科目コード (Code)	科目名 (Course title)	Course title (English)
10F201	都市社会情報論	Information Technology for Urban Society
10F251	自主企画プロジェクト	Exercise on Project Planning
10F253	キャップストーンプロジェクト	Capstone Project
10F257	都市社会工学セミナーA	Seminar on Urban Management A
10F259	都市社会工学セミナーB	Seminar on Urban Management B
10F150	長期インターンシップ	Long-Term Internship
10U210	都市社会工学実習	Practice in Urban Management
10F003	連続体力学	Continuum Mechanics
10F067	構造安定論	Structural Stability
10F068	材料・構造マネジメント論	Material and Structural System & Management
10F261	地震・ライフライン工学	Earthquake Engineering/Lifeline Engineering
10W001	社会基盤構造工学	Infrastructural Structure Engineering
10F009	構造デザイン	Structural Design
10F010	橋梁工学	Bridge Engineering
10A019	コンクリート構造工学	Concrete Structural Engineering
10F227	構造ダイナミクス	Structural Dynamics
10F263	サイスミックシミュレーション	Seismic Engineering Exercise
10F415	環境材料設計学	Ecomaterial Design
10F089	社会基盤安全工学	Infrastructure Safety Engineering
10F075	水理乱流力学	Hydrodynamics and Turbulence Mechanics
10F019	河川マネジメント工学	River Management
10A040	流砂水理学	Sediment Hydraulics
10F464	水工計画学	Hydrologic Design and Management
10F462	海岸波動論	Coastal Wave Dynamics
10F267	水文気象防災学	Hydro-meteorologically based Disaster Prevention
10A222	水資源システム論	Water Resources Systems Analysis
10F077	流域治水砂防学	River basin management of flood and sediment
10F011	数値流体力学	Computational Fluid Dynamics
10F065	水域社会基盤学	Hydraulic Engineering for InfrastructureDevelopment and Management
10F100	応用水文学	Applied Hydrology
10F103	環境防災生存科学	Case Studies Harmonizing Disaster Managementand Environment Conservation
10F106	流域管理工学	Integrated Disasters and Resources Management in Watersheds
10F025	地盤力学	Geomechanics
10K016	計算地盤工学	Computational Geotechnics
10F238	ジオリスクマネジメント	Geo-Risk Management
10F241	ジオコンストラクション	Construction of Geotechnical Infrastructures
10F405	ジオフロント工学原論	Fundamental Geofront Engineering
10A055	環境地盤工学	Environmental Geotechnics
10F109	地盤防災工学	Disaster Prevention through Geotechnics
10F203	公共財政論	Public Finance
10F207	都市社会環境論	Urban Environmental Policy
10F219	人間行動学	Quantitative Methods for Behavioral Analysis
10F215	交通情報工学	Intelligent Transportation Systems
10A805	リモートセンシングと地理情報システム	Remote Sensing and Geographic Information Systems
10A808	景観デザイン論	Civic and Landscape Design
10F223	リスクマネジメント論	Risk Management
10X333	災害リスク管理論	Disaster Risk Management
693287	防災情報特論	Disaster Information
733707	環境デザイン論	Environmental Design Research
10A402	資源開発システム工学	Resources Development Systems
10F053	応用数理解析	Applied Mathematics in Civil & Earth Resources Engineering
10A405	地殻環境工学	Environmental Geosphere Engineering
10F071	応用弾性学	Applied Elasticity for Rock Mechanics
10F073	物理探査の基礎数理	Fundamental Theories in Geophysical Exploration
10F076	地下空間と地殻物性	Underground space and petrophysics
10F085	地殻環境計測	Measurement in the earth's crust environment
10F088	地球資源学	Earth Resources Engineering
10X311	都市基盤マネジメント論	Urban Infrastructure Management
10F113	グローバル生存学	Global Survivability Studies
693291	危機管理特論	Emergency Management
10F380	強靭な国づくりのためのｴﾝｼﾞﾆｱﾘﾝｸﾞｾﾐﾅｰ	Engineering Seminar for Disaster Resiliencein ASEAN countrie
10F382	安寧の都市のための災害及び健康ﾘｽｸﾏﾈｼﾞﾒﾝﾄ	Disaster and Health Risk Management for Liveable City
756790	エネルギービジネス展開論	Business Development in Energy
10i049	エンジニアリングプロジェクトマネジメント	Project Management in Engineering
10i059	エンジニアリングプロジェクトマネジメント演習	Exercise on Project Management in Engineering

未更新

Numbering code			
Course title <English>	都市社会情報論 Information Technology for Urban Society	Affiliated department, Job title,Name	Graduate School of Management Associate Professor,OOBA TETSUHARU

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.1	Class style	Lecture	Language	Japanese and English

[Outline and Purpose of the Course]

The advancement of urban society by the use of information has been realized through the remarkable development of informational communication technology. This seminar has the discussions about the worth and affect in the urban society using engineering and economic estimation method, and lectures about the way of maintenance, operation and management of urban systems in the advanced informational and knowledge-intensive society.

[Course Goals]

[Course Schedule and Contents]

,15times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Details will be provided in the first lecture.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	自主企画プロジェクト Exercise on Project Planning	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,ONDA SHINICHIROU

Target year		Number of credits	2	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Practical training	Language	Japanese and English

[Outline and Purpose of the Course]

The purpose of this seminar is to bring out the self-initiative, the planning ability, the creativity of students. From project and to practice, the students set up the goals of projects, go ahead with the projects by themselves, and finally make the presentations of project results. Specifically, about the internship activities in enterprises, the training activities in enterprises or universities at home and abroad, the planning and operation of collaborative projects with citizen, the student makes the perfect plannings including the purposes, the ways, the results and so on. For a final, the students do practice, they write the reports and make the presentations about the project results.

[Course Goals]

Goals are cultivating ability for self-initiative, planning and creativity.

[Course Schedule and Contents]

Course introduction,1time,
Proposal of project,6times,
Management of project,12times,
Progress report,1time,
Final report,8times,
Presentation,2times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Planning, implementation of project and reports are comprehensively evaluated.

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Details are provided in the first lecture.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	キャップストーンプロジェクト Capstone Project	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,FURUKAWA AIKO

Target year		Number of credits	2	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Practical training	Language	Japanese and English

[Outline and Purpose of the Course]

The students plan and implement projects on various problems in the urban society by widely making use of the basic knowledge which you have gotten in Undergraduate or Master Course. Actually, the students simulate the actual problems for which you collect and analyze the data, and then evaluate the practice and effect of projects. At the end, the students write the reports about a series of project results and make the presentations about them.

[Course Goals]

Goals are to cultivate students' ability for planning, creativity and communication.

[Course Schedule and Contents]

Guidance,1time,
Plan projects,4times,
Implement projects,6times,
Analyze and evaluate projects,12times,
Discuss results,6times,
Presentation,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation for each student is made comprehensively based on both report and presentation about the project, and usual contribution of student to the project.

[Textbook]

Non

[Reference books, etc.]

（Reference books）

Non

[Regarding studies out of class (preparation and review)]

Examine the project theme.

（Others (office hour, etc.)）

Details will be provided in the first lecture.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	都市社会工学セミナーA Seminar on Urban Management A	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NARA YOSHITAKA

Target year		Number of credits	4	Course offered year/period	2019/Intensive, year-round

Day/period	Intensive	Class style	Seminar	Language	Japanese

[Outline and Purpose of the Course]

This seminar has the lectures about the movement and content of the most advanced research at home and abroad on Urban Management Engineering.. Also, the teachers in this seminar instruct the students individually about the planning of study schedule, the way of collecting datas, doing the research and summarizing the results of research on the concrete and specific themes.

[Course Goals]

[Course Schedule and Contents]

,2times,
,6times,
,8times,
,6times,
,8times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Points are allocated for research activities such as a presentation at laboratory seminars, domestic conferences, international conferences, research paper presentation etc. Students are required to obtain the points in total which are more than predefined points.

Students are required to get no less than 10 points in total for two years from M1 to M2, no less than 3 points in each year.

1 point: Presentation at laboratory seminar (only if supervisor agrees), oral presentation in the annual meeting in the Society of Civil Engineers.

1〜5 point: Attending the lecture held by Academic Society (Certification is required), number of points is determined by your supervisor in accordance to the level of difficulty for approval.

3 point : Presentation in English in international conference. If the papers are peer-reviewed, the points are determined as journal papers (see below).

5〜10 point: Fist author or coauthor of published and/or accepted journal papers (e.g., for Journal of Society of Civil Engineers, ASCE Journal, etc.) (Number of points is determined by your supervisor depending on level of journal and/or your contribution.)

Others: Exercise on project or training course (Number of points is determined by your supervisor). However, the activities related to the other courses are not admitted, which are Exercise on Project Planning, Capstone Project, Internship on Infrastructure Engineering, Long-Term Internship, Practice in Infrastructure

Continue to 都市社会工学セミナーA(2)↓↓↓

都市社会工学セミナーA(2)

Engineering or Practice in Urban Management.

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	都市社会工学セミナーB Seminar on Urban Management B	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NARA YOSHITAKA

Target year		Number of credits	4	Course offered year/period	2019/Intensive, year-round

Day/period	Intensive	Class style	Seminar	Language	Japanese

[Outline and Purpose of the Course]

The students make the collection of datas, research and summarize the research results about the concrete and specific themes on Urban Management Engineering.. In addition, the teachers in this seminar instruct the students individually about the way of presentations of research results through the presentations and questions at the conferences at home and abroad, the ones at laboratory and participation in lecture classes.

[Course Goals]

[Course Schedule and Contents]

,2times,
,6times,
,8times,
,6times,
,8times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Points are allocated for research activities such as a presentation at laboratory seminars, domestic conferences, international conferences, research paper presentation etc. Students are required to obtain the points in total which are more than predefined points.

Students are required to get no less than 10 points in total for two years from M1 to M2, no less than 3 points in each year.

1 point: Presentation at laboratory seminar (only if supervisor agrees), oral presentation in the annual meeting in the Society of Civil Engineers.

1〜5 point: Attending the lecture held by Academic Society (Certification is required), number of points is determined by your supervisor in accordance to the level of difficulty for approval.

3 point : Presentation in English in international conference. If the papers are peer-reviewed, the points are determined as journal papers (see below).

5〜10 point: Fist author or coauthor of published and/or accepted journal papers (e.g., for Journal of Society of Civil Engineers, ASCE Journal, etc.) (Number of points is determined by your supervisor depending on level of journal and/or your contribution.)

Others: Exercise on project or training course (Number of points is determined by your supervisor). However, the activities related to the other courses are not admitted, which are Exercise on Project Planning, Capstone Project, Internship on Infrastructure Engineering, Long-Term Internship, Practice in Infrastructure

Continue to 都市社会工学セミナーB(2)↓↓↓

都市社会工学セミナーB(2)

Engineering or Practice in Urban Management.

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	長期インターンシップ Long-Term Internship	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,ONDA SHINICHIROU

Target year		Number of credits	4	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Practical training	Language	Japanese

[Outline and Purpose of the Course]

Through the long-term internship outside the university, the students can get the practical techniques, the way of finding and solving the problems, the way of integrating the techniques, the way of summarizing the results and making the presentation in each field of Urban Management.

[Course Goals]

[Course Schedule and Contents]

,15times,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Writing plans, completing internship, final report and presentation are comprehensively evaluated.

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	都市社会工学実習 Practice in Urban Management	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NARA YOSHITAKA

Target year		Number of credits	2	Course offered year/period	2019/Intensive, Second semester
Day/period	Intensive	Class style	Practical training	Language	Japanese

[Outline and Purpose of the Course]

To develop integrated and holistic understandings on Urban Management and cultivate problem-solving abilities, students are encouraged to attend a practical education and engineering program offered by educational institutes such as universities, international and domestic associations. Students attend a program under the instructions of academic supervisors. Programs are limited to the ones certified by the department.

