class)

[Out-of-class Learning]

Read the lecture notes and related research papers and documents distributed in this course in advance to understand the lecture outline. After the lectures, seminars, practices, and fieldwork, review the

content and apply it to each student's research topic and area of study. Students can also learn from the case studies implemented by other students in an interactive way.

3. Grading :

Since this class focuses on discussions based on individual data and computation results, active contributions to presentations and discussions will be highly evaluated. Students will receive grades ranging from A to D or E based on their active discussion in the class (20%) and final presentation (80%).

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Teaching materials for 1) Introduction to the research activities in ICHARM and 4) Thesis writing seminar are provided at each lecture.

4-2:Others

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

The thesis format will be announced later

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5801E
Course Name	Water-related Disaster Specific Seminar
Instructor	USHIYAMA Tomoki, HARADA Daisuke, OHARA Miho／牛山 朋來, 原田 大輔, 大原 美保
Email Address	
Term／Day／Period	Winter through Summer 冬－夏
Credits	2

1. Course Description and the Learning Objectives :

The course consists of three areas: Hydrometeorology, Sediment and flood disasters, and Disaster Risk Reduction, and students will attend classes in their areas of interest.

-Hydrometeorology-

This course is designed to study hydrology and/or meteorology with the goal of simulating river stream and flood inundation under climate change tailored to different field conditions. Students will select specific basins affected by flood or drought problems, apply numerical hydrological models to simulate the hydrological conditions or apply numerical weather prediction models to predict precipitation used for flood forecasting. Students will also develop a numerical modeling system, flood/drought risk mapping, and examine flood/drought risk change due to climate change through discussion among students, lectures, and researchers.

[Course Goals]

Students can obtain a deep understanding of the nature and characteristics of each basin and flood and drought issues through data, numerical analysis, and discussion among students with lectures and researchers and explain their ideas on those. In addition, they can discuss strategies to adapt and mitigate flood and drought disasters, focusing on the unique challenges and characteristics of each basin.

-Sediment and flood disasters-

This course is designed to study sediment and flood hazards with the goal of developing effective control and mitigation strategies tailored to different field conditions. Students will select specific basins affected by sediment and flooding problems, apply numerical models to understand the dynamics of these disasters, and develop mitigation strategies based on their findings through discussion among students with lectures and researchers.

[Course Goals]

Students can obtain a deep understanding of the nature and characteristics of water flows and associated sediment transport in selected basins through the numerical analysis and discussion among students with lectures and researchers and explain their ideas on those. In addition, they can develop and present strategies to mitigate flood disasters, focusing on the unique challenges and characteristics of each basin.

-Disaster Risk Reduction -

This course is designed to study disaster risk reduction with the goal of understanding policy options for reducing disaster risk under climate change and studying evidence-based approaches to verify effectiveness of these policy options, select appropriate options and implement them in the society. Students will identify the gap between actual and ideal society, assess current and future disaster risk under climate change and consider policy options for reducing the risk in study area. Students will also

study evidence-based approaches including necessary processes such as technical analysis, establishment of governance, risk communication with stakeholders, consensus building towards implementation of selected policy options through discussion among students, lectures, and researchers.

[Course Goals]

Students can obtain a deep understanding of the process of evidence-based policy making for disaster risk reduction through problem identification, risk assessment, selection of policy options, verification of their effectiveness and development of implementation plan and explain these.

- Common-

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

-Hydrometeorology-

1. Introduction to each study area and its characteristics – floods
2. Introduction to each study area and their characteristics – drought and water management
3. Extreme flood events and numerical modeling –Part 1
4. Extreme flood events and numerical modeling –Part 2
5. Hydrological modeling for floods (short-term modeling)
6. Hydrological modeling for water management and droughts (Long-term modeling)
7. Global warming and climate change scenarios
8. Data availability and preparation of alternative data
9. Application of GCM outputs in hydrological models
10. Model calibration and validation
11. Post-processing of model outputs
12. Flood adaptation and mitigation measures
13. Water management and drought adaptation and mitigation measures
14. Group projects
15. Presentation, discussion, and evaluation based on the contents and active discussion.

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline. After the lecture, review the content and submit the assigned report by the due date. Students can also learn from lecture notes for the Hydrology and Integrated Flood Risk Management and related research papers, and prepare themselves for their research objectives.

-Sediment and flood disasters-

1. Characteristics of each field through data collections (1), (2)
2. Longitudinal and lateral profile of the basin (3)
3. Introduction and application of numerical methods (4),(5),(6)
4. Boundary conditions (7)
5. Model validity (8), (9)
6. Presentations and discussions 1 (10)

7. Characteristics of flow with sediment transport (11), (12)
8. Effective countermeasures (13), (14)
9. Presentations and discussions 2 (15)

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can also learn from lecture notes for the hydraulics and Mechanics of Sediment Transportation and related research papers, and prepare themselves in relation to their own research objectives.

-Disaster Risk Reduction -

1. Introduction to each study area
2. Problem identification to understand the gap between actual and ideal society
3. Mechanism of disaster risk reduction
4. Policy options for disaster risk reduction: Examples in Japan
5. Policy options for disaster risk reduction: Examples in other countries
6. Methodology of disaster risk assessment
7. Methodology of data collection for enhancing accuracy of assessment
8. Methodology of verification of effectiveness of selected policy options
9. Selection of policy options
10. Development of implementation plan
11. Establishment of disaster risk governance
12. Risk communication with stakeholders
13. Consensus building
14. Group projects
15. Presentation, discussion, and evaluation based on the contents and active discussion.

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline. After the lecture, review the content and submit the assigned report by the due date. Students can also learn from lecture notes for the Crisis and Risk Management and related research papers, and prepare themselves for their research objectives

3. Grading :

Since this class focuses on discussions based on individual data and computation results, active contributions to presentations and discussions are highly evaluated. Research results and lively discussions are evaluated equally.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

-Sediment and flood disasters-

Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes, Lecture Notes

-Disaster Risk Reduction -

Blaikie, P. (2003): At Risk: Natural Hazards, People's Vulnerability and Disasters, Routledge

5 . Software Used in Lectures :

6 . Auditing ; Allow or Not Allow :

Not Allow

7 . Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP5802E
Course Name	Project Cycle Management Practice
Instructor	KOIKE Toshio／小池 俊雄
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

The purpose of this course is to learn the concept of PCM at the timing prior to writing the master's thesis in order to utilize what students have learned in Japan in their home countries, and to "raise awareness" so that they will work on their master's thesis with an awareness of problem solving, practicality, and realistic viewpoints with a view to utilizing what they have learned in Japan in their home countries.

[Course Goals]

Students will learn how to plan, implement, evaluate, and provide feedback on projects, the theory of PCM, and specific methods of stakeholder analysis, problem analysis, objective analysis, and PDM proposal development.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
 2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
 3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
 4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them
- Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

Practice on project cycle management

- 1) Introductory lecture (one class)
- 2) Overview of PCM (two classes)
- 3) Problem analysis (explanation of method and practice) (two classes)
- 4) Objective analysis (explanation of method and practice) (two classes)
- 5) PDM proposal development (explanation of method and practice) (two classes)
- 6) Group works and Group presentations and discussion (four classes)
- 7) Follow-up seminar (two classes)

[Out-of-class Learning]

Read the lecture notes and related research papers and documents distributed in this course in advance to understand the lecture outline. After the lectures, seminars, practices, and fieldwork, review the content and apply it to their own research topics and areas. Students can also learn from the case studies implemented by other students in an interactive way.

3. Grading :

Since this class focuses on discussions based on individual data and computation results, active contributions to presentations and discussions are highly evaluated. Students will receive grades ranging from A to D or E based on their active discussion in the class (40%) and final presentation (60%).

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Teaching materials are provided at each lecture.

4-2:Others

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2800E
Course Name	Hydrology
Instructor	MIYAMOTO Mamoru, KOIKE Toshio, TANAKA Shigenobu／宮本 守, 小池 俊雄, 田中 茂信
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

Water is a key which makes a bridge between the socio benefit areas including agriculture and forestry, health, energy and human settlement and the geophysical and bio-geochemical water cycle processes in atmosphere, land and oceans. To establish a physical basis on water cycle, this course aims to introduce important roles of water in climatological and meteorological processes and the basic concepts of hydrology including understanding, observing and modeling of hydrologic processes. Statistic approach, river planning, and climate change adaptation are introduced as advanced facets of hydrology.

[Course Goals]

This course requires students to understand various hydrological processes as well as governing equations for describing surface flow and stream flow. Students also are required to understand runoff modeling, statistical analysis, and climate change which are needed for water-related disaster management.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (3) Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

2. Course Outline :

1. Water Cycle and Climate System

- 1) Hydrology, creating environmental diversity in the world (Koike)
- 2) Water cycle as a part of the climate system (Koike)

2. Hydrological Processes; Observation and Modeling

- 1) Atmosphere-land interaction
- 2) Soil moisture
- 3) Surface flow
- 4) Stream flow
- 5) Groundwater
- 6) Runoff modeling
- 7) Basin hydrological processes

3. Water Resources Planning and Management

- 1) Statistical hydrology 1 (Tanaka)

- 2) Statistical hydrology 2 (Tanaka)
- 3) Statistical hydrology 3 (Tanaka)
- 4) River planning (Koike)
- 5) Climate change adaptation (Koike)
- 6) Operational hydrology

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the basics of phenomena in each hydrological process by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of hydrological phenomena and their systems through lectures and the final examination. They will be graded from A to E based solely on the results of the final examination held after 15 classes.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

- 4-2 Roland B.Stull: An Introduction to Boundary Layer Meteorology, KLUWER ACADEMIC PUBLISHERS.
- 4-2 J.R.Holton: An Introduction to Dynamic Meteorology, Academic Press.
- 4-2 Wilfried Brutsaert: Hydrology: An Introduction, Cambridge University Press

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2810E
Course Name	Hydraulics
Instructor	HARADA Daisuke, SHIMIZU Yoshihiko, QIN Menglu／原田 大輔, 清水 義彦, 秦 夢露
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

All flows formed in water environments such as river channels, irrigation channels, lakes and seas are subjected to conservation laws of mass, momentum and energy, and are described by means of partial differential equations. This course aims to obtain knowledge on water flows formed in river channels and flood plains, and discusses methods to evaluate such flows. Special attention are paid on open channel flow.

[Course Goals]

This course requires students to understand basic concepts for the theory of hydraulics including governing equations which describes the nature of water flows. Describing of water surface profile under various conditions are particularly important for the planning of disaster management.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

1. Hydrostatics (1)

- Properties of water
- Hydrostatic pressure and force

2. Governing equations for water flow -Conservation principles (6)

- Mass conservation law
- Momentum conservation law
- Energy conservation law
- Velocity profile and friction law

3. Fundamental open channel flows (4)

- Flow classification, Channel geometry
- Subcritical, critical and supercritical flow
- Steady uniform flow analysis, Manning formula, Bed shear stress
- Rapidly varied flow with a hump in stream bed, Specific energy, Hydraulic jump

4. Gradually varied flow (2)

- Gradually varied flow equation

- Classification of water surface profiles
- Procedure of water surface calculation

5. Unsteady flow (2)

- Basic equation of unsteady flow
- Dynamic wave, diffusive wave, kinematic wave

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the basics of phenomena in each hydraulics by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of the hydraulic phenomena and its system through lectures and the final examination and will be graded from A to D or E depending on the depth of their understanding

50% for Learning attitude, considering the assignment for the classes

50% for Final examination (will be held after the 15th class)

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

Lecture notes will be distributed to students in the class.