[Course Goals]

To develop integrated and holistic understandings on Urban Management and cultivate problem-solving abilities by attending a practical education and engineering program offered by educational institutes such as universities, international and domestic associations.

[Course Schedule and Contents]

,,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Attendance and reports are comprehensively evaluated.

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	連続体力学 Continuum Mechanics	Affiliated department, Job title,Name	Graduate School of Global Environmental Studies Professor,SUGIURA KUNITOMO Graduate School of Engineering Professor,YAGI TOMOMI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Continuum mechanics is a unified basis for solid mechanics and fluid mechanics. The aims of this course are to introduce the continuum mechanics from their basics to the some forms of constitutive law and also to provide students with mathematical way of understanding the continuum mechanics. This course contains the fundamentals of vector and tensor calculus, the basic equations of continuum mechanics, the tensor expressions of elastic problems and further applications.

[Course Goals]

Fundamental theorems on structural mechanics and design will be learned, and ability to judge the proprieties of each computational structural analysis will be acquired.

[Course Schedule and Contents]

Introductions, 1time, Yagi
- Outline of Structural Analysis
- Mathematical Preliminaries (Vectors and Tensors)

Matrices and tensors, 1time, Yagi
- Summation Convention
- Eigenvalues and Eigenvectors

Differential and integral calculus of tensors, 1time, Yagi
- Quotient Laws
- Divergence Theorem

Kinematics, 1time, Yagi
- Material Description
- Spatial Description
- Material derivative

Deformation and strain, 1times, Yagi
- Strain tensors
- Compatibility conditions

Stress and equilibrium equation, 1time, Yagi
- Stress Tensors
- Equilbrium Equations

Conservation law and governing equation, 1time, Yagi
- Conservation of Mass

Continue to 連続体力学(2)↓↓↓

連続体力学(2)

- Conservation of Linear Momentum
- Conservation of Energy

Constitutive equation of idealized material, 1time, Sugiura
- Perfect Fluid
- Linear Elastic Material(Isotropic)

Elastic-plastic behavior and constitutive equation of construction materials, 1time, Sugiura
- Yield Criteria
- Flow Rule
- Hardening Rule

Boundary value problem, 1time, Sugiura
- Governing Equations and Unknowns
- Navier-Stokes Equation
- Navier Equation

Variational principle, 2time, Sugiura
- Principle of Virtual Work
- Principle of Complementary Virtual Work

Various kinds of numerical analyses, 2times, Sugiura
- Weighted Residual Method
- Finite Element Method

Confirmation of the attainment level of learning, 1time, All
Feedback based on the Final Examination

[Class requirement]

Basic knowledge for structural mechanics, soil mechanics and fluid mechanics are required.

[Method, Point of view, and Attainment levels of Evaluation]

Assessment will be based on exam, report and participation.

[Textbook]

Handouts are given

[Reference books, etc.]

（Reference books）
not specified

[Regarding studies out of class (preparation and review)]

As appropriate, the assignments are given based on the content of Lecture.

Continue to 連続体力学(3)↓↓↓

連続体力学(3)

（Others (office hour, etc.)）

upon request

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	構造安定論 Structural Stability	Affiliated department, Job title,Name	Graduate School of Global Environmental Studies Professor,SUGIURA KUNITOMO Graduate School of Engineering Associate Professor,KITANE YASUO

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Fri.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Fundamental concept of static and dynamic stability of large-scale structures such as bridges is to be introduced in addition to the way to keep/improve their safety and to evaluate their performance. Basic concept of structural stability and its application and technical subjects to improve safety will be lectured systematically. Furthermore, the practical solutions to the subjects are to be introduced to assure the safety of structures.

[Course Goals]

The class aims to cultivate the understanding of static and dynamic stability problems for structural system and make understand the methodology to clarify the limit state. To get knowledge on countermeasures to assure the stability which is applicable to practical design and manufacturing will be also required.

[Course Schedule and Contents]

Elastic Stability under Static Loading(8)
\\Stability of Structures and Failures
\\Basis of Structural Stability
\\Elastic Buckling of Columns
\\Elastic Buckling of Beams & Frames
\\Elastic Torsional Buckling of Beams
\\Elastic Buckling of Plates
\\Elasto-plastic Buckling
\\Buckling Analysis

Basic Theory of Dynamic Stability(3)
\\Dynamic Response Characteristics of Structural System
\\State Equation of Motion with Nonlinearities in External, Damping and Restoring Force,
\\Stability around Equilibrium Points

Examples of Structural Instability under Dynamic Loadings(3)
\\Instability under Nonconservative Force
\\Instability under Periodical Force
\\Instability under Impact Force

Achievement Check(1)
Summary and Achievement Check

[Class requirement]

It is desired for participants to master structural mechanics, continuum mechanics, mathematical analysis as well as vibration theory.

Continue to 構造安定論(2)↓↓↓

構造安定論(2)

[Method, Point of view, and Attainment levels of Evaluation]

Grading will be evaluated by written examination, reports and attendance.

[Textbook]

Not specified.

[Reference books, etc.]

（Reference books）

Introduced in class if necessary.

（Related URLs）

(none)

[Regarding studies out of class (preparation and review)]

Work on Assignments

（Others (office hour, etc.)）

none

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	材料・構造マネジメント論 Material and Structural System & Management	Affiliated department, Job title,Name	Graduate School of Management Professor,KAWANO HIROTAKA Graduate School of Engineering Associate Professor,HATTORI ATSUSHI Graduate School of Engineering Associate Professor,YAMAMOTO TAKASHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Regarding the maintenance of concrete structures, the deterioration prediction procedures in material and structural properties will be described based on durability and deterioration processes of concrete structures. Repairing materials and methods are also introduced. Note: strengthening materials and methods will be described in Concrete Structural Engineering, provided in the second semester. In the later half of this lecture, structures are focused as groups rather than an individual structure to understand the difference between asset management and maintenance. By taking into consideration the economic aspect and human resources aspect as well as the physical aspect, the work flow of the asset management for structures with view points of the life cycle cost and the budget will be described.

[Course Goals]

Understanding the maintenance targeting individual structure and asset management for targeting structures.

[Course Schedule and Contents]

1. Outline of maintenance for concrete structures, 1
Outline of the durability and deterioration of concrete structures
Outline of the maintenance management of concrete structures

2. Deterioration mechanisms of concrete structures and deterioration prediction, 4
Infiltration and shift of degradation factors, reaction mechanisms, deterioration of materials and adhesion characteristics, deterioration of mechanical performance

3. Repair materials and methods for concrete structures, 1
Repair materials and methods for concrete structures

4. Maintenance and asset management, 3
Overview and work flow of asset management
Performance of structure

5. Maintenance for structures, 3
Inspection and its sophistication and simplification
Deterioration prediction, uncertainty, and safety factors

6. Management for structures, 2
Remedial measures, LCC calculation, and levelization
Prospect of asset management

Continue to 材料・構造マネジメント論(2)↓↓↓

材料・構造マネジメント論(2)

7. Confirmation of learning achievements, 1

[Class requirement]

Basic knowledge on Construction Materials, Concrete Engineering and Steel Engineering.

[Method, Point of view, and Attainment levels of Evaluation]

Reports and mini quizzes will be assigned, and the overall score will be judged.

[Textbook]

Not used
Some handouts will be distributed as necessary.

[Reference books, etc.]

（Reference books）

Introduced during class
To be introduced during class.

（Related URLs）

http://csd.kuciv.kyoto-u.ac.jp/(Department of Urban Manatement, Structures Management Engineering (Hirotaka Kawano, Atsushi Hattori))
http://sme.kuciv.kyoto-u.ac.jp/(Department of Civil & Earth Resources Engineering, Structural Materials Engineering (Takashi Yamamoto))

[Regarding studies out of class (preparation and review)]

1. Previewing the handouts.
2. Reviewing by tackling mini quizzes.

（Others (office hour, etc.)）

It is expected that students will actively participate in the lectures by showing their positive presence.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	地震・ライフライン工学 Earthquake Engineering/Lifeline Engineering	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,IGARASHI AKIRA Graduate School of Engineering Professor,KIYONO JIYUNJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This course deals with the mechanism and propagation characteristics of the seismic ground motion that often greatly affects the urban society, in particular the wave generation in the earthquake fault and the ground vibration analysis, and the elastic and elastoplastic response of the structures to the seismic ground motions. The topics include the dynamic response characteristics of RC/steel structures, current seismic response control technology, basic theory and technical development of lifeline earthquake engineering, thoretical aspect of lifeline management and safety assessment learned from past damage experience.

[Course Goals]

[Course Schedule and Contents]

,2times,
,1time,
,1time,
,1time,
Principles of seismic design of structures,2times,Fundamental thories on dynamic response of nonlinear elastoplastic structural systems and representative seismic design principles
Seismic performance of concrete and steel structures,1time,Essentials and current issues related to seismic performance and design of RC and steel structures
Seismic response control and seismic retrofit of structures,1time,Idea and current issues on seismic isolation, seismic response control techniques for enhancement of seismic performance of structures, and seismic retrofit and rehabilitation of existing structures
,1time,
,2times,
,1time,
,1time,
Achievement evaluation,1time,Students#039 achievements in understanding of the course material are evaluated.

[Class requirement]

None

Continue to 地震・ライフライン工学(2)↓↓↓

地震・ライフライン工学(2)

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

Not specified

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	社会基盤構造工学 Structural Engineering for Civil Infrastructure	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,FURUKAWA AIKO

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Thu.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Structural engineering problems related to planning, design, construction and maintenance of the infrastructures are discussed. Topics concerning structural engineering and management are widelly taken up including latest advanced knowledge and technology, future view and/or international topics. Special lectures by extramural lecturers are carried out if necessary.

[Course Goals]

To grasp problems related to structural engineering and their specific solutions.
To understand applicability of advanced technologies and development prospects.

[Course Schedule and Contents]

Structural Materials, Structural Mechanics,4times,Steel materials, Concrete materials, mechanical behavior of structures, Problems related to design, construction and maintenance
Applied Mechanics,1time,Numerical analysis for structure performance evaluation
Earthquake and Wind Resistance of Structures,7times,Infrastructure and natural disaster, Trends of disaster prevention technology, Problems related to Earthquake and wind resistant design
Maintenance of structure,3times,International technology, Scenario design, International technological education and collaboration

[Class requirement]

Structural Mechanics, Wind Resistant Design, Construction Materials, Dynamics of Structures, etc.

[Method, Point of view, and Attainment levels of Evaluation]

Coursework will be graded based on the reports.

[Textbook]

The textbook is not required. Materials will be supplied by instructors.

[Reference books, etc.]

（Reference books）
Supplemental text books will be introduced by instructors.

[Regarding studies out of class (preparation and review)]

To review today's topics.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	構造デザイン Structural Design	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TAKAHASHI YOSHIKAZU Graduate School of Engineering Associate Professor,MATSUMURA MASAHIDE

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This course provides the knowledge of the structural planning and design for civil infrastructures. Fundamentals of the reliability of structures based on the probability and statistics are given. Emphasis is placed on the reliability index and the calibration of partial safety factors in the LRFD design format. Furthermore, the relationship between structure and form is discussed with various examples.

[Course Goals]

To understand the structural planning and design for civil infrastructures.
To understand the reliability-based design of structures.
To deepen the understanding of the relationship between structure and form.

[Course Schedule and Contents]

Structural Planning,2times,Structural Planning of civil infrastructures is introduced. The concept, significance of planning, characteristics of civil infrastructures are discussed. Practical planning process of a bridge is explained.
Structure and Form,3times,The bridge types such as girder, truss, arch and suspension bridge that have been regarded individually are explained as an integrated concept from the viewpoint of acting forces to understand the structural systems which have continuous or symmetrical relationships. Furthermore, various examples are discussed based on the understanding of the structural systems.
Structural Design and Performance-based Design,3times,Design theory of civil infrastructures is introduced. The allowable stress design method and the limit state design method are explained. The basic of earthquake resistant design is discussed based on the dynamic response of structures. Performance-based design is also introduced.
Random Variables and Functions of Random Variables,1time,Fundamentals of random variables, functions of random variables, probability of failure and reliability index in their simplest forms are lectured.
Structural Safety Analysis,3times,Limit states, probability of failure, FOSM reliability index, Hasofer-Lind reliability index, Monte Carlo method are lectured.
Design Codes,2times,Code format as Load and Resistance Factors Design (LRFD) method, calibration of partial safety factors based on the reliability method are given.
Assessment of the Level of Attainment,1time,Assess the level of attainment.

[Class requirement]

Fundamental knowledge on Probability and Statistics, and Structural Mechanics

Continue to 構造デザイン(2)↓↓↓

構造デザイン(2)

[Method, Point of view, and Attainment levels of Evaluation]

Assessed by term-end examination, reports and quizes

[Textbook]

Reliability of Structures, A. S. Nowak amp K. R. Collins, McGraw-Hill, 2000

[Reference books, etc.]

（Reference books）

U.Baus, M.Schleich, Footbridges, Birkhauser, 2008（Japanese ver.: Footbridges(translated by Kubota, et al.), **鹿島出版会**, 2011）**久保田善明**, **『橋のディテール図鑑』**, **鹿島出版会**, 2010\Other books will be given in the lectures as necessary.

[Regarding studies out of class (preparation and review)]

N/A

（Others (office hour, etc.)）

Structural planning and design will be given by Y. Takahashi, and Structural reliability analysis by M. Matsumura.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	橋梁工学 Bridge Engineering	Affiliated department, Job title,Name	Graduate School of Global Environmental Studies Professor,SUGIURA KUNITOMO Graduate School of Engineering Professor,YAGI TOMOMI Graduate School of Engineering Associate Professor,KITANE YASUO Graduate School of Engineering Assistant Professor,NOGUCHI KYOHEI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The subject matter of bridge engineering can be divided into two main parts, which are steel structure and wind loading/wind resistant structure. The aim of this course is to provide details of mechanical behaviors, maintenance and design of bridge structures. The former part of this course contains the static instability of steel structures and the problems of corrosion、fatigue、brittleness、weldability on steel bridges. In the latter part, the basics of wind engineering, bridge aerodynamics and wind-resistant design　including current problems to be solved are provided are provided.

[Course Goals]

Also, the basic knowledge for wind engineering and aerodynamic instabilities, which are necessary for the wind resistant design of bridges, will be acquired.

[Course Schedule and Contents]

Introduction(1, Sugiura)
- Fundamental knowledge on steel structures
- Types of steel structures
- Future trend of steel structures
- Stress-strain relationship
- High performance steels

Failures of Steel Structures(1, Sugiura)

Fabrication and Erection of Steel Structures(1, Sugiura)
- Initial imperfections
- Construction of steel structures
- Residual stresses and initial deformations
- Joints(welded and bolted)

Fatigue fracture, fatigue life and fatigue design(1, Sugiura)
- S-N design curve
- Fatigue crack growth, stress intensity factor
- Miner's rule on damage accumulation
- Repair of fatigue damage

Structural stability and design for buckling(1, Sugiura)

Continue to 橋梁工学(2)↓↓↓

橋梁工学(2)

- Structural instability and accident
- Theory of Stability
- Compressive members, etc.

Corrosion and anti-corrosion of steel structures(1, Sugiura)
- Mechanism of corrosion
- Micro- and Macro- cells
- Anti-corrsion
- Life-cycle costs

Wind resistant design of structures(2, Yagi)
- Natural winds due to Typhoon, Tornado and so on
- Evaluation and estimation of strong winds
- Wind resistant design methods
- Various kinds of design codes

Aerodynamic instabilities of structures(3, Yagi)
- Introduction of aerodynamic instabilities (ex. vortex-induced vibration, galloping, flutter, buffeting, cable vibrations)
- Mechanisms of aerodynamic instabilities
- Evaluation methods and Countermeasures

Computational Fuid Dynamics(2, Noughi)
- Fundamentals of CFD
- Aplication to bridge aerodynamics

Topics(1, Sugiura)
- Introduction of current topics on bridge engineering by a visiting lecturer

Confirmation of the attainment level of learning(1, All)
Confirm the attainment level of learning

[Class requirement]

Basic knowledge for construction materials, structural mechanics and fluid mechanics are required.

[Method, Point of view, and Attainment levels of Evaluation]

Assessment will be based on exam, reports and participation.

[Textbook]

Handouts are given

[Reference books, etc.]

（Reference books）

not specified

Continue to 橋梁工学(3)↓↓↓

橋梁工学(3)

[Regarding studies out of class (preparation and review)]

work on assignment

（Others (office hour, etc.)）

upon request

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	コンクリート構造工学 Concrete Structural Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TAKAHASHI YOSHIKAZU Graduate School of Engineering Associate Professor,YAMAMOTO TAKASHI Graduate School of Engineering Assistant Professor,TAKAYA SATOSHI Part-time Lecturer,MIZUNO KATSUHIKO

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

The most common concrete is introduced as a material to be used for infrastructures in various forms. In particular, various structural forms are mentioned, including prestressed concrete. Design, construction, diagnosis, repair, strengthening, and their management in relation to performance based design will be studied.

[Course Goals]

Understanding the mechanical properties of concrete and the interaction between concrete and steel material, as well as learning the basic theories of reinforced concrete (RC) structure and prestressed concrete (PC) structure, and also design, construction and maintenance methods.

[Course Schedule and Contents]

Outline (1 time)
Outlining the purpose and composition of lectures that focus on the relationship between various concretes and infrastructure structures, as well as the grading method, and so forth

Reinforced concrete structure (6 times)
The mechanical properties of concrete structural materials constituting reinforced concrete structures and the interaction between concrete and steel material are explained, and at the same time, the analysis of the mechanical behavior of reinforced concrete structural parts that are subjected to bending, axial forces, or shearing forces is studied.

Prestressed concrete structure (6 times)
The basic theory of prestressed concrete (PC) structures, PC bridge types, PC bridge installation methods, new structures/new construction methods, bridge type selection methods, PC part design, PC bridge change and repair, recent developments of PC technology, and so forth are explained. In addition, the criteria used in Japan are introduced, and the basics of PC construction and various construction methods/structure forms using prestressing are studied.

The latest concrete technology (topics) (1 time)
The latest topics related to concrete structural engineering are covered and explained.

Confirmation of learning achievements (1 time)
The degree of achievement regarding the contents of this lecture is confirmed.

Continue to コンクリート構造工学(2)↓↓↓

コンクリート構造工学(2)

[Class requirement]

Basic knowledge on civil engineering materials science and concrete engineering

[Method, Point of view, and Attainment levels of Evaluation]

Reports and presentations will be assigned, and the overall performance for the full term will be judged.

[Textbook]

Instructed during class
Others; not specified. Research papers, and so forth will be distributed as necessary.

[Reference books, etc.]

（Reference books）

Introduced during class
Others; books will be introduced from time to time during the lectures.

[Regarding studies out of class (preparation and review)]

The contents of civil engineering materials science and concrete engineering should be reviewed.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	構造ダイナミクス Structural Dynamics	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,IGARASHI AKIRA Graduate School of Engineering Associate Professor,FURUKAWA AIKO

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

This course deals with dynamics of structural systems and related topics, to provide the theoretical basis to deal with the problems of vibration, safety under dynamic loads and health monitoring associated with infrastructures. The students will study the dynamic response, properties of natural modes and methods of eigenvalue analysis for multi-DOF systems. The topics on the numerical time integration schemes, probabilistic evaluation of structural response to random excitation, and dynamic response control techniques for structures are also studied.

[Course Goals]

(1) To aquire the knowledge on theories and principles of analysis of MDOF systems (2) Systematic understanding of frequency-domain structural response analysis (3) Concept of analysis of numerical time integration schemes (4) Understanding of fundamentals of the random vibration theory

[Course Schedule and Contents]

Introduction (1 week)
The fundamental concepts of structural dynamics and the scope of the problem to be treated are described, and the outline of the theoretical framework of methodologies for analysis is overviewed.

Dynamics of Multi-Degree-Of-Freedom Systems (2 weeks)
Basic concepts, including the formulation of vibration model of multi-degree of freedom systems, eigenvalue analysis, normal modes and modal analysis of linear systems and modeling of system damping, are described.

Frequency-Domain Analysis of System Response (1 week)
Methodology of response analysis of linear systems based on the concept of the frequency response function, and the relationship between the frequency-domain analysis and time-domain response via Fourier integral, mathematical operation and numerical procedure are described.

Numerical Time Integration (2 weeks)
Overview of the step-by-step time integration method used for numerical response analysis in the time domain is followed by the implication and mathematical analysis of the characteristics of the integration method, including stability and accuracy.

Random Vibration (6 weeks)
The methodology for stochastic modeling of inputs when the dynamic load on the structure can not be deterministically specified is shown, and the concept, theory and method for probabilistic evaluation of the dynamic response of the structures are described.

Structural Response Control (2 weeks)
The concept of dynamic response control of structures, in particular the active control and semi-active control,

Continue to 構造ダイナミクス(2)↓↓↓

構造ダイナミクス(2)

is described, and the standard theories for analysis and design are introduced.

Achievement Evaluation (1 week)
Students' achievements in understanding of the course material are evaluated.

[Class requirement]

Mechanical vibration (undergraduate level), Complex calculus (integration of analytic functions, Fourier transform, etc.), Probability theory, Linear algebra

[Method, Point of view, and Attainment levels of Evaluation]

Based on the results of a final examination, plus homework assignments

[Textbook]

Not used; Class hand-outs are distributed when necessary.

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

There will be homework assignments at the end of most of the lectures.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	サイスミックシミュレーション Seismic Engineering Exercise	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TAKAHASHI YOSHIKAZU Disaster Prevention Research Institute Professor,SAWADA SUMIO Disaster Prevention Research Institute Associate Professor,GOTOU HIROYUKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.4	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

This course provides the knowledge of simulation methods for earthquake engineering. Small groups of students are exercised in the prediction of ground motion generated by a specified seismic fault and the response analysis of structure selected by themselves considering soil-structure interaction.

[Course Goals]

At the end of this course, students will be required to have a good understanding of: - Prediction of ground motion generated by a specified seismic fault - Dynamic response analysis of structures and foundation (linear/nonlinear)

[Course Schedule and Contents]

1. Frequency domain analysis
Basics of Fourier transformation is introduced.

2. Modeling of structure - soil system and time domain analysis
Equation of motion of SR model is introduced and the integration method of the equation in time domain is explained.

3-4. Exercise of linear seismic response analysis
Small groups of students are exercised in elastic modeling of structures and linear response analysis in time domain and frequency domain.

5-7. Prediction of ground motion by empirical Green's function method
Empirical Green's function method is introduced to predict large earthquakes based on observed small earthquakes.

8-9. Seismic analysis method of soil
Seismic analysis method of layered half-space based on equivalent linearization method is introduced.

10-11. Nonlinear seismic analysis method of structures
Nonlinear modeling of structures and the integration and iterative methods of the nonlinear equation of motion in time domain are introduced.

12-14. Exercise of nonlinear seismic response analysis
Small groups of students are exercised in the prediction of ground motion generated by a specified seismic fault and the nonlinear response analysis of structures and foundation.