4-2 Others

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2821E
Course Name	Disaster Risk Reduction for Hydroclimatic Extremes
Instructor	KOIKE Toshio／小池 俊雄
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

This course addresses the question of how we can reduce the risks of hydro-climatological extremes, such as floods, which are being exacerbated by climate change. It introduces the recent conceptual developments of "risk", "resilience" and "sustainability" and their reflection in UN policies on "Development and Environment" and "Disaster Risk Reduction". Japan provides a useful example of the evolution of the concepts and their implementation, including governance, legislation and finance. In this course, the history of trials and errors and updates will be presented and discussed.

[Course Goals]

This course enables students to develop and share adequate capacity and science-based knowledge for informed cross-sectoral decision-making among all stakeholders to improve resilience to hydro-climatological extremes under climate change and to build a sustainable society.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

(1) Occurrence of disaster (four classes)

- 1) What is disaster risk?
- 2) PAR model and ACCESS model
- 3) Impacts of Climate Change
- 4) Disaster management cycle

(2) Conceptual evolution of UN policies (four classes)

- 1) Development and Environment
- 2) Disaster Risk Reduction
- 3) Climate Change Mitigation and Adaptation
- 4) Integrated Management

(3) Presentation 1: A disaster risk assessment of a river in each student's country.

(4) Japan's experiences (four classes)

1) Conventional river management before the 20th century

2) The river management evolution in the 20th century

3) Updated river management in the 21st century

4) Strengthening sustainability and resilience by all

(5) Science-based international cooperation (one class)

(6) Presentation 2: An approach for reducing disaster risk for a river in each student's country.

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the basics of water resources management and river engineering by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will receive grades ranging from A to D or E based on their active discussion in the class (20%), presentations (30%), and final exam (50%). The exam will be administered after Class 15.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1: Required

- Ben Wisner, Piers Blaikie, Terry Cannon and Ian Davis: At Risk -natural hazards, people's vulnerability and disasters- (Routledge, London & NY, 2004)
- Kuniyoshi Takeuchi: Integrated Flood Risk Management – Basic Concepts and the Japanese Experience (Routledge, London & NY, 2023)
- UNESCO IWRM guidelines steering committee, IWRM Guidelines at River Basin Level: Part 1-1 Principles, 2-1 Part 2-1 Coordination, 2-2 Flood Management, 2-3 Irrigation. (UNESCO, 2009)

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2871E
Course Name	Geography on Flood Disaster Management
Instructor	NAGUMO Naoko, SUGAI Toshihiko／南雲 直子, 須貝 俊彦
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

The characteristics of river basins are developed over a long period of time by both the natural conditions inherent to rivers and the social and economic activities by human. One of the goals of Geography is to elucidate these characteristics of river basins and to assist in fostering more desirable relationships with rivers, such as flood control, water use, and environmental conservation measures. From this perspective, students in this lecture will learn the methods of geographical regional analysis and understand that there are regional differences in the characteristics of rivers, hydraulic and hydrological phenomena in river basins, and human settlement patterns. Furthermore, students will study the history of rivers and human interactions with them, and grasp the importance of flood control, water use, and environmental conservation measures adapted to the characteristics of each river basin.

[Course Goals]

This course aims to enable students to create maps and conduct regional analysis using geographic information, as well as to be able to explain geographic characteristics of their individual study area. Additionally, understanding the importance of flood control, water use, and environmental conservation measures which are tailored to the characteristics of each river basin is also one of the goals of this lecture.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

1: Introduction (1)

Geographic viewpoints and approaches

2: Introduction (2)

Geographic characteristics of Japan and its flood disasters

3: Interpretation of Geographic Information (1)

Basics of map representation and map reading

4: Interpretation of Geographic Information (2)

Practical use of topographic maps

5: Interpretation of Geographic Information (3)

Basics of aerial photograph and satellite image interpretation

6: Interpretation of Geographic Information (4)

Practical use of aerial photographs and satellite images

7: Regional analysis using geographic information

Description and analysis of regional characteristics

8: Excursion

Excursion to the Geospatial Information Authority

9: Fluvial systems and fluvial processes (1) (Prof. Sugai)

Earth system and hydrological system

10: Fluvial systems and fluvial processes (2) (Prof. Sugai)

Fluvial processes and floodplain geomorphology

11: Fluvial systems and fluvial processes (3) (Prof. Sugai)

Fluvial responses to climate, sea-level and tectonic changes under natural environmental conditions

12: Fluvial systems and fluvial processes (4) (Prof. Sugai)

Human impacts on fluvial systems and new approaches to river management through Nature based Solutions

13: Development of river basins and alluvial plains (1)

Sediment transportation and flooding of sediment in a river basin

14: Development of river basins and alluvial plains (2)

Landform changes and its challenges

15: Summary of the class

[Out-of-class Learning]

Students are required to review the lecture materials distributed in class and their own lecture notes both before and after the lecture. Additionally, they must submit assignments by the deadline, and search for and read related research papers according to their individual interests.

3. Grading :

Students are required to deepen their understanding of geography through lectures, class exercises and assignments as well as examination. The grade will be evaluated based on class assignments from the 3rd to 6th, 10th, and 12th sessions (50%) and final exam (50%).

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

In this course, no textbook is specified.

4-2 Others

Fryirs, K.A. and Brierley, G.J. (2013) Geomorphic Analysis of River Systems: An Approach to Reading the Landscape, First Edition, Blackwell Publishing.

Leopold, L.B., Wolman, M.G., Miller, J.P. (2020) Fluvial Processes in Geomorphology, Second Edition, Dover Publications.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2901E
Course Name	Crisis and Risk Management
Instructor	OHARA Miho／大原 美保
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

For achieving flood disaster risk reduction, both risk management and crisis management is essential. Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) defines four priority for action. Among these priorities, "Priority 1: Understanding disaster risk" and "Priority 2: Strengthening disaster risk governance to manage disaster risk" are the basis of disaster risk reduction. In addition, "Priority3: Investing in disaster risk reduction for resilience" is related to risk management while "Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better"" is related to crisis management. Based on SFDRR, This course aims to provide the basic understanding of crisis and risk management. The measures implemented in Japan for these priorities for action are also introduced. Necessary governance and communication to achieve these priorities are also explained.

[Course Goals]

This course requires students to understand both risk management and crisis management defined as priorities for action by SFDRR. Students are required to understand measures implemented in Japan including their history of establishment and revisions in addition to understand necessary governance and communication with related stakeholders to achieve these priorities. Students are also required to obtain the skill of making a plan of risk management and crisis management, conducting risk assessment for designing preventive investment and implement necessary measures for achieving appropriate risk management and crisis management following to SFDRR.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP): DP1,2,3,4

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

1. Introduction: Framework of SFDRR and four priorities for action
2. Understanding Risk (SFDRR-Priority1)
3. Understanding Risk (SFDRR-Priority1)
4. Risk Governance (SFDRR-Priority2)
5. Methodology for assessing socio-economic impact (SFDRR-Priority 3)
6. Methodology for assessing socio-economic impact (SFDRR- Priority 3)

7. Example of assessing direct impact (SFDRR- Priority 3)
8. Example of assessing indirect impact (SFDRR- Priority 3)
9. Disaster information dissemination in Japan (SFDRR-Priority 4)
10. Disaster information dissemination in Asia, Dr. Minami (SFDRR- Priority 4)
11. Emergency response /Timeline (SFDRR- Priority 4)
12. Risk finance and impact on Business sector (SFDRR- Priority 4)
13. Risk-based land use management (SFDRR- Priority 4)
14. Build Back Better (SFDRR- Priority 4)
15. Discussion
16. Exam

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the examples of risk management and crisis management by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of risk management and crisis management through lectures. The evaluation will be done by contribution to the class (10%), mid-term report after 5th class (20%), and the final examination with the grades from A to D or E depending on total evaluation results.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-2 Others

At Risk: Natural Hazards, People's Vulnerability and Disasters, Piers Blaikie, 2003.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3811E
Course Name	River Engineering
Instructor	SHIMIZU Yoshihiko／清水 義彦
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

A river has a naturally-based form in general but has changed by influences of human impacts. The purpose of this course is to understand such characteristics of rivers caused by natural and human impacts and to learn the basics and their applications of river channel design and river management with safety against flood disasters and conservation of river environment.

[Course Goals]

This course enables students to acquire the implementation methodology of "River Engineering" linking knowledge of "Hydraulics" and "Sediment Transport Mechanics".

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

(1) Fundamental characteristics of river basin and channel morphology (three classes)

- Drainage basin zones and some channel formation types,
- Typical longitudinal variation in channel properties from headwater to river mouth,
- Morphological classification of channel plane-form pattern.

(2) Basics and practice for river channel design (three classes)

- Applications of specific energy and specific force,
- Channel design by using uniform and non-uniform flow analysis,
- Evaluating flow resistance due to lateral variation of roughness in a cross-section.

(3) Flood hydraulics and its applications (three classes)

- Characteristics on time and space propagation of water level and flood discharge by using unsteady one-dimensional flow analysis,
- Transformation of water level and discharge hydrographs,
- Function of dam and flood retarding facility.

(4) Depth-averaged flow approach (three classes)

- Basic equations on depth-averaged flow and river bed variation analysis,
- Channel flow with a narrow path
- Meandering channel, Flow with riparian forest, Flow with bars

(5) Function of river hydraulic structure (three classes)

- Hydraulic function of groyne, Consolidation works with a hydraulic drop,

- Levee design, Local scouring around the pier,
- Traditional measures for flood fighting

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the basics of river engineering by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of their understanding of the hydrological and hydraulic phenomena, river system and its engineering controls through lectures and the final examination (will be held after the 15th class) and will be graded from A to D or E depending on the depth of their understanding.

30% for Learning attitude

70% for Final examination (will be held after the 15th class)

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

Lecture notes will be distributed to students in the class.

4-2 Others

Pierre Y. Julien (2018), River Mechanics, Cambridge University Press.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3821E
Course Name	Sediment Transport Mechanics
Instructor	QIN Menglu, EGASHIRA Shinji/秦 梦露, 江頭 進治
Email Address	
Term/Day/Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

1. Course aims and objectives

Sediment is transported in various forms—such as bedload, suspended load, and debris flow—each contributing to the dynamic shaping of river systems. Spatial imbalance in sediment transport leads to riverbed degradation/aggradation, bank erosion, bar formation, and channel migration. These are natural processes critical to the evolution of river morphology and the physical environment that supports aquatic and riparian ecosystems. However, they are highly sensitive to external drivers such as rainfall, earthquakes, and human interventions, often resulting in disasters or environmental degradation. This course provides a comprehensive introduction to the fundamental theories of various sediment transport mechanisms and discusses current research topics and emerging issues in the field. Toward the end of the course, integrated sediment transport processes at the river basin scale will be demonstrated, along with practical applications and challenges in sediment management and disaster mitigation.

[Course Goals]

Upon successful completion of the course, students are expected be able to:

- Understand various forms of sediment transport and estimate their transport rates.
- Apply governing equations for flood flow and sediment transport systems to evaluate channel changes.
- Evaluate sediment transport processes across multiple spatial and temporal scales, including sediment sorting, longitudinal bed profiles, and channel width variations.
- Understand sediment management strategies aimed at disaster mitigation and river environmental conservation.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4) Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

1: Introduction (1)

- Characteristics of sediment

2: Introduction (2)

- Sediment transportation and corresponding channel changes
- Methods to evaluate channel changes

3: Mechanics of sediment transportation (1)

- Parameters associated with sediment transportation
- 4: Mechanics of sediment transportation (2)
 - Critical condition for initiating bed load
- 5: Mechanics of sediment transportation (3)
 - Bed load formulas
- 6: Mechanics of sediment transportation (4)
 - Bed load formulas
- 7: Mechanics of sediment transportation (5)
 - Extension of bed load formula to non-uniform sediment
- 8: Mechanics of sediment transportation (6)
 - Suspended load
- 9: Mechanics of debris flow (1)
 - Constitutive equations
 - Debris flow characteristics over erodible beds
- 10: Mechanics of debris flow (2)
 - A bed load formula derived from constitutive equations
- 11: Bed forms and flow resistance (1)
 - Geometric characteristics of bed forms
 - Formative domain of bed forms
- 12: Bed forms and flow resistance (2)
 - Flow resistance
- 13: Prediction of channel changes (1)
 - Governing equations employed in steep areas
 - Topographic change in steep areas
- 14: Prediction of channel changes (2)
 - Governing equations employed in alluvial reaches
 - Topographic change in alluvial reaches
- 15: Method to predict sediment transport process in drainage basins
 - Sediment management in drainage basin

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about Mechanics of Sediment Transportation and Channel Changes by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

River bed variations are evaluated using the sediment transport system equations that are constituted by the continuity equation and equation of motion for flood flow, the mass conservation equation of sediment in the flow body, the equations of sediment erosion and deposition for suspended sediment, the mass conservation equation for bed sediment, and the bed load formula. Students will deepen their understanding of the sediment transport system through lectures, reports and examination, and will be graded from A to D or E depending on the depth of their understanding.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

Short quizzes (50%)

Final examination (50%; is held on 16th class)

Notice: Short quizzes are assigned every two classes, regarding questions illustrated at the end of each chapter in Lecture Note.

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

- Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes, Lecture Note

4-2 Others

- turn, T. W. (2001): Open Channel hydraulics, McGraw-Hill.
- Graf, W. H. (1997): Fluvial Hydraulics, Wiley.
- Julien Pierre: River Mechanics, Cambridge University Press

(Website: <http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521529709>)

(<http://www.amazon.co.jp/River-Mechanics-Pierre-Y-julien/dp/0521529700>)

- Albert Gyr and Klaus Hoyer: Sediment Transport, A Geophysical Phenomenon, Springer Netherlands

(<http://www.springerlink.com/content/q0x656/>)

- Ashida K., Egashira S. and Nakagawa H. (2008), River Morphodynamics for the 21st Century, Kyoto University Press (in Japanese)

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3840E
Course Name	Control Measures for Landslide & Debris Flow
Instructor	YAMAGUCHI Shinji, TAKESHI Toshiya, UCHIDA Taro, SUMI Tetsuya, OKAMOTO Atsushi／山口 真司, 武士 俊也, 内田 太郎, 角 哲也, 岡本 敦
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

Landslides, debris flows and sediment-laden flood give serious impacts for human lives and infrastructures by not only direct hitting, but also discharge for downstream area in many countries. This course provides the key issues of landslide, debris flow and sediment-laden flood phenomena. Then, structural and non-structural countermeasures to reduce damages due to both direct hitting and sediment discharge to downstream. The lecture will also illustrate the sediment yield preventions works, such as revegetation works, on hillslopes. For non-structural countermeasures, the basic information about the hazard mapping and the early-warning systems will be provided.

[Course Goals]

This course requires students to understand various natural phenomena related to landslide and debris flow and to have ideas for various type of control measures on such disasters.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
- (2) Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
- (4). Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

Week

1. Outline of sediment-related disasters and Sabo projects (Prof. Yamaguchi)
2. Sediment yield and discharge (Prof. Uchida)
3. Sabo planning for debris flow and sediment discharge control (Prof. Uchida)
4. Structural countermeasures against debris flow and sediment discharge (Prof. Uchida)
5. Hazard mapping for debris flows (Prof. Uchida)
6. Landslides- phenomenon and mechanism (Mr. Takeshi)
7. Planning for landslide (Mr. Takeshi)
8. Structural countermeasures against landslide (Mr. Takeshi)
9. Hazard mapping for landslides (Mr. Takeshi)
10. Warning and evacuation system for sediment-related disasters (Mr. Okamoto)
11. Restoration of vegetation on wasteland and its effect (Mr. Okamoto)
12. Dams and River Basin Sustainability (Prof. Sumi)
13. Sediment Management in Reservoirs (Prof. Sumi)

14. Application of Sabo/landslide projects to each country (1) (Prof. Yamaguchi Prof. Uchida)
15. Application of Sabo/landslide projects to each country (2) (Prof. Yamaguchi, Prof. Uchida)

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about Control Measures for Landslide & Debris Flow by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Class contribution (30%) Report and Final discussion (70%)

The report and final discussion will be presented during the first lecture. The final discussion will be held on the same day as the 14th and 15th lectures.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

4-2 Others

SABO in JAPAN : Japan Sabo Association, 2018

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP1801E
Course Name	Numerical Analysis Method and Practice
Instructor	USHIYAMA Tomoki, RASMY Mohamed, QIN Menglu／牛山 朋來, RASMY Mohamed, 秦 梦露
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

This course provides general knowledge of the numerical analysis method and basic computer programming skills of Fortran90 to develop the ability to analyze problem-related data to solve water-related problems. Computer programming skills are required in the other elective courses, such as "Practice on Integrated Flood Analysis System (IFAS)", "Practice on GIS and Remote Sensing Technique", and "Practice on Open Channel Hydraulics". However, this course provides basic understanding and skills in the use and application of the programming languages. In addition to Fortran, Python is introduced which is now popular for handling data files, etc.

[Course Goals]

The aim is to understand the numerical analysis methods. In addition, students should be able to understand, modify and create computer programs to solve water problems using the basic techniques of the computer languages listed below.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them

2. Course Outline :

Week

- 1 : Introduction of Computer Programming with Fortran90
- 2 : Variables, Arithmetic Calculation
- 3 : Program Structure (if)
- 4 : I/O Statement
- 5 : Program Structure (do loop)
- 6 : Arrays (vectors)
- 7 : Arrays (matrix)
- 8 : Procedures and Structured Programming (subroutine, function)
- 9 : Hydrologic Application Exercise (1) Tank model
- 10 : Numerical approximations in hydrological application Exercise (2)
- 11 : Advanced Hydrologic modeling (RRI algorithm and structures)

- 1 2 : Introduction to Python
- 1 3 : Application of Python (1)
- 1 4 : Application of Python (2)
- 1 5 : Application of Python (3)
- 1 6 : Quiz

[Themes]

Students will learn the basic components and operations of programming using Fortran 90 (and Python), create their own examples to check their operation, and create similar example programs by themselves in the assignments after each class. After that students will learn numerical analysis method using the programming skills they have got.

[Out-of- class learning]

After each class students further learn the use of algorithms and functions by creating, executing, and checking the results of the programs similar to the one learned in the class. The results will be discussed between students in the next class.

3. Grading :

Quiz (50%), Assignment reports assigned after most of the lectures (50%)

If a report is late for the deadline, it will not be evaluated.

A: Good understanding of basics of the Fortran 90 programming techniques and be able to make numerical analysis using them.

B: Understanding of basics of the Fortran 90 programming techniques and be able to make numerical analysis using them.

C: Understanding of basics of the Fortran 90 programming techniques and be able to use them to create basic programs.

D: Understand the minimum methods of Fortran 90 programming techniques and be able to use them to create basic programs.

E: Do not understand the minimum methods of Fortran 90 programming techniques and are unable to create programs using them.

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

4-2:Others

Reference: Fortran95/2003 for Scientists and Engineers (Third Ed.), by Stephen J. Chapman, McGraw-Hill,

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP2891E
Course Name	Hydrological Modeling for Water and Sediment Disaster Management under Climate Change
Instructor	RASMY Mohamed, SAYAMA Takahiro, QIN Menglu/RASMY Mohamed, 佐山 敬洋, 秦 梦露
Email Address	
Term/Day/Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

The hydrologic model is a simplified representation of an existing hydrologic system that helps water resources comprehension, assessment, forecasting, management, and mitigation.

[Course Goals]

The objective of this course is to introduce a theoretical background of hydrological processes, and concepts of model developments, and provide the necessary skills for undertaking hydrological flow, flood inundation, and sediment-related simulations and analysis in poorly gauged basins under climate change using the state-of-the-art global information and technologies.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

- (1) Ability to understand hydrological, hydrodynamic, and sediment processes and their modelling
- (2) Ability to execute, analyze, and visualize the outputs from Rainfall-Runoff-Inundation (RRI) modeling, Rainfall-Sediment-Runoff (RSR) modeling, and Water and Energy Budget Rainfall-Runoff-Inundation (WEB-RRI) modeling at different scales
- (3) Ability to understand climate change scenarios and selection and bias-correction of climate model outputs to be used for hydrological modeling under various climate projection scenarios.

2. Course Outline :

- 1 : Basics of Flood Hazard Models
- 2 : Rainfall-Runoff-Inundation modeling (1) Data preparation
- 3 : Rainfall-Runoff-Inundation modeling (2) Running model
- 4 : Rainfall-Runoff-Inundation modeling (3) Command User Interface
- 5 : Rainfall-Runoff-Inundation modeling (4) Parameter setting
- 6 : Rainfall-Runoff-Inundation modeling (5) Analysis of simulation results
- 7 : Rainfall-Runoff-Inundation modeling (6) Advanced model settings
- 8 : Introduction to Rainfall-Sediment-Runoff (RSR) (1) processes modeling
- 9 : Rainfall-Sediment-Runoff (RSR) (2) model setup and simulation
- 10: Water and Energy flux estimation in Modified Simple Biosphere Model 2 (SiB2)
- 11: Water and Energy Budget Rainfall-Runoff-Inundation (WEB-RRI) modeling
- 12: Introduction to climate model, scenarios, and projections
- 13: Climate model selection using Data Integration Analysis System (DIAS)
- 14: Statistical downscaling of climate model outputs (1)
- 15: Application of climate model outputs in hydrological model
- 16: Final Exam

[Out-of-class Learning]

Study the lecture notes, manuals, and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can also learn about hydrological and sediment transport processes and their modelling by searching lecture notes and related research papers online, and prepare themselves for their research objectives.

3. Grading :

Students will enhance their understanding of hydrological and sediment transport processes and modelling through lectures, hands-on training, assignments, and examinations, and they will be graded from A to E depending on the depth of their understanding.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

65% points for assignment reports: The assignments will be assigned at the end of 4th, 6th, 9th, 14th, and 15th classes.

35% points for the final examination

Remarks: The late submission of the reports and assignments will not be evaluated.

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required Material made by the instructors

4-2 Others

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3803E
Course Name	Geographic Information Systems and Remote Sensing Technique
Instructor	RASMY Mohamed, KAWASAKI Akiyuki/RASMY Mohamed, 川崎 昭如
Email Address	
Term/Day/Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

1 Course aims & objectives

Remote sensing entails obtaining information about the Earth's surface using special cameras/devices. A geographic information system (GIS) is a computer system for capturing, storing, checking, analyzing, and displaying mostly huge and complex geographic information. The fields of Remote Sensing and GIS are expanding very fast and the methods are constantly adapted to new fields of application.

[Course Goals]

The objective of this course is to introduce the basic theory and practices of remote sensing (RS) and geographic information systems (GIS) and how they can be applied to water-related disaster management research, planning, and decision-making processes. The course is delivered through lectures, hands-on training, exercises, assignments, and a group-seminar. By the end of the course, students will be able to:

- (1) Understand the basic GIS and satellite remote sensing principles
- (2) Execute, analyze, and visualize the outputs from the latest available tools (e.g. ArcGIS and QGIS), and their applications in hydrology
- (3) Work with big data and advanced cloud-based for big-data processing methods (e.g. Google Earth Engine and cloud computing) for rainfall estimation and inundation mapping.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice

2. Course Outline :

- 1 : Geographic Information System (GIS) (1) Understanding GIS data structures
- 2 : Geographic Information System (GIS) (2) ArcGIS Data management
- 3 : Geographic Information System (GIS) (3) ArcGIS Data processing
- 4: Geographic Information System (GIS) (3) ArcGIS Spatial analysis
- 5 : Geographic Information System (GIS) (4) ArcGIS Hydrology analysis (1)
- 6 : Geographic Information System (GIS) (5) ArcGIS Hydrology analysis (2)
- 7 : Geographic Information System (GIS) (6) Working with Q-GIS
- 8 : Remote Sensing (1) Basic principles of optical and thermal satellite remote sensing
- 9 : Remote Sensing (2) Basic principles of microwave remote sensing and rainfall estimation
- 10 : Remote Sensing (3) Inundation Mapping (1) MODIS images & water indices

- 11: Remote Sensing (4) Inundation Mapping (2) Case studies using MODIS data
- 12: Remote Sensing (5) Satellite rainfall estimation (1) GSMap data processing
- 13: Remote Sensing (6) Satellite rainfall estimation (2) GSMap data applications
- 14: Big-data processing and Applications (1) Google Earth Engine and cloud computing
- 15: Big-data processing and Applications (2) Group project presentation and evaluation

[Out-of-class Learning]

Study the lecture notes, manuals, and related research papers distributed in this course in advance to understand the lecture outline. After the lecture, review the content and submit the assigned report by the due date. Students can also learn about GIS, remote sensing, and Google Earth Engine applications by searching lecture notes and related research papers online and preparing themselves for their research objectives.