Continue to サイスミックシミュレーション(2)↓↓↓

サイスミックシミュレーション(2)

15. Achievement Check
All students give presentations and discussions.

[Class requirement]

Earthquake Engineering/Lifeline Engineering (10F261), Structural Dynamics (10F227)

[Method, Point of view, and Attainment levels of Evaluation]

Based on the performance during the course (including homework) and the results of presentation and reports.

[Textbook]

Not used; Class hand-outs are distributed when necessary.

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

Students require to review and analyze in preparation for final presentations.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	環境材料設計学 Ecomaterial Design	Affiliated department, Job title,Name	Graduate School of Management Professor,KAWANO HIROTAKA Graduate School of Engineering Associate Professor,HATTORI ATSUSHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Lecture on outline of impact of construntion materials to environment and influence on materials and structures from environment. Discuss how to use materials sustainably. Keywords are concrete, steel, composite materials, CO2, durability, recycle and reuse, life-cycle assessment.

[Course Goals]

To understand the limit of resources and effect of material use to environment. and to understand the basic theory to make environmental-friendly infrastructures from the view point of materials use.

[Course Schedule and Contents]

Guidance,1time,Object of the Course, Grading and Goals
product of materials and impact to environment,1time,Product of cement, steel, concrete CO2 product and its influence
recycle and reuse of materials,3times,Recycle and reuse of steel, metals, concrete, asphalt, plastics Technology development of construction materials
deterioration of concrete structures,1time,Mechanism of deterioration of concrete structures: carbonation, salt attack, alkali-aggregate reaction Maintenance and retrofit methods
deterioration of steel structures,1time,Mechanism of deterioration of steel structures: corrosion, fatigue Maintenance and retrofit methods
deterioration of composite structures,1time,Mechanism of deterioration of composite structures: Maintenance and retrofit methods
life-cycle assessment of structures,1time,Life-cycle assessment of structures considering initial cost as well as maintenance cost
topics and discussion,2times,Recent topics on construction materials and discussion
presentation by students and discussion / feedback,4times,Presentation by students on the individual topics Discussion on the topics. Feedback at the last class

[Class requirement]

Basic knowledge of construction materials, concrete engineering

[Method, Point of view, and Attainment levels of Evaluation]

Attendance(%), Report(%),Presentation(%)

Continue to 環境材料設計学(2)↓↓↓

環境材料設計学(2)

[Textbook]

No set text

[Reference books, etc.]

（Reference books）

Instructed in class

[Regarding studies out of class (preparation and review)]

Check the handouts. Additional studies will also be instructed.

（Others (office hour, etc.)）

Questions and discusions are welcome

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	社会基盤安全工学 Infrastructure Safety Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUGIYAMA TOMOYASU Graduate School of Engineering Assistant Professor,YASUDA NAOTOSHI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Thu.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

The issues concerning the safety and reliability of infrastructures such as tunnels and bridges and also the issues on natural disaster are reviewed in the lecture.

[Course Goals]

To understand the basic technologies to enhance the safety of structures and also the fundamentals on disaster prevention.

[Course Schedule and Contents]

Introduction,1time,Introduction on the safety of infrastructures
Maintenance of railway structures,1time,Planning, investigation, evaluation and repair in maintenance for mainly railway structures is generally explained
Weather information for disaster prevention,2times,Overview of weather information for disaster prevention and its monitoring system, the evaluation method for climatological statistics and extreme value statistics.
Disaster prevention in railway structures,1time,To sustain the users#039 safety in railway system, it is necessary to maintain the structures properly but also to consider the prevention against disaster. Thus herein disasters in railway structures and its counteractions are explained
Regulation and counteraction against rainfall,1time,The need for regulation in railway operation at rainfall is explained
Risk assessment for rainfall disaster,1time,Risk assessment for rainfall disaster is described and also some practical cases are introduced
Technical tour,3times,Prevention technologies against natural disaster
Earthquake and its early detection,1time,Warning system for earthquake and the algorithm of earthquake early detection, which is one of the regulations for Super expressway in earthquake, is explained
Basics of snow hydrology,2times,Physical phenomenon of snow hydrology and its relationship with natural and social environment
Countermeasures of snow disasters for railway,1time,Disorder caused by snow and ice and the countermeasures in railways
Report,1time,Report

[Class requirement]

Basic knowledge on statistics is required. Students should have taken the course of geo-mechanics, structural mechanics and concrete engineering.

Continue to 社会基盤安全工学(2)↓↓↓

社会基盤安全工学(2)

[Method, Point of view, and Attainment levels of Evaluation]

This lecture involves reports (70%) and attendance(30%)

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

confirm the attendance at every lecture

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	水理乱流力学 Hydrodynamics and Turbulence Mechanics	Affiliated department, Job title,Name	Graduate School of Management Professor,TODA KEIICHI Graduate School of Engineering Associate Professor,SANJIYOU MICHIO Graduate School of Engineering Assistant Professor,OKAMOTO TAKAAKI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

Guidance ,1time,Guidance and entrance level lecture about fluid dynamics and turbulence
Theories of turbulence ,3times,Lectures about momentum equation, boundary layer, energy transport, vortex dynamics and spectrum analysis
Turbulence in natural rivers,4times,Lectures about diffusion and dispersion phenomena observed in natural rivers.
Vegetation and turbulence,3times,Lecture about turbulence transport in vegetation canopy together with introduction of recent researches
Practical topics in natural rivers,2times,Lectures about compound channel and sediment transport
Practical topics in hydraulic engineering,2times,Lectures about drifting object in flood and fish way

[Class requirement]

Hydraulics

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	河川マネジメント工学 River Management	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HOSODA TAKASHI Graduate School of Engineering Professor,KISHIDA KIYOSHI Graduate School of Engineering Associate Professor,ONDA SHINICHIROU

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

It is important to consider about rivers comprehensively from the various points of view based on natural amp social sciences and engineering amp technology. The fundamental knowledge to consider rivers and to make the plans for river basins is explained with the following contents: various view points to consider rivers, long term environmental changes of rivers and its main factors, river flows and river channel processes, the ecological system of rivers and lakes, flood amp slope failure disasters, the integrated river basin planning(flood defense, environmental improvement planning, sediment transport system), functions of dam reservoir and management.

[Course Goals]

Students are requested to understand the fundamental knowledge to consider rivers and river basins comprehensively from the various points of view based on natural amp social sciences and engineering amp technology.

[Course Schedule and Contents]

Various view points to consider rivers and river basins,2times,Various viewpoints to consider rivers and river basins, Various rivers on the earth, Formation processes of river basins, long term environmental changes of rivers and its main factors
Ecological system in rivers,1time,The fundamental knowledge on river ecologycal system
Applications of computational methods to environmental problems,2times,The following items are lectured: Computational method to predict river flows and river channel processes with sediment transport and river bed deformation, Hydrodynamics in Lake Biwa.
Recent flood disasters amp Integrated river basin planning,3times,Characteristics of recent flood and slope failure disasters, the Fundamental river management plan and the River improvement plan based on the River Law, Procedures to make the flood control planning, Flood invasion analysis and hazard map.
Groundwater and its related field,1time,Simulation technology of groundwater, Geo-environmental issues, Reservoir Engineering, Contaminant Transport Processes.
Sustainable development of dam,1time,Needs of dam development and history of dam construction, Maintenace of Dam reservoir.
Economic evaluation of environmental improvement projects,2times,Evaluation of people#039s awareness amp WTP to river improvement projects by means of CVM, Conjoint Analysis, etc.
Riverbank and Dam structure and its maintenance,2times,River bank and dam structure, foundation, grouting. Desighn of River bank, Arch Dam and Graviety Dam.
Achievement Confirmation and Feedback,1time,Comprehension check of course contents (Reports amp Quiz)

Continue to 河川マネジメント工学(2)↓↓↓

河川マネジメント工学(2)

[Class requirement]

Fundamental knowledge on Hydraulics, Hydrology and Ecology

[Method, Point of view, and Attainment levels of Evaluation]

Reports amp Attendance

[Textbook]

Printed materials regarding the contents of this class are distributed in the class.

[Reference books, etc.]

（Reference books）

（Related URLs）

(http://www.geocities.jp/kyoto_u_rivereng/)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.) ）

Students can contact with professors by visiting their rooms and sending e-mails.
Prof. Hosoda: hosoda.takashi.4w@kyoto-u.ac.jp
Prof. Kishida: kishida.kiyoshi.3r@kyoto-u.ac.jp
Associate Prof. Onda: onda.shinichiro.2e@kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	流砂水理学 Sediment Hydraulics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,GOTOH HITOSHI Graduate School of Global Environmental Studies Associate Professor,HARADA EIJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Natural flows in river and coast are movable bed phenomena with the interaction of flow and sediment. At a river and a coast, a current and a wave activate a sediment transport and bring the topographical change of a bed such as sedimentation or erosion. This lecture provides an outline about the basics of sediment (or movable bed) hydraulics, and detail of the computational mechanics of sediment transport, which has been developed on the basis of dynamics of flow and sediment by introducing a multiphase flow model and a granular material model. Furthermore, about sediment and water-environment relationship, some of frontier technologies, such as an artificial flood, removal works of dam sedimentation, coastal protection works, and sand upwelling work for covering contaminated sludge on flow bottom etc., are mentioned.

[Course Goals]

Students understand the basics of sediment hydraulics and outline of advanced models for computational sediment hydraulics, such as multiphase flow model and granular material model. Students understand the present conditions of sediment control works.

[Course Schedule and Contents]

Introduction,1time,The purpose and constitution of the lecture, the method of the scholastic evaluation are explained.
Basics of sediment hydraulics,5times,Physical characteristic of a movable bed and a non-equilibrium sediment transport process and its description are explained. Furthermore, the prediction technique of topographical change due to current and waves is outlined.
Computational mechanics of sediment transport: The state of the art,8times,Essential parts of numerical models of the movable bed phenomena, which has been developed by introducing dynamic models such as a granular material model to describe a collision of sediment particles and a multiphase flow model to describe a fluid-sediment interaction, are described. In comparison with the conventional movable bed computation, the points on which has been improved to enhance the applicability of the models are concretely mentioned. Some frontier studies of sediment transport mechanics are also introduced.
Achievement cofirmation,1time,Comprehension check of course contents.

[Class requirement]

Undergraduate-level Hydraulics or Hydrodynamics is required. Because a commentary easy as possible is kept in mind by lectures, students without these prerequisite are welcomed.

[Method, Point of view, and Attainment levels of Evaluation]

Grading is based on studentrsquos activities in lectures and written examination.

Continue to 流砂水理学(2)↓↓↓

流砂水理学(2)

[Textbook]

Hitoshi Gotoh: Computational Mechanics of Sediment Transport, Morikita Shuppan Co., Ltd., p.223, 2004 (in Japanese).

[Reference books, etc.]

（Reference books）

Non

（Related URLs）

(Non)

[Regarding studies out of class (preparation and review)]

Review fundamental items of hydraulics or hydrodynamics.

（Others (office hour, etc.)）

Non

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	水工計画学 Hydrologic Design and Management	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TACHIKAWA YASUTO Graduate School of Engineering Associate Professor,ICHIKAWA YUTAKA

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Fri.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Hydrologic design and real-time rainfall-runoff prediction methods are described. The frequency analysis of hydrologic extreme values and the time series analysis of hydrologic variables are described, and then a procedure to determone an external force for the hydrologic design are explained. Next, a physically based hydrologic model which includes various processes of human activities for the hydrologic cycle is described. A flood control planning and water resources management with the use of innovative hydrologic simulation tools is described. Then, A real-time rainfall runoff prediction method with the use of Kalman filter theory is described.

[Course Goals]

The class aims to understand the probabilistic and statistical analysis of hydrologic variables to determine the external force of hydrologic designs, applications of hydrologic simulations for hydrologic designs, and real-time rainfall and runoff prediction methods for water resources management.

[Course Schedule and Contents]

Introduction,1time,A flood control planning and water resources planning are introduced.
Frequency analysis and hydrologic design,3times,The frequency analysis of hydrologic extreme values is described. The methods to set the external force for the hydrologic design are explained.
Time series analysis and hydrologic design,2times,The time series analysis of hydrologic variables is described. The methods to develop time series models, time serried data generation methods, spatiotemporal variation of hydrologic variables and a random field model, disaggregation methods are explained.
Hydrologic modeling and predictive uncertainty ,2times,Hydrologic models which include the process of human activities for the hydrologic cycle is described. Then, hydrologic predictive uncertainty is explained, which is inevitable coming from model structure uncertainty, parameter identification uncertainty and model input uncertainty. Especially, the relation between spatiotemporal scales of hydrologic modeling and model parameter values is described.
Hydrologic modeling system,2times,A hydrologic modeling system which helps to develop complicated hydrologic simulation models and its importance for a flood control planning is also described.
Watershed management for flood disaster,2times,Watershed management to mitigate flood disasters is described. A cost-benefit analysis of flood control measures is discussed.
Real-time rainfall runoff prediction,2times,A real-time rainfall runoff prediction method with the use of Kalman filter theory and a new filter theory is described.
Feedback of study achievement,1time,Feedback of study achievement is conducted.

Continue to 水工計画学(2)↓↓↓

水工計画学(2)

[Class requirement]

Basic knowledge of hydrology, probability and statistics are required.

[Method, Point of view, and Attainment levels of Evaluation]

Final report (100)

[Textbook]

[Reference books, etc.]

（Reference books）

（Related URLs）

(http://hywr.kuciv.kyoto-u.ac.jp/lecture/lecture.html)

[Regarding studies out of class (preparation and review)]

Read the textbook and/or related documents in advance and work on assignments to improve understanding of the lecture contents.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	海岸波動論 Coastal Wave Dynamics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,GOTOH HITOSHI Graduate School of Engineering Associate Professor,KHAYYER, Abbas Graduate School of Global Environmental Studies Associate Professor,HARADA EIJI Graduate School of Engineering Assistant Professor,IKARI HIROYUKI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Fri.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Wave motion, which is the main driving force in coastal zone, is explained focusing on wave transformation theory and computational fluid dynamics, and design for coastal structures of their engineering applications is illustrated. As for the computational fluid dynamics for waves, methodology of free-surface wave based on the Navier-Stokes equation, which has been significantly developed in recent years, is explained in detail.

[Course Goals]

Goal of this course is a detailed understanding of fundamental of wave transformation theory and computational fluid dynamics related to wave motion, and is also acquiring a design concept for coastal structures as their engineering applications.

[Course Schedule and Contents]

Introduction:
The purpose and constitution of the lecture the method of the scholastic evaluation are explained.(1)

Conservation laws of fluid:
Fundamentals of fluid mechanics, liner / non-liner wave theories and numerical mathematics are explained.(4)

Modeling of surf zone dynamics:
Several methodologies against free-surface wave including breaking waves (i.e. VOF, MPS, SPH) are illustrated. Especially advanced approaches of MPS and SPH are explained in detail.(6)

Introduction of turbulence models:
Reynolds averaging models and large eddy simulation are outlined.(1)

Modeling of rock mound dynamics:
Method for tracking of armor blocks under high waves using Distinct Element Method is described.(2)

Achievement Confirmation:
Comprehension check of course contents.(1)

Continue to 海岸波動論(2)↓↓↓

海岸波動論(2)

[Class requirement]

Non. It is desiarable to have knowledge about hydraulics, fluid mechanics.

[Method, Point of view, and Attainment levels of Evaluation]

Grading is based on student’s activities in lectures and written examination.

[Textbook]

Computational Wave Dynamics by Hitoshi Gotoh, Akio Okayasu and Yasunori Watanabe 234pp, ISBN: 978-981-4449-70-0

[Reference books, etc.]

（Reference books）

non

[Regarding studies out of class (preparation and review)]

The review after the class is necessary.

（Others (office hour, etc.)）

If there are any questions, please send e-mail to the staff. This course will be offered in 2019.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	水文気象防災学 Hydro-meteorologically based Disaster Prevention	Affiliated department, Job title,Name	Graduate School of Advanced Integrated Studies in Human Survivability Professor,TAKARA KAORU Disaster Prevention Research Institute Professor,NAKAKITA EIICHI Disaster Prevention Research Institute Associate Professor,SAYAMA TAKAHIRO Disaster Prevention Research Institute Associate Professor,YAMAGUCHI KOSEI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Technical theories of designing and real-time predictions, which combine hydrology and meteorology, as well as water planning and management theory will be covered based on climate change, as well as changes in water circulation and water environments associated with urbanization, and the impact of these on people and society, as well as disasters. Not only the physical factors but also the probability statistics approach will be covered, while using weather radars and satellite remote sensing information, on a scale from the global to the city level.

[Course Goals]

Learning about the technical theories of planning prediction and real-time prediction, which combine hydrology and meteorology, as well as basin water planning and management theory will be covered based on climate change as well as changes in water circulation and water environments associated with urbanization and the impact of these on people and society and disasters.

[Course Schedule and Contents]

"Observation and prediction of rainfall by radar (2 times)
Up-to-date information on rainfall observations with advanced weather radars and satellite-mounted radars will be provided, as well as rainfall estimation and rainfall prediction.
World heavy rain disasters, people/society and global warming (2 times)
Consideration of the impact of heavy rain disasters on people and society, taking as examples the flood disasters that have occurred abroad. In addition, consideration will be given to how it is thought that global warming affects how rain falls, how to confirm this scientifically, how to carry out flood control planning, and what countermeasures to take.

Hydrometeorological disasters and prevention (1 time)
Recent cases of hydrometeorological disasters that have occurred both in Japan and abroad are introduced, and their characteristics are clarified. Additionally, a lecture will be given on techniques, policies, and legal systems for the prevention of disasters.

Hydrologic frequency analysis (2 times)
A method to calculate the frequency of extreme events by the probabilistic statistical analysis of data on hydrological extreme values, such as the greatest torrential rainfall and flood of the year, will be presented. Using the actual data series on extreme values, various probability distributions will be applied, their fitness will be evaluated, and the T annual probable hydrological value and its estimation accuracy will be obtained.

Continue to 水文気象防災学 (2)↓↓↓

水文気象防災学 (2)

Hydrological and water quality analysis of urban rivers (2 times)
The explanation, analysis, and evaluation method of the rainfall outflow system in urban river basins (natural) and water and substance outflow phenomena in water supply/sewerage systems (artificial) will be discussed. In particular, the outflow phenomenon from the non-point pollution source and the impact on the river environment will be described.

Flood control in urban areas and water environmental management (2 times)
Sewerage for urban flood control and the suppression effect of various facilities for the suppression of the accompanying overflow as well as the actual situation of rainwater use will be introduced. In particular, the necessity of real-time control of sewage pumping stations and storage facilities, and their effects and limitations, will be described.

Operation of flood control dams and their effect (1 time)
Dams are a powerful method for controlling floods. Practical examples of the operation method of flood control dams and the operation of dams at the time of floods in recent years will be introduced, and improvements in the degree of safety by flood control dams will also be considered. Additionally, the possibility of further improving the effect by using a flexible operation method combined with weather forecasting will be covered.

Transmission of hydrometeorological information and flood hazard map (1 time)
Hydrometeorological information is transmitted using various media. The information route and communication method from observation to actual evacuation/flood control activities will be introduced. Thorough consideration will be given to the ideal state of an effective disaster prevention information system.

Test (1 time)

[Class requirement]

Basic knowledge on hydrology and water engineering

[Method, Point of view, and Attainment levels of Evaluation]

The results will be evaluated by combining regular tests and points given for class participation.

[Textbook]

Not in particular.

[Reference books, etc.]

（Reference books）

Not in particular.

Continue to 水文気象防災学 (3)↓↓↓

水文気象防災学 (3)

[Regarding studies out of class (preparation and review)]

Review of basic knowledge on hydrology and water engineering

（Others (office hour, etc.)）

The course is opened every other year. It will be opened in 2019.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	水資源システム論 Water Resources Systems Analysis	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,HORI TOMOHARU Disaster Prevention Research Institute Associate Professor,TANAKA KENJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

A method to model the mechanisms of natural and social phenomena related to water resources as a system will be introduced, and lectures will be given on planning theory and management theory for the sustainable use of water resources. Specifically, first, after explaining the idea of systematically thinking about water resource-related problems, lectures will be given on the theory and methodology of the mathematical planning approach to water resource planning/management, as well as the water resource dynamics modeling relationship between water supply-demand balance and production/economic activity. Next, the evaluation method, simulation model, the comprehensive basin management method, and so forth that incorporate environmental elements such as water volume, water quality, ecology, and landscape, aiming to form a proper water circulation system throughout the basin, will be explained.

[Course Goals]

Understanding the fundamental techniques for modeling natural and social phenomena related to water resources as a system, and acquiring the ability to collect, analyze, and design data for the sustainable use of water resources.

[Course Schedule and Contents]

Optimal design theory of water management system (3 times)
Regarding the planning and design of a water management system consisting of facilities for water supply and water disaster prevention, lectures will be given about the method of finding the optimum configuration based on the performance index and the cost index, while paying attention to the setting and formulation of problems, the search method of a solution, and its efficiency.

Management of water resources system and decision support (2 times)
Discussions will be conducted about the management of the water resources system consisting of reservoirs and weirs for both flood defense and water use. Specifically, methods for optimizing operations of facility groups and coping with uncertainty will be explained, and the technology that supports management decision making based on recent technical trends, such as a knowledge base approach, fuzzy theory, and neural network, will also be explained.

Recent topics about water management (2 times)
Deepening understanding about recent topics related to water management and water disaster prevention with a focus on discussions among students. The problems to be covered will vary depending on the year.

World water management (3 times)
The actual condition of water resource management in various basins in various places around the world, climate conditions, geographical conditions, socio-economic development stages, problems, and examples of past efforts will be introduced.

Continue to 水資源システム論 (2)↓↓↓

水資源システム論 (2)

Land surface process model and its application to water management (4 times)
The method of maintenance of input parameters for operating the land surface process model, and the model describing the water circulation in the basin will be outlined, as well as how effective and useful model output elements, such as soil moisture content, evapotranspiration volume, irrigation necessary water volume, snow water volume, and runoff amount are as water resources management support information. Examples of the impact of climate change on water resources utilizing the land surface process model output will be introduced.

Confirmation of learning achievement (1 time)
The achievement degree will be evaluated according to assignments, and feedback will be provided.

[Class requirement]

It is desirable that students have basic knowledge on hydrology and water resource engineering.

[Method, Point of view, and Attainment levels of Evaluation]

The results will be evaluated by combining regular tests and points given for participation.

[Textbook]

not specified. Research papers and so forth will be distributed as necessary.

[Reference books, etc.]

（Reference books）
Introduced during class

[Regarding studies out of class (preparation and review)]

It is necessary to review based on lecture materials and to complete the report assignments given during the lecture.

（Others (office hour, etc.)）

The course is opened every year. It will be opened in 2019.

Active participation is expected in the lectures through questions and so forth. The content and number of lectures may change depending on circumstances. In addition, some lecture items may be replaced with special lectures given by researchers and others outside the university on current topics.

*Please visit KULASIS to find out about office hours.