3. Grading :

Students will enhance their understanding of hydrological and sediment transport processes and modelling through lectures, hands-on training, assignments and a group project, and will be graded from A to E depending on the depth of their understanding.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

75% points for assignment reports: The assignments will be assigned at the end of 6th, 7th, 11th, 13th, 14th and 15th classes.

25% points for the group project

Remarks: The late submission of the reports and assignments will not be evaluated.

4. Textbooks : (4-1:Required 4-2:Others)

5. Software Used in Lectures :

ArcGIS, Q-GIS, Google Earth Engine

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3901E
Course Name	Field Inspection Study
Instructor	KOIKE Toshio／小池 俊雄
Email Address	
Term／Day／Period	Fall through Summer 秋－夏
Credits	2

1. Course Description and the Learning Objectives :

This course provides opportunities for students to visit actual fields to study structural countermeasure and flood control practice in Japan so that they would experience and understand the concept and ideas that can possibly be introduced to their countries. The course shall provide insight of structural countermeasures, which include but not limited to, river levees, flood retarding basins, dams, and Sabo structures. After each study-visit, students will be requested to submit a report describing the lessons they have learnt and discussion of any possibility to introduce the concept to their countries.

[Course Goals]

Through literature review, and field experience, students will gain a deep and broad understanding of the diverse natural and social characteristics underlying water-related disasters in Japan.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

- 1) Introductory lecture (two classes, October)
- 2) Kinu River (two classes, November)
- 3) Rivers in Shikoku Area (three classes, December)
- 4) Kokai River (one class, March)
- 5) Fuji River and Kano River (three classes, April)
- 6) Shinano River and Tone River (four classes, May)

[Out-of-class Learning]

Read the related documents and reports distributed in this course in advance to understand the site visit outline. After each of the three site visits, 3) Rivers in Shikoku Area, 5) Fuji River and Kano River, and 6) Shinano River and Tone River, students will be required to submit a report for each visit. The report topic will be announced prior to each site visit.

3. Grading :

This course focuses on sharing the knowledge gained in Japan. Active discussion at each site based on students' preparatory studies and comprehensive reports are highly valued. Students will receive grades ranging from A to D or E based on their active discussion in the sites (25%) and three reports (75%).

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Documents for each site will be distributed to students in the class.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP3911E
Course Name	Open Channel Hydraulics and Practice
Instructor	SHRESTHA Badri Bhakta
Email Address	
Term/Day/Period	Fall through Spring 秋－春
Credits	2

1. Course Description and the Learning Objectives :

In this course, students will learn to apply the theories studied in Hydraulics through exercises, observation of real flow through the hydraulic experiments, and hydraulic calculations, enabling them to use the theoretical framework of Hydraulics for analyzing real phenomena. The class will not only consist of lectures but also include group experiments, discussions, and individual applications of hydraulic analysis to various fields.

[Course Goals]

The learning goals for the students in this lecture are to be able to describe hydraulic phenomena using hydraulic theory, particularly to be able to depict water surface profile using hydraulic theory.

[Related Diploma Policy (DP)]

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies

2. Course Outline :

- 1: Open channel flow (1): Introduction and review of governing equations
- 2: Open channel flow (2): Simplification of equations
- 3: Open channel flow (3): Water surface profile (1)
- 4: Open channel flow (4): Water surface profile (2)
- 5: Experimental work (1): Outline of the experiments
- 6: Experimental work (2): Hydraulic conditions
- 7: Experimental work (3): Flow resistance
- 8: Experimental work (4): Hydraulic jump
- 9: 1-D flow calculation (1): Water surface profile (1)
- 10: 1-D flow calculation (2): Water surface profile (2)
- 11: 1-D flow calculation (3): Sediment transport (1)
- 12: 1-D flow calculation (4): Sediment transport (2)
- 13: 2-D flow calculation (1): Water surface profile
- 14: 2-D flow calculation (2): Sediment transport
- 15: Discussions
- 16: Final exam

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline. After the lecture, review the content and ask questions if any, and submit the

assigned report by the due date. Students can also enhance their understanding of open channel hydraulics and its practical application for solution of real-world problems by exploring related research papers and materials, which can be valuable resources for their research.

3. Grading :

Since this class focuses on discussions based on individual data and computation results, active contributions to presentations and discussions are highly evaluated. Students will deepen their knowledge through lectures, experimental works, assignment reports, and the final examination, and will be graded from A to D or E depending on the depth of their understanding.

The distribution of points for grading will be as follows:

- Assignment reports and discussions: **50%**
- Final examination: **50%**

Total: 100%

The assignments will be given after 2nd, 4th, 8th, 10th, 12th, and 14th sessions of the course, and the discussions will be held in the 15th session. The final examination will be held at the end of the course (in the 16th session) after completing all the 15 sessions.

Remarks: The late submission of the reports and assignments will not be considered for evaluation.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Egashira, S. (2016): Hydraulics

4-2 Lecture notes made by instructor

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP7001E
Course Name	Advanced Disaster Management Policies A: from Regional and Infrastructure Aspect
Instructor	CHIBANA Takeyoshi／知花 武佳
Email Address	
Term／Day／Period	Fall 秋
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

This course deals with the various aspects of disaster management policies from the viewpoint of infrastructure development. It emphasizes obtaining the ability to analyze the mechanisms of natural disasters that have occurred in various regions and to consider appropriate countermeasures. The course consists of four parts:

- I) Introductory lecture to overlook disaster management policies
 - II) Lectures in specialized fields on practical measures against natural disasters
 - III) Site-visiting in central Tokyo
 - IV) Presentations by students and overall discussions
- The 3rd and 4th are jointly managed with DMP(B).

[Course Goals]

Students can gain a broad and advanced understanding of key disaster management concepts, including policies and institutions, technical measures, and characteristics of natural dynamics, and will also be able to articulate these concepts.

[Related Diploma Policy (DP)]

Disaster Management Program (DM)

- 2.Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
- 3.Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
- 4.Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice.
- 5.Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.
- 6.Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society.

2. Course Outline :

[Topics]

I. Introduction

1. Characteristics of Natural Disasters

II. Disaster Management in Individual Fields (by various experts)

- 2. Heavy Rain, Snow and Other Disasters in Road Systems, etc.
- 3. Flood Management in Japan 1

4. Flood Management in Japan 2
 5. Japanese Railway and Natural Disaster ~Cases and Countermeasures~
 6. Japanese Railway and Natural Disaster ~History and Mechanisms of Damage~
 7. Coastal Disaster Management
 8. Flood Disaster and Poverty
- III. Site-Based Study in Tokyo Metropolitan District
 9. Site-Based Study 1) (Together with DMP(B))
 10. Site-Based Study 2) (Together with DMP(B))
 11. Site-Based Study 3) (Together with DMP(B))
- IV. Presentations and Discussion
 12. Esquisse (Presentation Workshop) (Together with DMP(B))
 13. Presentation and Discussion 1) (Together with DMP(B))
 14. Presentation and Discussion 2) (Together with DMP(B))
 15. Presentation and Discussion 3) (Together with DMP(B))

[Out-of-class Learning]

Students are expected to read the materials provided in advance and familiarize themselves with the lecture content prior to attending class.

3. Grading :

Final Group Presentation and Contribution to Discussion (70%)

Final Report (30%)

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Necessary materials will be provided by instructors. Students are required to independently refer various academic papers in their related fields.

4-2:Others

None

5. Software Used in Lectures :

None

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Exclude site visits from the audience

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP7011E
Course Name	Advanced Disaster Management Policies B: from Urban and Community Aspect
Instructor	TAMURA Hideyuki／田村 英之
Email Address	
Term／Day／Period	Fall 秋
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

This course aims to deepen understanding of disaster risk management with a particular focus on the implementation of concrete policy actions related to urban, housing, and community aspects. It aims to equip doctoral students with the skills necessary to apply sophisticated, context-specific strategies that address social, economic, and environmental conditions in various countries. The course will critically analyze:

- Detailed implementation strategies of disaster management policies
- In-depth case studies of significant global disasters
- Urban Disaster risk management approaches in Japan
- Evaluation of policies and regulations to secure building safety

[Related Diploma Policy]

Disaster Management Program (DM)

DP.2 Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.

DP.3 Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.

DP.4 Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice.

DP.5 Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

DP.6 Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society.

[Course Goals]

Students can gain an in-depth and advanced understanding of key disaster management concepts, including the use of tools for data management and analysis, policy development, and risk communication, and can also apply these effectively to address practical challenges.

2. Course Outline :

1. Disasters in the World, Basics of Disaster Risk Management
2. Lessons from 2011 Tohoku and 1995 Kobe ,Basics of Disaster Risk Management, Development of disaster risk management
3. Urban disaster risk management policy, Building / housing policy and disaster management
4. Special Lecture "Augmented Reality disaster management training"
5. Special Lecture "Weather and Disasters"

6. Special Lecture "Build back better"
7. Special Lecture "Sediment-related Disasters"
8. Special Lecture "OpenStreetMap"
9. Esquisse (Presentation Workshop) (Together with DMP(A))
10. Presentation and Discussion 1) (Together with DMP(A))
11. Presentation and Discussion 2) (Together with DMP(A))
12. Presentation and Discussion 3) (Together with DMP(A))
13. Site-Based Study 1) (Together with DMP(A))
14. Site-Based Study 2) (Together with DMP(A))
15. Site-Based Study 3) (Together with DMP(A))

[Out-of-class learning]

Students are expected to read the materials provided in advance and familiarize themselves with the lecture content prior to attending class.

3. Grading :

Final Presentation(70%) and Contribution to Discussion(30%)

[Evaluation Criteria]

Student's achievement of the Course Goals is:

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

Necessary materials will be provided by instructors. Students are required to independently refer various academic papers in their related fields.

5. Software Used in Lectures :

None

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Site visits are restricted to enrolled course students and are not open to the audience.

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP7831E
Course Name	Advanced Disaster Risk Reduction for Hydroclimatic Extremes
Instructor	KOIKE Toshio／小池 俊雄
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

This course addresses the question of how we can reduce the risks of hydro-climatological extremes, such as floods, which are being exacerbated by climate change. It introduces the recent conceptual developments of "risk", "resilience" and "sustainability" and their reflection in UN policies on "Development and Environment" and "Disaster Risk Reduction". Japan provides a useful example of the evolution of the concepts and their implementation, including governance, legislation and finance. In this course, the history of trials and errors and updates will be presented and discussed.

[Course Goals]

This course enables students to develop and share adequate capacity and science-based knowledge for informed cross-sectoral decision-making among all stakeholders to improve resilience to hydro-climatological extremes under climate change and to build a sustainable society.