Numbering code	G-ENG01 7F077 LJ73　G-ENG02 7F077 LJ73		
Course title <English>	流域治水砂防学 River basin management of flood and sediment	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,NAKAGAWA HAJIME Disaster Prevention Research Institute Professor,SUMI TETSUYA Disaster Prevention Research Institute Associate Professor,KAWAIKE KENJI Disaster Prevention Research Institute Associate Professor,TAKEBAYASHI HIROSHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

河川流域では、源頭部から河口部までにおいて、土石流・地すべり・洪水氾濫・内水氾濫・高潮などのあらゆる水災害・土砂災害が発生する。それらの災害について、国内外での事例、発生メカニズム、予測のための理論と方法、防止・軽減対策、ならびに流砂系の総合土砂管理やダム貯水池の土砂管理方策について述べる。

[Course Goals]

流域という単位で発生する現象について理解し、水災害および土砂災害に関する問題点や対策について見識を深めることを目標とする。

[Course Schedule and Contents]

流域砂防について(4回)
土砂災害の実態とハード・ソフト対策など流域砂防について、砂防プロジェクトの事例紹介とともに詳述する。

貯水池土砂管理について(3回)
ダムの長寿命化および流砂系の総合土砂管理の観点に着目した貯水池土砂管理について、世界的な動向、日本の先進事例を交えて詳述する。

流域土砂動態について(4回)
流域土砂動態の解析方法について、最新の研究事例を交えながら詳述する。

流域治水について(4回)
河川の流域で発生する水害とその対策について、日本の治水史をたどりながら詳述する。15回目は評価のフィードバック。

[Class requirement]

水理学、河川工学の基礎知識を習得していることが望ましい。

Continue to 流域治水砂防学 (2)↓↓↓

流域治水砂防学 (2)

[Method, Point of view, and Attainment levels of Evaluation]

４名全員が出す課題の中から２課題選択してレポートを提出。レポート点を７割、平常点を３割として、総合成績を判断する。

[Textbook]

必要に応じて研究論文等を配布する。

[Reference books, etc.]

（Reference books）

Introduced during class

[Regarding studies out of class (preparation and review)]

配布されたテキストを予習しておくことが望ましい。

（Others (office hour, etc.)）

隔年開講科目、平成31年度は開講。
開講年にあっては各回とも出席を確認する。

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	数値流体力学 Computational Fluid Dynamics	Affiliated department, Job title,Name	Academic Center for Computing and Media Studies Professor,USHIJIMA SATORU Graduate School of Engineering Professor,GOTOH HITOSHI Graduate School of Engineering Associate Professor,KHAYYER, Abbas Graduate School of Engineering Assistant Professor,TORIU DAISUKE

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Computational Fluid Dynamics (CFD) is largely developed according to the progress of computer technology in recent years. It is the powerful and effective technique to predict the various fluid phenomena, which show the complicated behaviors due to the non-linearity and other conditions. This course provides the dynamics of fluids and eddies as well as the discretization and numerical techniques, such as finite difference, finite volume and particle methods.

[Course Goals]

Course goal is to understand the basic theory and numerical techniques for CFD.

[Course Schedule and Contents]

computational method for incompressible fluids,7times,The course introduces the MAC algorithm, which is generally used for incompressible Newtonian fluids on the basis of finite difference and finite volume methods (FDM and FVM). The outline of numerical methods is also discussed for parabolic, hyperbolic or elliptic partial differential equations, in terms of the numerical stability and accuracy. Homework will be assigned each week.
Particle method - basic theory and improvements,7times,To simulate violent flow with gas-liquid interface which is characterized by fragmentation and coalescence of fluid, particle method shows excellent performance. Firstly, basics of the particle method, namely discretization and algorithm, which is common to SPH(Smoothed Particle Hydrodynamics) and MPS(Moving Particle Semi-implicit) methods, are explained. Particle method is superior in robustness for tracking complicated interface behavior, while it suffers from existence of unphysical fluctuation of pressure. By revisiting the calculation principle of particle method, various improvements have been proposed in recent years. In this lecture, the state-of-the-art of accurate particle method is also described.
Feedback,1time,Discuss the contents of all classes and assignments. The details will be introduced in the course.
,,

[Class requirement]

Basic knowledge of fluid dynamics, continuum mechanics and computational technique

Continue to 数値流体力学(2)↓↓↓

数値流体力学(2)

[Method, Point of view, and Attainment levels of Evaluation]

The grading will be based on homework assignments.

[Textbook]

No textbook assigned to the course

[Reference books, etc.]

（Reference books）

Recommended books and papers will be introduced in the course.

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	水域社会基盤学 Hydraulic Engineering for Infrastructure Development and Management	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HOSODA TAKASHI Graduate School of Management Professor,TODA KEIICHI Graduate School of Engineering Professor,GOTOH HITOSHI Graduate School of Engineering Professor,TACHIKAWA YASUTO Graduate School of Engineering Associate Professor,ICHIKAWA YUTAKA Graduate School of Global Environmental Studies Associate Professor,HARADA EIJI Graduate School of Engineering Associate Professor,SANJIYOU MICHIO Graduate School of Engineering Associate Professor,KHAYYER, Abbas Graduate School of Engineering Associate Professor,KIM SUNMIN Graduate School of Engineering Associate Professor,ONDA SHINICHIROU

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This lecture picks up various water-related problems and provides their explanation and solution methodology related to hydrodynamic and hydrological infrastructure improvements, maintenance, disaster prevention against flood and damage of water environment, interweaving several leading-edge cases in the real world. Turbulent flow and CFD, sediment transport system and design/planning of hydraulic structure are described on the basis of the integrated management of river-and-coast systems with sediment control and these relationship with infrastructure improvement. Perspective from the viewpoint of public environmental infrastructure on water environment is presented.

[Course Goals]

Students learn about case-based practical solutions against various problems related to hydraulic engineering, and students acquire academic preparation of how to approach to public environmental infrastructure on water area.

[Course Schedule and Contents]

Introduction,1time,The purpose and constitution of the lecture, the method of the scholastic evaluation are explained.
Hydraulics in open-channel flows,3times,Several problems and exciting topics related to hydraulics in open-channel flows are discussed with advanced practical examples.
River basin management ,3times,Introduction of flood disasters during a few decades in the world, flood control planning in Japan, Economic evaluation and analysis of peoplersquos awareness to river improvement projects with dam construction.
Beach erosion,3times,Several problems and their solution methodology against sediment transport process in coastal zone are explained. Advanced approaches for sediment control are overviewed.

Continue to 水域社会基盤学(2)↓↓↓

水域社会基盤学(2)

Rainfall-runoff prediction and hydrologic design ,3times,Water resources issues related to rainfall-runoff prediction and hydrologic design are discussed with advanced practical examples.
Numerical simulation for Hydraulic engineering,1time,Recent numerical simulation development and related state-of-the-art technologies are overviewed.
Achievement Confirmation,1time,Comprehension check of course contents.The exercises to the given subjects are performed.

[Class requirement]

hydraulics, fluid mechanics, river engineering, coastal engineering, hydrology, etc.

[Method, Point of view, and Attainment levels of Evaluation]

Grading is based on students activities in lectures and reports.

[Textbook]

Non

[Reference books, etc.]

（Reference books）

Non

（Related URLs）

(Non)

[Regarding studies out of class (preparation and review)]

Review fundamental items of hydraulics, fluid mechanics, river engineering, coastal engineering, hydrology, etc..

（Others (office hour, etc.)）

Non

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	応用水文学 Applied Hydrology	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,HORI TOMOHARU Disaster Prevention Research Institute Professor,SUMI TETSUYA Disaster Prevention Research Institute Professor,TANAKA SHIGENOBU Disaster Prevention Research Institute Associate Professor,TAKEMON YASUHIRO Disaster Prevention Research Institute Associate Professor,TANAKA KENJI Disaster Prevention Research Institute Associate Professor,Sameh Kantoush

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Applied and integrated approach to the problems closely related to the water circulation system, such as floods, droughts, water contamination, ecological change, and social change is introduced mainly from the hydrological viewpoint with reference to water quantity, quality, ecological and socio-economic aspects. In the course, several actual water problems are taken up and solving process of each problem which comprises of problem-identification and formulation, impact assessment, countermeasures design and performance evaluation is learned through the lecturesrsquo description and also investigation and discussion among the students.

[Course Goals]

To obtain fundamental Knowledge and skills to perform problem definition, survey amd countermeasure design on problems about water use, water hazard mitigation and water environment.

[Course Schedule and Contents]

Water disasters and risk management,2times,
Risk assessment of water disasters, countermeasures and adaptation design, wataer disasters and human security

Reservoir Systems and Sustainability,2times,
Reservoir system and its environmental impacts, Sustainable management of reservoir system

Hydrological Frequency Analysis,3times,
Basic theory and application of Hydrological Frequency Analysis, which is the basis for hydrologic design.

Land Surface Proceses,2times,
Modelling of land surface processes, Application of land surface model

Hydrological Measurements of Large River Basins,2times,
Design and management of hydrological measurement system in large river basins

Hydro-eco Systems,2times,
Ecohydrological management of habitats in river ecosystems, Ecohydrological management of biodiversity in

Continue to 応用水文学(2)↓↓↓

応用水文学(2)

wetland ecosystems

Presentation and Discussion,2times,
study and exersize for given topics

[Class requirement]

Elementary knowledge of hydrology and water resources engineering.

[Method, Point of view, and Attainment levels of Evaluation]

Grading is based on student activities in lectures, presentation and reports.

[Textbook]

Printed materials on the contents of this class are distributed in class.

[Reference books, etc.]

（Reference books）

None

[Regarding studies out of class (preparation and review)]

Review work based on handouts and report work for issues given in the classes are required.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	環境防災生存科学 Case Studies Harmonizing Disaster Management and Environment Conservation	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,NAKAKITA EIICHI Disaster Prevention Research Institute Professor,NAKAGAWA HAJIME Disaster Prevention Research Institute Associate Professor,MORI NOBUHITO Disaster Prevention Research Institute Associate Professor,SAYAMA TAKAHIRO Disaster Prevention Research Institute Associate Professor,YAMAGUCHI KOSEI Disaster Prevention Research Institute Senior Lecturer,LAHOURNAT, Florence

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Environmental impacts by infrastructure for disaster prevention and mitigation are discussed. Introducing various examples of natural disasters, degradation of the environment, and harmonizing disaster management and environmental conservation in the world, this classroom carries on a dialogue about effective measures for reducing negative environmental impacts and serious disasters.

[Course Goals]

Conservation of the environment and prevention/mitigation of natural disasters, which are very important for human's survivability, often conflict with each other. This course introduces various examples. Students will learn many examples harmonizing these two issues, and shall consider technical and social countermeasures fitting to the regional characteristics.

[Course Schedule and Contents]

Hajime Nakagawa / River environment and disaster

Eiichi Nakakita / Heavy rainfall -using radar nowcasts and climate change-

Nobuhito Mori / Climate change and impact assessment on coastal environment

Takahiro Sayama / Hydrological processes and water disaster predictions

Kosei YAMAGUCHI/ Heavy rainfall -prediction of severe storm

Florence LAHOURNAT/ Traditional narratives of disaster: adaptation, meaning making,

[Class requirement]

No special knowledge and techniques are necessary, but requires reading, writing and discussing in English in the class.

Continue to 環境防災生存科学(2)↓↓↓

環境防災生存科学(2)

[Method, Point of view, and Attainment levels of Evaluation]

Considering both the number of attendances and the score of final test at the end of the semester.

[Textbook]

No particular textbook for this course. Necessary documents and literature introduction are provided in the class room from time to time.

[Reference books, etc.]

（Reference books）

Some literature would be introduced by professors.

[Regarding studies out of class (preparation and review)]

No specific requirement for independent study. Collect information broadly regarding environment and disaster related topics.

（Others (office hour, etc.)）

Contact Associate Professor Mori email;mori.nobuhito.8a@kyoto-u.ac.jp, if you have any query.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	流域管理工学 Integrated Disasters and Resources Management in Watersheds	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,FUJITA MASAHARU Disaster Prevention Research Institute Professor,HIRAISHI TETSUYA Disaster Prevention Research Institute Associate Professor,YONEYAMA NOZOMU Disaster Prevention Research Institute Associate Professor,KAWAIKE KENJI Disaster Prevention Research Institute Associate Professor,TAKEBAYASHI HIROSHI Disaster Prevention Research Institute Associate Professor,BABA YASUYUKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.1	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Mechanism and countermeasures of sediment disasters, flood disasters, urban flood disasters and coastal disasters are explained. An integrated watershed management of these disasters and water/sediment resources is also introduced. This lecture will be open at Katsura Campus and Ujigawa Open Laboratory.

[Course Goals]

Learn an integrated basin management system for natural disasters (sediment disasters, food disasters, coastal disasters, urban flood disasters) mitigation and water/sediment resources utilization considering environmental conservation.

[Course Schedule and Contents]

Introduction,1time,Contents of this lecture are explaned.
Urban flood disaster managemnet,2times,We review urban floods from the viewpoint of river basins, flood causes, and features, together with the results of recent studies. Based on these studies, we propose comprehensive measures against urban floods, including underground inundations. In addition, we discuss on prediction methods of the tsunami disaster in urban area.
Flood disaster management,2times,Prevention / mitigation measures against flood disasters and flood prediction methods are explained as well as examples of recent flood disasters in Japan.
Sediment disaster management,2times,Showing the problems on sediment disasters and sediment resources, I explain an integrated sedimnet management system both for sediment disasters and sediment resources.
Coastal disaster management,2times,Coastal erosion and tsunami hazard become remarkable in these days in Japanese coast. In a lecture, we discuss on characteristics of such coastal disasters.
Exercise on flood disaster at Ujigawa Open Laboratory, 5 times,Experiment and analysis on debris flows, riverbed variation and flooding at Ujigawa Open Laboratory, Fushimi-ku, Kyoto city.
Evaluation of proficiency level, 1 times,Students confirm the proficiency level in this lecture.

[Class requirement]

Hydraulics, River Engineering, Coastal Engineering, Sediment Transport Hydraulics

Continue to 流域管理工学(2)↓↓↓

流域管理工学(2)

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation will be based on active participation (10 points), assignments (6 lecturers,15points each), Assignments will be assessed on the basis of achievement level for course goals.

- Those who are absent more than four times will not be credited.
- The assignments with high problem consciousness, originality and new ideas will be given a high score.

[Textbook]

Not used
None

[Reference books, etc.]

（Reference books）

Introduced during class
None

[Regarding studies out of class (preparation and review)]

This lecture is related to hydraulics, coastal engineering, hydrology and river ecology. Therefore we strongly recommend reviewing these subjects and the contents of the lecture should be well understood through report making.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	地盤力学 Geomechanics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MIMURA MAMORU Graduate School of Management Associate Professor,KIMOTO SAYURI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Mechanical behavior of soils and problems of its deformation and failure will be covered based on the multiphase mixture theory and the mechanics of granular materials.

[Course Goals]

The objectives of this course are to understand the basics of geomechanics, and the advanced theories.

[Course Schedule and Contents]

Deformation of geomaterils,1time,Mechanical property of geomaterials, critical state soil mechanics, Failure criteria, modelling of geomaterials (by Prof.Mimura)

Field equations and constitutive model,2times,Framework and field equations for contiuum, stress-strain ralations for soils, elastic model, elasto-plastic model, plasticity theory (by Prof.Mimura)

elasto-plastic constitutive model,3times,Constitutive model for geomaterials, elasto-plastic model, Cam clay model (by Prof. Mimura)

Theory of viscosity and viscoplasticity ,3times,Viscoelasticity, viscoplasticity, Elasto-viscoplastic mode, Adachi-Oka model, Microstructure of soils, Temperature dependent behavior, Applications of constitutive models (by Prof. Mimura)

Consolidation analysis,3times,Biot#039s consolidation theory and its application, Consolidation of embankment (by Assoc.Prof. Kimoto)

Liquefaction of soils,2times,Liquefaction of sandy soil, Damage and failure due to liquefaction, Remedial measures for liquefaction (by Assoc.Prof. Kimoto)

Confirmation of achievement,1time,

[Class requirement]

Soil mechanics, Fundamentals of continuum mechanics

[Method, Point of view, and Attainment levels of Evaluation]

Final examination (70) and hormeworks,class performance (30)

[Textbook]

Handout will be given.
Soil mechanics, Fusao Oka, Asakura Publishing (in Japaneses)

Continue to 地盤力学(2)↓↓↓

地盤力学(2)

[Reference books, etc.]

（Reference books）

Elasto-viscoplastic constitutive model for soils, Fusao Oka, Morikita Publishing (in Japanese)

[Regarding studies out of class (preparation and review)]

Homeworks are given during the course.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	計算地盤工学 Computational Geotechnics	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,UZUOKA RYOSUKE Graduate School of Management Associate Professor,KIMOTO SAYURI Graduate School of Engineering Associate Professor,SAWAMURA YASUO

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Fri.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The course provides students with the numerical modeling of geomaterials to predict the behavior of geomaterials such as sand, clay, and soft rock. The course will cover the fundamental constitutive models of geomaterials including the elastic model, the elastoplastic models, and the elasto-viscoplastic models. In addition, the governing equations for multiphase geomaterials based on the theory of porous media will be presented. Applications of FEM to predict soil behavior, such as, consolidation, soil-structure interaction problems will be also explained. Finally, students are required to do excises of numerical calculations.

[Course Goals]

Understanding the numerical modeling of multiphase geomaterials

[Course Schedule and Contents]

[Introduction] （1time）
Guidance and Introduction to Computational Geomechanics

[Governing equations] (7 times)
Fundamental concept in continuum mechanics such as deformation, stresses, and motion.
Governing equations for fluid-solid two-phase materials: Conservation of mass, balance of linear momentum.
Constitutive models for soils, including elastic model, elastoplastic model (Cam clay model), elastoviscoplastic
model.

[Applications] (4 times)
Applications of FEM such as consolidation, dynamic analysis, mechanical behavior of soil and structures

[Exercises] (3 times)
Exercises of numerical calculations and interpretations of the results

[Class requirement]

Understanding on fundamental geomechanics

[Method, Point of view, and Attainment levels of Evaluation]

Attendance, Reports

Continue to 計算地盤工学(2)↓↓↓

計算地盤工学(2)

[Textbook]

Handout will be given.

[Reference books, etc.]

（Reference books）

Handout will be given.

[Regarding studies out of class (preparation and review)]

Homeworkds are given during this course.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	ジオリスクマネジメント Geo-Risk Management	Affiliated department, Job title,Name	Graduate School of Engineering Professor,OOTSU HIROYASU

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This lecture aims to provide interdisciplinary knowledge associated with geo-risk engineering, the topics of risk analysis focusing on geotechnical structures. In detail, the contents of lectures consist of following topics: Introduction to risk analysis, Mathematical background of geo-risk evaluation, Examples of risk evaluation mainly focusing on slopes and Risk management on road slopes.

[Course Goals]

[Course Schedule and Contents]

Guidance,1time,Guidance\\ Introduction of Geo-Asset Management
Basic,5times,Basics of Risk Analysis (3)
Probability theory,8times,Evaluation of Slope Risk
Feed back,1time,Feed back
,,
,,
,,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Attendance(10%), Report(30%), Examination(60%)

[Textbook]

Hiroyasu Ohtsu, Project Management, Corona Publishing, 2010. (in Japanese)

[Reference books, etc.]

（Reference books）

C. Chapman and S. Ward, Project Risk Management, John Wiley amp Sons, 1997.\ R. Flanagan and G. Norman, Risk Management and Construction, Blackwell Science\ V.M. Malhotra amp N.J. Carino, CRC Handbook on Nondestructive Testing of Concrete, CRC Press, 1989.

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Addtional information is available by visiting the following professors. Appointment shall be made in advance by e-mail.
ohtsu.hiroyasu.6n@kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	ジオコンストラクション Construction of Geotechnical Infrastructures	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KISHIDA KIYOSHI Graduate School of Engineering Professor,KIMURA MAKOTO

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Fri.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Advanced construction technology of geo infrastructures, such as tunnel, large underground cavern, foundation, culvert, retaining wall, is introduced and explained. And, the practical projects applied by the advanced construction technology are also introduced.

[Course Goals]

To learn to the advanced construction technology and to propose the project and design through the advanced construction technology.

[Course Schedule and Contents]

Guidance, Introduction of construction of geotechnical infrastructures,1time,Guidance, Introduction of construction of geotechnical infrastructures
Geo-investigation and survey techniques,2times,Introduction of the advanced geo-infestation and survey techniques. Explanation of inversion theory and technique.
Auxiliary mthods of mountain tunnel,2times,Introduction of NATM for construction of tunnel and underground cavern. In addition, the role of auxiliary methods, auxiliary method for safety in tunnel constrcution, axiliary methods for preservation of the surrounding environment are explained
Rock physics and its applications,2times,Introduction of the constitutive law of rock material and rock physics (pressure solution) and its application fields, such as special projects of underground space, namely, nuclear waste disposal, and Carbon Capture and Storage.
Field visit or special lecture,1time,Visit the construction field or invite special lecture who is the expert engieer on the construction of geotechnical infrastructures.
Foundation,2times,Design and construction of piles foundation and steel pipe sheet piles
Culvert,2times,Design and construction of box type and arch type culverts
Retaining wall,2times,Design and construction of retaining wall
Examination of understanding,1time,

[Class requirement]

Soil mechanics, Rock mechanics

[Method, Point of view, and Attainment levels of Evaluation]

Attendance and Report (20 %), Examination (80 %)

Continue to ジオコンストラクション(2)↓↓↓

ジオコンストラクション(2)

[Textbook]

Not used

[Reference books, etc.]

（Reference books）
日本材料学会編 『ロックメカニクス』

[Regarding studies out of class (preparation and review)]

Students should be reviewed the exercises which are learned at the class.

（Others (office hour, etc.)）

Office hour will be explained at the guidance. Students can contact with professors as an e-mail.
kimura.makoto.8r@kyoto-u.ac.jp
kishida.kiyoshi.3r@kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	ジオフロント工学原論 Fundamental Geofront Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MIMURA MAMORU Graduate School of Engineering Associate Professor,HIGO YOUSUKE Graduate School of Engineering Professor,KIMURA MAKOTO

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.1	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This course deals with near-surface quaternary soft soil deposits that are the most important in the engineering sense. Physical properties and the mechanical characteristics of partially saturated and fully saturated soils are explained, and then various problems in terms of disaster prevention and infrastructure construction are discussed.

[Course Goals]

The aim of this course is to understand engineering problems and their mechanical background in the following points:

- Physical properties and mechanical characteristics of quaternary soft soil deposits and relevant engineering problems in terms of disaster prevention
- Fundamentals of unsaturated soil mechanics and engineering problems of earth structures in terms of disaster prevention
- Concepts of innovative underground foundations and structures and engineering problems during construction

[Course Schedule and Contents]

Outline of the course, introduction to quaternary deposits, 1time, Introduction to quaternary deposits. Types and mechanisms of geotechnical disasters relevant to quaternary deposits.

Geo-informatic database, 1 time, Geo-informatic database and its application to modelling soft alluvial soils, liquefaction hazard map, etc.

Evaluation of subsurface structure based on GID, 1 time, Scheme to evaluate subsurface structures using Geo-informatic database including boring logs, geophysical exploration, geological structures. Application to Kyoto basin is given.

Evaluation of liquefaction for near-surface sand deposits, 1 time, Evaluation of liquefaction for near-surface sand deposits using Geo-informatic database is explained. Applications to the 1995 Hyogo-ken Nanbu Earthquake and the 2011 Off the Pacific Coast of Tohoku Earthquake are given, through which open questions are discussed.

Problems of soft clay deposits, 1 time, Deformation characteristics and stability of soft clay deposits and their evaluation methods are explained, e.g., effectiveness and limitation of ground improvement, long term settlement problem, and case histories of large scale reclamation.