[Related Diploma Policy (DP)]

Disaster Management Policy Program (DMP):

1. Ability to identify problems by analyzing issues from multiple perspectives with the expertise in disaster management policies
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice
4. Ability to identify an issue, analyze related data using engineering tools, compile them into research papers and policy recommendations, and present them
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society

2. Course Outline :

(1) Occurrence of disaster (four classes)

- 1) What is disaster risk?
- 2) PAR model and ACCESS model
- 3) Impacts of Climate Change
- 4) Disaster management cycle

(2) Conceptual evolution of UN policies (four classes)

- 1) Development and Environment
- 2) Disaster Risk Reduction
- 3) Climate Change Mitigation and Adaptation
- 4) Integrated Management

(3) Presentation 1: A disaster risk assessment of a river in each student's country.

(4) Japan's experiences (four classes)

1) Conventional river management before the 20th century

2) The river management evolution in the 20th century

3) Updated river management in the 21st century

4) Strengthening sustainability and resilience by all

(5) Science-based international cooperation (one class)

(6) Presentation 2: An approach for reducing disaster risk for a river in each student's country.

[Out-of-class Learning]

After the lecture, students review the material and ask any questions they may have. By searching the lecture materials and related research publications, students can learn about the basics of hydroclimatic extremes and how to reduce the associated risks. These resources will help students expand their knowledge beyond disaster risk reduction for hydroclimatic extremes to include sustainable development and the environment.

3. Grading :

Students will receive grades ranging from A to D or E based on their active discussion in the class (20%), presentations (30%), and final exam (50%). The exam will be administered after Class 15.

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1: Required

- Ben Wisner, Piers Blaikie, Terry Cannon and Ian Davis: At Risk -natural hazards, people's vulnerability and disasters- (Routledge, London & NY, 2004)
- Kuniyoshi Takeuchi: Integrated Flood Risk Management – Basic Concepts and the Japanese Experience (Routledge, London & NY, 2023)
- UNESCO IWRM guidelines steering committee, IWRM Guidelines at River Basin Level: Part 1-1 Principles, 2-1 Part 2-1 Coordination, 2-2 Flood Management, 2-3 Irrigation. (UNESCO, 2009)

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP7881E
Course Name	Advanced Geography on Flood Disaster Management
Instructor	NAGUMO Naoko, SUGAI Toshihiko／南雲 直子, 須貝 俊彦
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

The characteristics of river basins are developed over a long period of time by both the natural conditions inherent to rivers and the social and economic activities by human. One of the goals of Geography is to elucidate these characteristics of river basins and to assist in fostering more desirable relationships with rivers, such as flood control, water use, and environmental conservation measures. From this perspective, students in this lecture will learn the methods of geographical regional analysis and understand that there are regional differences in the characteristics of rivers, hydrological and hydrological phenomena in river basins, and human settlement patterns. Furthermore, students will study the history of rivers and human interactions with them, and learn the importance of flood control, water use, and environmental conservation measures adapted to the characteristics of each river basin. Students are expected to acquire the ability to interpret and explain the geographic characteristics of target areas.

[Course Goals]

This course aims to enable students to create maps and conduct regional analysis using geographic information, as well as to be able to explain geographic characteristics of their individual study area at an advanced level. Additionally, understanding the importance of flood control, water use, and environmental conservation measures which are tailored to the characteristics of each river basin is also one of the goals of this lecture.

[Related Diploma Policy (DP)]

Disaster Management Program:

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

2. Course Outline :

1: Introduction (1)

Geographic viewpoints and approaches

2. Introduction (2)

Geographic characteristics of Japan and its flood disasters

3: Interpretation of Geographic Information (1)

Basics of map representation and map reading

4: Interpretation of Geographic Information (2)

Advanced use of topographic maps

5: Interpretation of Geographic Information (3)

Basics of aerial photograph and satellite image interpretation

6: Interpretation of Geographic Information (4)

Advanced use of aerial photographs and satellite images

7: Regional analysis using geographic information

Description and analysis of regional characteristics

8: Excursion

Excursion to the Geospatial Information Authority

9: Fluvial systems and fluvial processes (1) (Prof. Sugai)

Earth system and hydrological system

10: Fluvial systems and fluvial processes (2) (Prof. Sugai)

Fluvial processes and floodplain geomorphology

11: Fluvial systems and fluvial processes (3) (Prof. Sugai)

Fluvial responses to climate, sea-level and tectonic changes under natural environmental conditions

12: Fluvial systems and fluvial processes (4) (Prof. Sugai)

Human impacts on fluvial systems and new approaches to river management through Nature based Solutions

13: Development of river basins and alluvial plains (1)

Sediment transportation and flooding of sediment in a river basin

14: Development of river basins and alluvial plains (2)

Landform changes and its challenges

15: Summary of the class

[Out-of-class Learning]

Students are required to review the lecture materials distributed in class and their own lecture notes both before and after the lecture. Additionally, they must submit assignments by the deadline, and search for and read related research papers according to their individual interests.

3. Grading :

[Evaluation Criteria]

Students are required to deepen their understanding of geography through lectures, class exercises and assignments as well as examination. The grade will be evaluated based on class assignments from the 3rd to 6th, 10th, and 12th sessions as well as presentations (50%) and final exam (50%).

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

In this course, no textbook is specified.

4-2 Others

Fryirs, K.A. and Brierley, G.J. (2013) Geomorphic Analysis of River Systems: An Approach to Reading the Landscape, First Edition, Blackwell Publishing.

Leopold, L.B., Wolman, M.G., Miller, J.P. (2020) Fluvial Processes in Geomorphology, Second Edition, Dover Publications.

5 . Software Used in Lectures :

6 . Auditing ; Allow or Not Allow :
Not Allow

7 . Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP7911E
Course Name	Advanced Crisis and Risk Management
Instructor	OHARA Miho／大原 美保
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

For achieving flood disaster risk reduction, both risk management and crisis management is essential. Sendai Framework for Disaster Risk Reduction 2015-2030 (SFDRR) defines four priority for action. Among these priorities, "Priority 1: Understanding disaster risk" and "Priority 2: Strengthening disaster risk governance to manage disaster risk" are the basis of disaster risk reduction. In addition, "Priority3: Investing in disaster risk reduction for resilience" is related to risk management while "Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" is related to crisis management. Based on SFDRR, This course aims to provides the advanced understanding of crisis and risk management including learning good practices related to each priority for action. Necessary governance and communication to achieve these priorities are also explained.

[Course Goals]

This course requires students to understand both risk management and crisis management defined as priorities for action by SFDRR. Students are required to understand measures implemented in Japan including their history of establishment and revisions in addition to understand necessary governance and communication with related stakeholders to achieve these priorities. Students are also required to obtain the skill of making a plan of risk management and crisis management, conducting risk assessment for designing preventive investment and implement necessary measures for achieving appropriate risk management and crisis management following to SFDRR.

[Related Diploma Policy (DP)]

Disaster Management Program (DMP):

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

2. Course Outline :

1. Introduction: Framework of SFDRR and four priorities for action
2. Understanding Risk (SFDRR-Priority1)
3. Good practices for understanding Risk (SFDRR-Priority1)
4. Risk Governance (SFDRR-Priority2)
5. Methodology for assessing socio-economic impact (SFDRR-Priority 3)

6. Exercised for assessing socio-economic impact (SFDRR- Priority 3)
7. Example of assessing direct impact (SFDRR- Priority 3)
8. Example of assessing indirect impact (SFDRR- Priority 3)
9. Disaster information dissemination in Japan (SFDRR-Priority 4)
10. Disaster information dissemination in Asia, Dr. Minami (SFDRR- Priority 4)
11. Emergency response /Timeline and good practices (SFDRR- Priority 4)
12. Risk finance and impact on Business sector (SFDRR- Priority 4)
13. Risk-based land use management (SFDRR- Priority 4)
14. Build Back Better and good practices (SFDRR- Priority 4)
15. Discussion
- 16.Exam

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the examples of risk management and crisis management by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of risk management and crisis management and good practices through lectures. The evaluation will be done by contribution to the class (10%), mid-term report after 5th class (20%), and the final examination (70%) with the grades from A to D or E depending on total evaluation results.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-2 Others

At Risk: Natural Hazards, People's Vulnerability and Disasters, Piers Blaikie, 2003.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8831E
Course Name	Advanced River Engineering
Instructor	SHIMIZU Yoshihiko／清水 義彦
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

A river has a naturally-based form in general but has changed by influences of human impacts. The purpose of this course is to understand such characteristics of rivers caused by natural and human impacts and to learn the basics and their applications of river channel design and river management with safety against flood disasters and conservation of river environment. Students are required to obtain the ability to deeply consider the application of river engineering technics.

[Course Goals]

This course enables students to acquire the advanced implementation methodology of “River Engineering” linking knowledge of “Hydraulics” and “Sediment Transport Mechanics”.

[Related Diploma Policy (DP)]

Disaster Management Program (DMP):

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

2. Course Outline :

(1) Fundamental characteristics of river basin and channel morphology (three classes)

- Drainage basin zones and some channel formation types,
- Typical longitudinal variation in channel properties from headwater to river mouth,
- Morphological classification of channel plane-form pattern.

(2) Basics, practice and application for river channel design (three classes)

- Applications of specific energy and specific force,
- Channel design by using uniform and non-uniform flow analysis,
- Evaluating flow resistance due to lateral variation of roughness in a cross-section.

(3) Advanced flood hydraulics and its applications (three classes)

- Characteristics on time and space propagation of water level and flood discharge by using unsteady one-dimensional flow analysis,
- Transformation of water level and discharge hydrographs,
- Function of dam and flood retarding facility.

(4) Depth-averaged flow approach and its applications (three classes)

- Basic equations on depth-averaged flow and river bed variation analysis,
 - Channel flow with a narrow path
 - Meandering channel, Flow with riparian forest, Flow with bars
- (5) Function of river hydraulic structure and its applications (three classes)
- Hydraulic function of groyne, Consolidation works with a hydraulic drop,
 - Levee design, Local scouring around the pier,
 - Traditional measures for flood fighting

[Out-of-class Learning]

After the lecture, review the content and ask questions if any. Students can learn about the basics of river engineering by searching lecture materials and related research papers, which will support their research.

3. Grading :

Students will deepen their understanding of the hydrological and hydraulic phenomena, river system and its engineering controls through lectures and the final examination (will be held after the 15th class) and will be graded from A to D or E depending on the depth of their understanding.

30% for Learning attitude

70% for Final examination (will be held after the 15th class)

[Evaluation Criteria]

A: Achieved the goal at a high level

B: Achieved the goal at a satisfactory level

C: Achieved the goal at a generally acceptable level

D: Achieved the goal at a minimum acceptable level

E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1: Textbook will be distributed to students in the class.

4-2: Students are encouraged to search literatures, including articles related to this lecture, based on their individual interests.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8841E
Course Name	Advanced Sediment Transport Mechanics
Instructor	QIN Menglu, EGASHIRA Shinji／秦 梦露, 江頭 進治
Email Address	
Term／Day／Period	Fall, Winter 秋、冬
Credits	2

1. Course Description and the Learning Objectives :

Sediment is transported in various forms—such as bedload, suspended load, and debris flow—each contributing to the dynamic shaping of river systems. Spatial imbalance in sediment transport leads to riverbed degradation/aggradation, bank erosion, bar formation, and channel migration. These are natural processes critical to the evolution of river morphology and the physical environment that supports aquatic and riparian ecosystems. However, they are highly sensitive to external drivers such as rainfall, earthquakes, and human interventions, often resulting in disasters or environmental degradation. This course provides a comprehensive introduction to the fundamental theories of various sediment transport mechanisms and discusses current research topics and emerging issues in the field. Toward the end of the course, integrated sediment transport processes at the river basin scale will be demonstrated, along with practical applications and challenges in sediment management and disaster mitigation..

[Course Goals]

Upon successful completion of the course, students are expected be able to:

- Understand various forms of sediment transport and estimate their transport rates in a river.
- Apply governing equations for flood flow and sediment transport systems to predict channel changes and evaluate the risk of associated hazards.
- Evaluate sediment transport processes across multiple spatial and temporal scales, including sediment sorting, longitudinal bed profiles, and channel width variations, and propose appropriate river channel designs.
- Comprehend and assess sediment management strategies aimed at disaster mitigation and river environmental conservation.

[Related Diploma Policy (DP)]

Disaster Management Program (DMP):

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

2. Course Outline :

1: Introduction (1)

- Characteristics of sediment

2: Introduction (2)

- Sediment transportation and corresponding channel changes
- Methods to evaluate channel changes
- 3: Mechanics of sediment transportation (1)
 - Parameters associated with sediment transportation
- 4: Mechanics of sediment transportation (2)
 - Critical condition for initiating bed load
- 5: Mechanics of sediment transportation (3)
 - Bed load formulas
- 6: Mechanics of sediment transportation (4)
 - Bed load formulas
- 7: Mechanics of sediment transportation (5)
 - Extension of bed load formula to non-uniform sediment
- 8: Mechanics of sediment transportation (6)
 - Suspended load
- 9: Mechanics of debris flow (1)
 - Constitutive equations
 - Debris flow characteristics over erodible beds
- 10: Mechanics of debris flow (2)
 - A bed load formula derived from constitutive equations
- 11: Bed forms and flow resistance (1)
 - Geometric characteristics of bed forms
 - Formative domain of bed forms
- 12: Bed forms and flow resistance (2)
 - Flow resistance
- 13: Prediction of channel changes (1)
 - Governing equations employed in steep areas
 - Topographic change in steep areas
- 14: Prediction of channel changes (2)
 - Governing equations employed in alluvial reaches
 - Topographic change in alluvial reaches
- 15: Method to predict sediment transport process in drainage basins
 - Sediment management in drainage basin

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about Mechanics of Sediment Transportation and Channel Changes by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

River bed variations are evaluated using the sediment transport system equations that are constituted by the continuity equation and equation of motion for flood flow, the mass conservation equation of sediment in the flow body, the equations of sediment erosion and deposition for suspended sediment, the mass conservation equation for bed sediment, and the bed load formula. Students will deepen their understanding of the sediment transport system through lectures, reports at the end of each chapter in the Lecture Note and a final examination on 16th class, and will be graded from A to D or E depending on the depth of their understanding.

[Evaluation Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

Reports on this lecture and its presentation in class (50%)

Final examination (50%; is held on 16th class)

Notice: A report is assigned every two classes, regarding questions illustrated at the end of each chapter in Lecture Note.

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

- Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes, Lecture Note

4-2 Others

- turm, T. W. (2001): Open Channel hydraulics, McGraw-Hill.
- Graf, W. H. (1997): Fluvial Hydraulics, Wiley.
- Julien Pierre: River Mechanics, Cambridge University Press

(Website: <http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=9780521529709>)

(<http://www.amazon.co.jp/River-Mechanics-Pierre-Y-julien/dp/0521529700>)

- Albert Gyr and Klaus Hoyer: Sediment Transport, A Geophysical Phenomenon, Springer Netherlands

(<http://www.springerlink.com/content/q0x656/>)

- Ashida K., Egashira S. and Nakagawa H. (2008), River Morphodynamics for the 21st Century, Kyoto University Press (in Japanese)
- HARADA Daisuke, EGASHIRA Shinji, Tanjir Saif Ahmed and ITO Hiroyuki, Entrainment of bed sediment composed of very fine material, Earth Surface Process and Landforms (ESPL)、 Vol.47, Issue13, pp.3051-3061, 2022.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8830E
Course Name	Advanced Hydrometeorology
Instructor	KOIKE Toshio, Rasmy Mohamed and USHIYAMA Tomoki／小池 俊雄, Rasmy Mohamed, 牛山 朋来
Email Address	
Term／Day／Period	Spring 春
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

The objective of this subject is to establish a physical basis on the Earth's climate and weather systems and their prediction. This course introduces the hydro-meteorological processes associated with the energy and water cycle variability, and the numerical simulation of atmospheric dynamics including governing equations, weather forecasting, and data assimilation methodology. This course also introduces the several applications of numerical approaches for flood and drought forecasting as well as climate change projections. This course is related to the following SDGs: 6(Water and Sanitation), 11(Sustainable Cities and Communities and DRR), and 13(Climate Action).

[Related Diploma Policy (DP)] Disaster Management Program (DM) :

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

[Student Goals]

The aim of this course is to develop an understanding of the dynamics and physics of the earth climate system and of forecasting methods. Students will gain an understanding of the phenomena that cause water-related disasters and the effectiveness and limitations of forecasting methods, as well as the ability to use them to mitigate water-related disasters.

2. Course Outline :

- 15 lectures and 1 examination
- Students are requested to read the textbook before each class and make a short discussion about the assignments given after each class.

- (1) Climate system
- (2) Radiative processes
- (3) General circulations
- (4) Precipitation processes
- (5) Governing equations
 - 1)Equation for Mean Variables in a Laminar Flow
 - Ideal Gas Law and Conservation of Mass

- 2)Equation for Mean Variables in a Laminar Flow
 - Conservation of Momentum
- 3)Equation for Mean Variables in a Laminar Flow
 - Conservation of Moisture, Heat, and Scalar Quantity
- 4)Equation for Mean Variables in a Turbulent Flow
 - Ideal Gas Law and Conservation of Mass and Momentum
- 5)Equation for Mean Variables in a Turbulent Flow
 - Conservation of Moisture, Heat, and Scalar Quantity, and Simplification
- (6) Numerical Weather Prediction (NWP)
 - 1) General Circulation Models (GCMs) and regional climate modeling
 - 2) Data assimilation, cumulus parameterization.
- (7) Climate change
 - 1) Global warming and projections
 - 2) Dynamical downscaling and/or Bias correction methods
- (8) Flood forecasting
- (9) Drought forecasting

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about Advanced hydrometeorology by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

Active discussion in the class (25%), Short Reports(25%), Final Examination(50%)

A: Good understanding of the Hydrometeorological processes and be able to discuss the mechanism and limitation of the numerical approaches for flood and drought forecasting.

B: Understanding of the Hydrometeorological processes and be able to discuss the mechanism and limitation of the numerical approaches for flood and drought forecasting.

C: Understanding of the basic Hydrometeorological processes and be able to discuss the basic mechanism and limitation of the numerical approaches for flood and drought forecasting.

D: Understanding of the minimum Hydrometeorological processes and be able to discuss minimum level of the numerical approaches for flood and drought forecasting.

E: Do not understand the minimum Hydrometeorological processes and be unable to discuss minimum level of the numerical approaches for flood and drought forecasting.

4. Textbooks : (4-1:Required 4-2:Others)

J.R.Holton: An Introduction to Dynamic Meteorology, Academic Press.

Roland B.Stull: An Introduction to Boundary Layer Meteorology, KLUWER ACADEMIC PUBLISHERS.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Academic Year (April - March of the next year)	2025
Course Number	DMP8840E
Course Name	Advanced Hydrodynamics
Instructor	HARADA Daisuke／原田 大輔
Email Address	
Term／Day／Period	Spring 春
Credits	2

1. Course Description and the Learning Objectives :

Course Description

The goal of this course is to understand hydrodynamics through a numerical model. This course provides river morphology as a basic understanding of sediment hydraulics, mathematical tool as well as technique of numerical simulation. Then students learn depth integrated 2D governing equations to understand sediment transport in river flow. Finally, they learn about sediment transport processes in watersheds.

In terms of policy implementation, students acquire skills such as 1) making maximum use of the tools learned in this lecture and developing new ones for future implementation in the students target area, 2) making policy recommendations for practical and on-the-ground solutions based on a deep understanding of the current state of theory and practice, and finally 3) fostering creativity with which to help on-the-ground stakeholders develop their ability to solve problems on their own.

[Related Diploma Policy (DP)] Disaster Management Program (DM) :

1. Ability to identify and delineate on-site problems by surveying the gap between the ideal state and the current state from multiple perspectives with the expertise in disaster management policies.
2. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
3. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
5. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

[Achievement]

By the end of this course, students will be able to achieve the following goals.:

- Understanding the types of sand waves depending on the shear stress
- Understanding the different types of sediment transport equations
- Understanding the equations, which is implemented in the numerical model: e.g., Nays2DH or etc

2. Course Outline :

1. River morphology
 - Characteristics of sand waves (1)(2)(3)
 - Hydraulic resistance on the alluvial channels (4)(5)
 - Characteristics of sand bars and braided channel (6)(7)
2. Mathematical tool to integrate partial differential equations
 - Leibniz rule and its simplification, etc (8)
3. Depth-integrated 2D governing equations to describe flood flow and sediment transportation

- An equation set to evaluate depth integrated 2D-flow, sediment transportation and bed variation
- Parameters associated with sediment transportation (9) (10)
4. Governing equations described in terms of several grid systems
 - Cartesian coordinate system (11)
 - General grid system (General coordinate system) (12)
 5. Sediment transport process in drainage basins (13)
 6. Review and Discussion of current topics about Hydrodynamics (14)(15)

[Out-of-class Learning]

Read the lecture notes and related research papers distributed in this course in advance to understand the lecture outline and prepare questions to be asked. After the lecture, review the content and submit the assigned report by the due date. Students can learn about Advanced hydrometeorology by searching lecture notes and related research papers, and prepare themselves in relation to their own research objectives.

3. Grading :

- 50 points for reports and short quizzes
 - 50 points for the examination at the end of semester
 - A: Acquire sufficient basic knowledge and concepts of Hydrodynamics, and can explain how it works.
B: Acquire basic knowledge and concepts of Hydrodynamics, and can explain how it works.
C: Acquire basic knowledge and concepts of Hydrodynamics in general, and can explain how it works.
D: Acquire the minimum basic knowledge and concepts of Hydrodynamics, and can explain how it works.
 - E: Not acquire the basic knowledge and concepts of Hydrodynamics, and cannot explain how it works.
- Rejection.

4. Textbooks : (4-1:Required 4-2:Others)

4-1 Required

Yorozuya, A. (2016):Advanced Hydrodynamics, Lecture Note

4-2 Others

Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes, Lecture Note.

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Not Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8850E
Course Name	International Policies on Water and Disasters
Instructor	HIROKI Kenzo／廣木 謙三
Email Address	
Term／Day／Period	Fall 秋／Mon 月／2
Credits	2

1. Course Description and the Learning Objectives :

This course studies formulation and implementation process of international policies that give concrete impacts on local practices and field works, and vice versa. Water and disasters, key cross cutting areas of SDGs, will be addressed in the course. The course intends to help students broaden their knowledge base and enhance their capacity to implement national and international policies and connect them with local practices and projects.

The course will be started by lectures on cases in which practitioners and stakeholders faced actual disasters. Group discussion will explore how international policies may help local practitioners and stakeholders in meeting diverse challenges. Afterwards, the course moves to lectures on chronological development of international water and disaster policies. Key official documents are examined. A recent process of merging water policy and disaster policy will also be studied.

Having learned these basics, students will learn key policy elements such as Climate Change Adaptation and transboundary water. Process and methods to connect policy and science at decision making levels will be discussed. Meeting/conference processes will be taken up as a tool to facilitate formulation and implementation of policies. The course will explore how those meeting processes determine success and failure of the policies.

As Integrated Water Resources Management (IWRM) is the key for sustainable, inclusive, and resilient water management, the course will study basic concept, field cases and national and international policies on IWRM. They will deepen their knowledge by presenting their own cases and discuss them in a seminar.

Having completed this course, students will be able to acquire sufficient basic knowledge and concepts of international water and disasters, and can explain how it works, thereby using and analyzing them in formulation and implementation. They will strategically realizing the policies by creating effective conference processes, and reviewing and upgrading the current the processes of Integrated Water Resources Management (IWRM).

[Related Diploma Policy (DP)][EW1]

Disaster Management Program(DM): 2,3,4,5,6

-Science, Technology and Innovation Policy Program(Doctoral): Highly relevant 4, ◎ Relevant 5, ○

Partially relevant 1,2, △

2. Course Outline :

Phase 1 (Week1-4): "Overview of status and policies on water and disasters at local and global levels"

The course is started by knowing from cases what challenges practitioners and stakeholders are likely to face. Students will learn outline of key international policies on water as well as DRR and their historical background. A recent process of merging water policy and disaster policy will also be visited. Group discussion will explore how international practitioners and stakeholders in meeting the local challenges. Having completed this phase, students will be able to acquire background information on international policies on water and disasters in analyzing and formulating policies.

(Diploma Policy 2,3,4,5,6)

- Lecture: Global overview on water and disasters
- Lecture: International policy on water
- Lecture: International DRR policy and merging water and DRR policies
- Seminar on DRR Policy (Group discussion on policies to address local challenges on water and disasters)

Read "Sendai Framework for Disaster Risk Reduction (DRR)" (Pages to be specified by the lecturer):

https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

Phase 2 (Week 5-7): "Bridging international policy, national policy, and field practice"

Students will learn how international and national policies are translated into local practices. Practical knowledge from recent cases will be shared through lecture. These will lead to group discussion on status and challenges water and disasters.

Having completed this phase, students will be able to use obtained knowledge and information on international disasters in formulating and implementing practices by bridging policies and practices at national and local levels (Diploma Policy 3,4,5,6)

- Lecture: Bridging international policy, national policy, and field practice
 - Crisis management of water-related disasters
 - Dam safety policy
 - Financing and investment on water-related DRR
- Lecture: Learning from cases and good practices
- Seminar: "Looking at the future by visiting the past: Discussing policies which should be created in the future"

Read "The 2030 Agenda for Sustainable Development" (Pages to be specified by the lecturer):

<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development.pdf>

Phase 3 (Week 8-11): "Methods to create effective international policies"

International policies are just a stack of paper without giving real impacts on national and local actions. Students will learn of developing effective international policies. Various meetings and conferences are compared as prerequisite to formulate international policies. Students will discuss building effective international policies that will give intended impact on national and local actions.

Through this phase, students will be able to use obtained background information on international policies on formulating policies and implementing practices at national and local levels.

Having completed this phase, students will be able to use obtained knowledge and information to help strategic conference processes that will serve policy objectives at international and national levels. (Diploma Policy 3,4,5,6)

- Lecture: How international policies and their implementation are connected to conference process
- Lecture: Climate change adaptation and DRR
- Lecture: Addressing water-related Disaster Risk Reduction under COVID-19
- Seminar: "Discussing methods to formulate effective international policies that lead to concrete actions"

Read "UNSGAB Hashimoto Action Plan 1" and "UNSGAB Journey"

<https://sustainabledevelopment.un.org/content/documents/8701unsgab-journey-web.pdf>

Read "Final Outcome Report of High Level panel on Water" (Pages to be specified by the lecturer)

https://sustainabledevelopment.un.org/content/documents/17825HLPW_Outcome.pdf

Phase 4 (Week 12-15): "Integrated Water Resources Management (IWRM)"

Concept, background, effects and necessary frameworks and process of IWRM will be learned. International case studies of IWRM will be visited to learn how practically IWRM can help integrate various water-related sectors including transboundary management of water resources.

Having completed this phase, students will be able to use obtained knowledge and information to help create processes at transboundary, national, and basin levels. (Diploma Policy 2,3,4,5,6)

- Lecture: Overview of Integrated Water Resources Management (IWRM)
- Lecture: Practicing IWRM (1)
- Lecture: Practicing IWRM (2)

- Seminar: "Discussing cases of IWRM"

Read "UN Convention on the Law of the Non-navigational Uses of International Watercourses" (Pages to be specified)
http://legal.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf

3. Grading :

Performance in class discussion (20%), Presentation (30%), and Final Exam (50%)

Criteria of grading is as follows:

- A: Acquire sufficient basic knowledge and concepts of international policies on water and disasters, and can explain how they work.
- B: Acquire basic knowledge and concepts of international policies on water and disasters, and can explain how they work.
- C: Acquire basic knowledge and concepts of international policies on water and disasters in general, and can explain how they work.
- D: Acquire the minimum basic knowledge and concepts of international policies on water and disasters, and can explain how they work.
- E: Not acquire the basic knowledge and concepts of international policies on water and disasters, and cannot explain how they work.

4. Textbooks : (4-1:Required 4-2:Others)

4.1

"Sendai Framework for Disaster Risk Reduction (DRR)": https://www.preventionweb.net/files/43291_sendaif

"The 2030 Agenda for Sustainable Development":

<https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development.pdf>

"UN Convention on the Law of the Non-navigational Uses of International Watercourses" (Pages to be specified)
http://legal.un.org/ilc/texts/instruments/english/conventions/8_3_1997.pdf

"UNSGAB Hashimoto Action Plan 1": to be distributed by the lecturer

"UNSGAB Journey"

<https://sustainabledevelopment.un.org/content/documents/8701unsgab-journey-web.pdf>

Other materials to be distributed by the lecturer when necessary

5. Software Used in Lectures :

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

対面出席を原則とするが、病気等やむを得ない場合はリモート聴講も可とするので事前に申し出ること(In-person attendance is required, but remote attendance is permitted in unavoidable circumstances such as illness, so please notify us in advance.)

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Academic Year (April - March of the next year)	2025
Course Number	DMP8860E
Course Name	Water and Sanitation
Instructor	TAKIZAWA Satoshi, FURUMAI Hiroaki／滝沢 智, 古米 弘明
Email Address	
Term／Day／Period	Winter, Spring 冬、春
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

Rapid population growth, political instability, and lack of funds have led to an increase in waterborne diseases, a loss of human dignity, an increase in gender-based violence, regional disparities, and conflicts over limited water resources. Improving access to water and sanitation will have a ripple effect on nutrition, health, education, gender, climate change, and other areas, contributing to the achievement of the SDGs as a whole.

In this course, students will learn the history and role of the development of water supply and sewerage systems, in addition to their composition and structure, function, planning, facility design, construction, operation and management.

[Course Goals]

1. Students will deepen their understanding of the functions, roles, and structures of water supply and sewerage systems, which are the arteries and veins of cities.
2. Students will acquire the basic knowledge necessary for planning, designing, and managing water supply and sewerage facilities.
3. Based on the knowledge gained through lectures, students will review water and sanitation issues in their own countries and develop the ability to design appropriate systems through international comparisons.

[Related Diploma Policy (DP)]

1. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice.
4. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society.

2. Course Outline :

1. Water, Sanitation and SDGs (FURUMAI)
2. Appropriate Technologies for Water and Sanitation in Developing Countries (FURUMAI)
3. Water Sources for Water Supply, Part 1: Types of Water Sources, Characteristics, Water Quality, and Droughts (TAKIZAWA)

4. Water Sources for Water Supply, Part 2: Types of Water Sources, Characteristics, Water Quality, and Droughts (TAKIZAWA)
5. Water Quality and Water Treatment Technology, Part 1 : Water Quality Standards, Water Safety Plans, and Water Treatment and Disinfection Technology (TAKIZAWA)
6. Water Quality and Water Treatment Technology, Part 2 : Water Quality Standards, Water Safety Plans, and Water Treatment and Disinfection Technology (TAKIZAWA)
7. Design and Maintenance of Water Supply Pipelines Part 1: Measures to Reduce Water Loss (NRW Reduction), Seismic Reinforcement of Pipelines, Pipeline Blockage and DMA, EPANET-2 (TAKIZAWA)
8. Design and Maintenance of Water Supply Pipelines Part 2: Measures to Reduce Water Loss (NRW Reduction), Seismic Reinforcement of Pipelines, Pipeline Blockage and DMA, EPANET-2 (TAKIZAWA)
9. History and Roles of Sewerage Systems (FURUMAI)
10. Planning and Facility Design of Sewerage Systems (FURUMAI)
11. Operation and Management of Sewerage Systems (FURUMAI)
12. Water, Sanitation and Hygiene (WASH) Projects in India (FURUMAI)
13. Lectures by Overseas Lecturers,
- 14-15. Review of Case Studies from Various Countries and Discussion of Improvement Methods, etc. (TAKIZAWA, FURUMAI)

Note: As a general rule, each class will be offered in person. However, it may be conducted online depending on the circumstances.

[Out-of-class Learning]

After the lecture, students review the content and ask any questions they may have. Students can learn about the basics of water and sanitation by searching the lecture materials and related research publications. These resources will help students expand their knowledge beyond water and sanitation to include disasters and the environment.

3. Grading :

Students will receive grades ranging from A to D or E based on their contributions to Classes 14 and 15 ("Review of Case Studies," 30%) and their final exam results (70%). The exam will be administered after Class 15.

[Grading Criteria]

Below are examples of grading criteria. Please set the criteria that meet your course / course goals.

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Teaching materials are provided at each lecture.

4-2:Others

WHO global water, sanitation and hygiene: annual report 2023

<https://www.who.int/publications/i/item/9789240106079>

Management of Wastewater in Japan

https://www.jswa.jp/en/jswa-en/pdf/SWJ_2024_Management_of_Wastewater_in_Japan2.pdf

Essence of Japanese Sewerage Law

<https://www.jswa.jp/en/jswa-en/pdf/Essence%20of%20Japanese%20Sewerage%20Law20190219.pdf>

1. Abbas, M., Kazama, S., Takizawa, S., Water demand estimation in service areas with limited numbers of customer meters—Case study in Water and Sanitation Agency (WASA) Lahore, Pakistan, *Water*, 14, 2191, 2022. <https://doi.org/10.3390/w14142197>
2. Alfonso, S. M, Kazama, S., Takizawa, S., Inequalities in access and consumption of safely managed water due to socio-economic factors: Evidence from Quezon City, Philippines, *Current Research in Environmental Sustainability*, 4, 2022. <https://doi.org/10.1016/j.crsust.2021.100117>
3. Amin, S., Kazama, S., Sawangjang, B., Takizawa, S., Causes and effects of scale deposition in water supply pipelines in Surakarta City, Indonesia, *Water*, 16, 2275, 2024. <https://doi.org/10.3390/w16162275>
4. Chandaeng, S., Kazama, S., Sawangjang, B., Takizawa, S., Analysis of the factors influencing the fluctuation of non-revenue water in Luangprabang City, Laos, *AQUA – Water Infrastructure, Ecosystems and Society*, 73, 3, 453. <https://doi.org/10.2166/aqua.2024.246>
5. Hashimoto, R., Kazama, S., Hashimoto, T., Oguma, K., Takizawa, S., Planning methods for conjunctive use of urban water resources based on quantitative water demand estimation models and groundwater regulation index in Yangon City, Myanmar, *Journal of Cleaner Production*, 113123, 2022. <https://doi.org/10.1016/j.jclepro.2022.133123>
6. Indrastuti, Kazama, S., Takizawa, S., Evaluation of microbial contamination of groundwater under different topographic conditions and household water treatment systems in Special Region of Yogyakarta Province, Indonesia, *Water*, 13, 1673, 2021. <https://doi.org/10.3390/w13121673>
7. Khaing K. S., Kazama, S., Takizawa, S., Assessment of billed-unmetered water consumption to improve water utility management in Yangon City, *J. JSCE, Ser. G (Environmental Research)*, Vol. 63, No. 7, III277-III285, 2020. https://doi.org/10.2208/jscejer.76.7_III_277
8. Khanal, S. Sawangjanb, B., Kazama, S., Takizawa. S., Performance assessment of household water treatment and safe storage in Khatmndu Valley, Nepal, *Water*, 15, 2305, 2023. <https://doi.org/10.3390/w15122305>
9. Mitria, W., Sawangjanb, B., Kazama, S., Takizawa. S., Assessment of water reclamation and reuse in Bali Province, Indonesia, *Water*, 15, 2642, 2023. <https://doi.org/10.3390/w15142642>
10. Pathirane, A., Kazama, S., Takizawa, S., Dynamic analysis of non-revenue water in district metered areas under varying water consumption conditions owing to COVID-19, *Heliyon*, 20, e23516, 2024. <https://doi.org/10.1016/j.heliyon.2023.e23516>
11. Phea, S., Kazama, S., Takizawa, S., Performance assessment for increasing connection rates of private water supply operators in Cambodia.,, *Water*, 14, 2369, 2022. <https://doi.org/10.3390/w14152369>
12. Purwandari, T. W., Kazama, S., Takizawa, S., Water consumption analysis of small islands supplied with desalinated water in Indonesia, *J. JSCE, Ser. G (Environmental Research)*, Vol. 77, No. 7, III-129-III_140, 2021. https://doi.org/10.2208/jscejer.77.7_III_129
13. Shrestha, A., Kazama, S., Takizawa, S., Influence of service levels and COVID-19 on water supply inequalities of community-managed service providers in Nepal, *Water*, 13, 1349, 2021. <https://doi.org/10.3390/w13101349>
14. Shrestha, A., M., Kazama, S., Sawangjang, B., Takizawa, S., Improvement of removal rates for iron and manganese in groundwater using dual-media filters filled with manganese-oxide-coated sand and ceramic in Nepal, *Water*, 16, 2450, 2024. <https://doi.org/10.3390/w16172450>
15. Taftazani, R., Kazama, S., Takizawa, Spatial analysis of groundwater abstraction and land subsidence for planning the piped water supply in Jakarta, Indonesia. *Water*, 14,3197, 2022. <https://doi.org/10.3390/w14203197>

16. Urfanisa, D., Kazama, S., Takizawa, S., Evaluation of a slum upgrading program for improvement of water supply in Bandung City, Indonesia. *Water*, 14, 3025, 2022.
<https://doi.org/10.3390/w14193025>
17. Widianingtias, M., Kazama, S., Sawangjang, B., Takizawa, S., Assessment of water reclamation and reuse potential in Bali province, Indonesia, *Water*, 15, 2642, 2023.
<https://doi.org/10.3390/w15142642>
18. Zikrina, M. N., Kazama, S., Sawangjang, B., Takizawa, S., Filling discrepancies between consumer perception and actual piped water quality to promote the potable use of the municipal water supply in Indonesia, *Sustainability*, 16, 7082, 2024. <https://doi.org/10.3390/su16167082>
19. Zin, N. N., Kazama, S., Takizawa, S., Network model analysis of residual chlorine to reduce disinfection byproducts in water supply sstems in Yangon City, Myanmar, *Water*, 13, 2921, 2021.
<https://doi.org/10.3390/w13202921>

5. Software Used in Lectures :

EPANET 2.2, Downloadable at <https://www.epa.gov/water-research/epanet>

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8861E
Course Name	Water and Poverty
Instructor	KAWASAKI Akiyuki／川崎 昭如
Email Address	
Term／Day／Period	Winter, Spring 冬、春
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

Goal 1 of the Sustainable Development Goals (SDGs) is to "end poverty everywhere and in all its forms". Poverty is a multifaceted problem and its solution requires a comprehensive understanding of multidimensional issues such as global environmental changes, including climate change and frequent natural disasters, in addition to increasing human activities and socio-economic changes. This course provides the basic knowledge and discussion opportunities to develop comprehensive insights into the links between water and poverty and to explore solutions. The impact of water on poverty is complex and includes various aspects, such as water resources, sanitation, education, security, sustainability. This course will provide an overview of this issue, but with a special focus on disasters.

[Course Goals]

Through this course, students will learn the basic ideas and theories of poverty and development that have been argued in the humanities and social sciences, and will deepen their knowledge through case studies in Asia and Africa and their understanding of the bigger picture of the issue. The course will also enable students to discuss approaches to climate change adaptation strategies, disaster risk reduction investments and other problem-solving measures.

[Related Diploma Policy (DP)]

1. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice.
4. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.
5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society.

2. Course Outline :

1. Definition, types, and measurement of poverty
2. Global poverty situation (past and present, MDGs, SDGs)
3. Water and poverty issues (water access (resource inequality), water quality and health, sewage management, water-borne diseases, disasters, water security)
4. Impact of global warming on water and poverty
5. Framework for capturing water and poverty (vulnerability, risk, resilience)

6. Water and education (impact of lack of access to water on education, gender issues)
7. Case studies: Riverine floods and poverty in Southeast Asia; Coastal disasters and coastal erosion and poverty in Africa
8. International cooperation (projects supported by MDBs and Official Development Assistance)
9. Policy making for poverty alleviation: Development Economics approach (RCT, Microfinance)
10. Group work
11. Group work
12. Case study: Floods and poverty in old Tokyo, and solutions
13. Disaster risk reduction investment 1: Climate adaptation strategies in flood prone areas
14. Disaster risk reduction investment 2: Long-term socioeconomic spillovers, nature-based solutions
15. Student presentation

[Out-of-class Learning]

After the lecture, review the content and ask any questions students may have. Students can learn about the basics of water and sanitation by searching the lecture materials and related research publications. These resources will help students expand their knowledge beyond water and peace to include disasters and the environment.

3. Grading :

Students will receive grades ranging from A to D or E based on their active discussion in the class (20%), final presentation (30%), final report (50%).

[Grading Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1: Required

4-2: Others

- Chambers, R. (1983) *Rural Development: Putting the Last First* (Volume 198), Longman, London. (訳書 : 『第三世界の農村開発』 ロバート・チェンバース, 1995)
- Piers Blaikie, Terry Cannon, Ian Davis, Ben Wisner (2004) *At Risk: Natural hazards, people's vulnerability and disasters*, Routledge, London. (訳書 : 『防災学原論』, 岡田憲夫 (監訳) , 2010)
- Abhijit V. Banerjee and Esther Duflo (2011), *Poor Economics: A Radical Rethinking of the Way to Fight Global Poverty*. (訳書 : 『貧乏人の経済学—もういちど貧困問題を根っこから考える』 アビジット・V・バナジー, エステル・デュフロ, 2012)
- Abhijit V. Banerjee and Esther Duflo (2019), *Good Economics for Hard Times*. (訳書 : 『絶望を希望に変える経済学—社会の重大問題をどう解決するか』 アビジット・V・バナジー, エステル・デュフロ, 2020)

5. Software Used in Lectures :

None

6. Auditing ; Allow or Not Allow :

Allow

7. Note :

Back

Academic Year (April - March of the next year)	2025
Course Number	DMP8862E
Course Name	Water and Peace
Instructor	ISHIWATARI Mikio／石渡 幹夫
Email Address	
Term／Day／Period	Winter, Spring 冬、春
Credits	2

1. Course Description and the Learning Objectives :

[Course Description]

Water has long been a source of conflict between regions, countries, and local communities within river basins. Tensions arise over water distribution, as well as responses to flooding and water pollution. These conflicts are exacerbated by socioeconomic factors such as population growth, urbanization, and changes in industrial structure, as well as climate change. Furthermore, conflict combined with climate change increases climate vulnerability.

However, water can be both a source of conflict and an important tool for peacebuilding. Proper management of the water cycle systems can promote cooperation among river basin communities, regional societies, and the international community. The functions of the water cycle can be utilized as a tool for peace through mutual cooperation among relevant organizations. This improves everyday sustainability and mitigates water disaster risks during normal times and accelerates recovery and reconstruction in times of disasters.

This course will help students understand conflicts over water resources by examining specific examples from Japan and other countries. It will also discuss organizations, agreements, governance, and international cooperation aimed at mitigating conflicts. Through a combination of theory and practice, the course aims to cultivate practical problem-solving skills in water resource management.

[Course Goals]

1. Students will understand and be able to analyze conflicts over water between regions, countries, and local communities within a river basin.
2. Students will understand the mechanisms for mitigating conflicts and be able to explain how to apply them.
3. Students will understand and be able to evaluate international cooperation systems for transboundary rivers.

[Related Diploma Policy (DP)]

1. Ability to make maximum use of available tools, and/or develop new one to explore, collect, archive, search and integrate scientific data and information as well as information of experiences, including good practices and success/failure stories, and facilitate effective risk communications.
2. Ability to conduct policy analysis for problem solving based on academic analysis from multiple perspectives with the wide-range of knowledge on disaster management policies.
3. Ability to make policy recommendations for practical solutions based on a deep understanding of the current state of theory and practice.
4. Ability to nurture creativity with which to help on-site stakeholders develop their ability to solve problems by themselves.

5. Ability to play an active role as a balanced leader based on a deep understanding of different values and systems in a global society.

2. Course Outline :

1. Introduction: Course Overview and Basic Concepts of Water Resource Management

Japan's Experience

1. Case Studies in Japan: How did conflicts create water governance during the early modern period, which then became the basis for governance during the modernization?
2. Mitigating Conflict Structures in Watershed Development: What approaches and policies were used to resolve conflicts and develop the Lake Biwa and Yodo River Basin?
3. Conflicts over Dams and Weirs: How has water governance changed to resolve environmental and societal conflicts in Japan?

Transboundary River Issues

1. Basic Framework for Water Resource Management under International Law Part 1: How does international water law govern transboundary issues?
2. Basic Framework for Water Resource Management under International Law Part 2: Case Study
3. Water Allocation Issues Part 1: What are the conflicts surrounding transboundary rivers?
4. Water Allocation Issues Part 2: What are issues in Asia
5. International Organization: What are safeguards of international organizations to address transboundary issues?
6. The Tigris-Euphrates River Case Study

Climate Change and Disaster Management

1. Climate Vulnerability Risks: How are climate change and conflict related?
2. Disaster Diplomacy: How did the recovery from the Indian Ocean Tsunami contribute to armed-conflict resolution?

Special Lectures

13-14. Leveraging Water for Peace (provisional title)

Course Summary

1. Summary of the course

[Out-of-class Learning]

After the lecture, review the content and ask any questions students may have. Students can learn about the basics of water and peace by searching the lecture materials and related research publications. These resources will help students expand their knowledge beyond water and peace to include disasters and the environment.

3. Grading :

Students will receive grades ranging from A to D or E based on their final exam results. The exam will be administered after Class 15.

[Grading Criteria]

- A: Achieved the goal at a high level
- B: Achieved the goal at a satisfactory level
- C: Achieved the goal at a generally acceptable level
- D: Achieved the goal at a minimum acceptable level
- E: Did not achieve the goal

4. Textbooks : (4-1:Required 4-2:Others)

4-1:Required

Materials are provided during classes.

4-2:Others

Ishiwatari M., and KE Seetha Ram (2024) *Sociocultural Dimensions in Water Resources Management*, Asian Development Bank Institute: Tokyo. <https://www.adb.org/publications/sociocultural-dimensions-in-water-resources-management> Ishiwatari, M., Djalante, R., Mavrodieva, A., Gómez, O. A., Prabhakar, S.V.R.K., Wataya, E., Shaw, R., (2019) *Climate Fragility Risks*

In Development Sectors: Six Principles for Managing Synergies and Trade-Offs, The University of Tokyo, The United Nations University - Institute for the Advances Study of Sustainability (UNU-IAS), Keio University, Ritsumeikan Asia Pacific University, Institute for Global Environmental Strategies (IGES), Integrated Research on Disaster Risk (IRD), Japan, 28 pages.

https://collections.unu.edu/eserv/UNU:7334/CFR_Guidance_Report_May_2019.pdf

5 . Software Used in Lectures :

6 . Auditing ; Allow or Not Allow :

Allow

7 . Note :

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