Concept of innovative underground structures, 1 time, Citizen-participate-type renovation technique for

Continue to ジオフロント工学原論(2)↓↓↓

ジオフロント工学原論(2)

unpaved roads using sandbags.

Concept of innovative underground structures, 1 time, New construction method of embankments using consecutive precast arch culvert.

Concept of innovative underground structures, 2 times, Technical problems of steel pipe sheet pile. Development of consecutive steel pipe sheet pile and its application.

Outline of earth structures, Unsaturated soil mechanics, 2 times, Roles of earth structures as an infrastructure. Unsaturated soil mechanics.

Damage of earth structures caused by rainfall and earthquake, 1time, Case examples and their mechanisms of the damages of earth structures caused by rainfall and earthquake.

Methods to evaluate and improve stability of earth structures subjected to rainfall and earthquake, 1 time, Design methods of earth structures and their problems are outlined.

Site visit, 1 time, Visit construction site relevant to the issues of this course.

Evaluation and feedback, 1 time, Evaluation of achievement by examination, and its feedback.

[Class requirement]

Undergraduate courses in geology, geotechnical engineering, and soil mechanics.

[Method, Point of view, and Attainment levels of Evaluation]

Performance grading will be provided based on examination. Attendance and quality of assigned reports, etc. are considered.

[Textbook]

Handouts will be distributed.

[Reference books, etc.]

（Reference books）

References are indicated in the handout.

[Regarding studies out of class (preparation and review)]

Fundamental knowledge of soil mechanics

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	環境地盤工学 Environmental Geotechnics	Affiliated department, Job title,Name	Graduate School of Global Environmental Studies Professor,KATSUMI TAKESHI Graduate School of Global Environmental Studies Associate Professor,TAKAI ATSUSHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.1	Class style	Lecture	Language	Japanese and English

[Outline and Purpose of the Course]

Several issues on environmental geotechnics including geoenvironmental contamination and countermeasure, waste containment and reuse are introduced to understand the contribution of geotechnical engineering to global and local environmental issues. Geoenvironmental issues due to the 2011 East Japan Earthquake and Tsunami are also introduced.

[Course Goals]

Students should understand the geotechnics to solve the following geoenvironmental issues; soil amp groundwater contamination, waste disposal and waste utilization, and extend this knowledge to the development of concepts and technologies for creating and preserving the geo-environment.

[Course Schedule and Contents]

Introduction,1time,Introduction to Environmental Geotechnics, including goals, outline and grading policy of the course
Waste geotechnics,3-4times,Functions and structures of waste containment facilities\\ Geotechnics on the liner system (Geosynthetics, clay liner, Leachate collection layer)\\ Post-closure utilization of waste landfill
Remediation geotechnics,3-4times,Behaviors of contaminants in subsurface\\ Mechanisms of soil and groundwater contamination\\ Remediation of soil and groundwater contamination\\ Case histories
Geo-environmental issues related to construction works, global environmental issues, and natural disasters,2-3times,Mechanisms and remediation of geoenvironmental problems and geo-disasters caused by construction works \\ Geoenvironmental issues caused by the 2011 East Japan Earthquake and Tsunami
Reuse of wastes in geotechnical applications,3-4times,Engineering properties of recycled materials in geotechnical applications (Incineration ashes, coal ash, surplus soils, dredged soils)\\ Geoenvironmental impact assessment and control of waste utilization\\ Case histories
Presentation and discussion,2-3times,Student presentation, discussion, and summary on above topics

[Class requirement]

Having knowledge on soil mechanics and geotechnical engineering at bachelor level is preferable, but not requirement.

[Method, Point of view, and Attainment levels of Evaluation]

Continuous assessment including attendance, some assignments, and final report

Continue to 環境地盤工学(2)↓↓↓

環境地盤工学(2)

[Textbook]

Not specified.\ Several technical papers related to the course will be distributed.

[Reference books, etc.]

（Reference books）

Geoenvironmental Engineering (Kyoritsu Shuppan Publishing, ISBN: 9784320074293)\ Handbook of Geoenvironmental Engineering (Asakura Publishing, ISBN: 9784254261523)\ Introduction to Environmental Geotechnics (Japanese Geotechnical Society, ISBN: 9784886444196)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	地盤防災工学 Disaster Prevention through Geotechnics	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,UZUOKA RYOSUKE Disaster Prevention Research Institute Assistant Professor,UEDA KYOHEI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The lecture covers nonlinear continuum mechanics and dynamic three-phase analysis of ground and geotechnical structures. In particular, the lecture covers the geo-hazards mechanism and prediction of failure modes, and mitigation measure against geo-hazards. The lecture ranges from fundamental mechanics of granular materials to numerical simulation.

[Course Goals]

Successful students will have the ability to initiate their own research work on geo-hazards based on the solid understanding of the mechanics of granular materials and numerical analysis.

[Course Schedule and Contents]

Week 1: Introduction
- Introduction to the course (objectives, contents, and grading procedure)
- Geo-hazards induced by heavy rain and earthquake
- Application of numerical analysis to predict the geo-hazards

Week 2-4: Nonlinear continuum mechanics 1
- Vector and tensor algebra
- Kinematics (motion and strain tensors)
- Concept of stress tensors

Week 5-7: Nonlinear continuum mechanics 2
- Balance Principles
- Objectivity and stress/strain rates
- Constitutive laws

Week 8-15: Numerical analysis for geo-hazards
- Balance equations
- Constitutive equations
- Numerical method

[Class requirement]

None

Continue to 地盤防災工学(2)↓↓↓

地盤防災工学(2)

[Method, Point of view, and Attainment levels of Evaluation]

Based on reports to exercises.

[Textbook]

Handouts

[Reference books, etc.]

（Reference books）

Gerhard A. Holzapfel: Nonlinear Solid Mechanics: A Continuum Approach for Engineering, Wiley. \ Javier Bonet, Antonio J. Gil, Richard D. Wood: Nonlinear Solid Mechanics for Finite Element Analysis: Statics, Cambridge University Press.

[Regarding studies out of class (preparation and review)]

Fundamental soil mechanics

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	公共財政論 Public Finance	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MATSUSHIMA KAKUYA

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The structure of the economy of a nation will be explained using the concepts of the macroeconomic model, input-output analysis, and the general equilibrium model in order to understand the budget of central governments or municipalities and public fiscal policy concerning its execution. Specifically, the definition of GDP and SNA (System of National Accounts), input-output analysis and general equilibrium analysis, the IS-LM model and the AD-AS model in Keynesian macroeconomics, the international economic model, and the economic growth model will be explained while taking up specific examples.

[Course Goals]

Understanding the budget of the central government or municipalities and the public finance of its execution

[Course Schedule and Contents]

Outline (1 time)
The overall flow of the lecture will be explained.

GDP and social accounting (2 times)
The definition of GDP and the principle of equivalence of three aspects will be explained.

Input-output table and general equilibrium model (2 times)
The input-output table explaining the flow of transactions between industries, and the role of the general equilibrium model using it will be explained.

IS-LM Model (2 times)
The IS-LM model for the goods and financial markets will be explained.

International economics (2 times)
The balance of payments and foreign exchange, as well as the IS-LM model considering international transactions will be explained.

AD-AS Model (2 times)
The AD-AS model for the middle term will be explained.

Economic growth model (2 times)
The economic growth model analyzing long-term economic growth will be explained.

Summary (1 time)
Summary of the entire course and confirmation of learning achievements

Feedback (1 time)

Continue to 公共財政論(2)↓↓↓

公共財政論(2)

Feedback of the class

[Class requirement]

Preliminary knowledge on microeconomics (“public economics” subject of the Global Engineering Department) is desirable.

[Method, Point of view, and Attainment levels of Evaluation]

Points given for class participation (attendance, reports, quizzes, etc.) make up 30 to 40%.
The final examination makes up 60 to 70%.

[Textbook]

Not used

[Reference books, etc.]

（Reference books）

Dornbusch et al., Macroeconomics 13rd edition, Mcgrow-hill, 2017 isbn{}{9781259253409}

（Related URLs）

(will be notified in the first class.)

[Regarding studies out of class (preparation and review)]

It is advisable to read newspaper/articles in macroeconomics in advance.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	都市社会環境論 Urban Environmental Policy	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MATSUNAKA RYOUJI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

This lecture aims to learn urban environmental policy and its fundamental theory and methodology to solve social and environmental problems that occur in urban area as well as to understand the structure of these problems.

[Course Goals]

to understand the structure of social and environmental problems in urban area and urban environmental policy, its fundamental theory and methodology to solve the problems

[Course Schedule and Contents]

Outline,1time

Structure of urban problems,3times
Expansion of urban areas, Increase of Environmental impact, Making compact cities

Basic theory of transportation and environment,2times
Downtown activation, Road space re-allocation, Pedestrianisation

Road traffic and Public transportation,2times
Characteristics of traffic modes, Light Rail Transit, Bus Rapid Transit, Mobility Management

Fundamental theory for measurements of environmental values,3times
Utility, Equivalent Surplus, Compensating Surplus

Methodology to measure environmental values,3times
Travel Cost Method, Hedonic Approach, Contingent Valuation Method, Conjoint Analysis

Summary and feedback,1time,

[Class requirement]

basic knowledge of public economics is required

[Method, Point of view, and Attainment levels of Evaluation]

evaluation by commitment, tests, reports and examination

[Textbook]

Not used

Continue to 都市社会環境論(2)↓↓↓

都市社会環境論(2)

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

Review of each class is required.

（Others (office hour, etc.)）

Office our : Check on KULASIS

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	人間行動学 Quantitative Methods for Behavioral Analysis	Affiliated department, Job title,Name	Graduate School of Engineering Professor,FUJII SATOSHI

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.5	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

[Course Goals]

[Course Schedule and Contents]

,1time,
,1time,
,3times,
,3times,
,3times,
,3times,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	交通情報工学 Intelligent Transportation Systems	Affiliated department, Job title,Name	Graduate School of Engineering Professor,UNO NOBUHIRO Graduate School of Management Professor,YAMADA TADASHI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Fri.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

This class provides you with the outlines of engineering methodology with information and communication technology as its core element for improving the safety, efficiency and reliability of traffic and transportation systems and reducing the environmental burden. Concretely, we discuss the applicability of countermeasures, such as Travel Demand Management, modal-mix in transportation systems, traffic safety improvement schemes for relieving contemporary problems in traffic and transportation systems, in addition to brief introduction of innovative approaches to collect high-quality of real-time traffic data. Moreover, the methodology for policy evaluation and the related basic theory are explained.

[Course Goals]

Goal of this class is to cultivate basic and critical abilities of students for implementing effective traffic and transportation management using ITS (Intelligent Transportation System).

[Course Schedule and Contents]

Basics for Transportation Network Analysis,1time,
Estimation of OD Traffic Volume using Observed Link Traffic Counts,1time,
Analytical Approaches Based on Transportation Network Equilibrium,4times,
Outlines of ITS ,1time,
Traffic Management for Enhancing Efficiency,2times,
Innovative Approaches for Data Collection Using ICT,1time,
Application of ITS for Enhancing Traffic safety,1time,
Travel Demand Management and Congestion Charging,2times,
Application of Traffic Simulation,2times,
Feedback of evaluation of report examination to students,1time,
,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Final report: 45%, Mid-term report: 45% and Mark given for class participation: 10%

Continue to 交通情報工学(2)↓↓↓

交通情報工学(2)

[Textbook]

[Reference books, etc.]

（Reference books）

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	リモートセンシングと地理情報システム Remote Sensing and Geographic Information Systems	Affiliated department, Job title,Name	Graduate School of Engineering Professor,UNO NOBUHIRO Graduate School of Engineering Associate Professor,SUSAKI JIYUNICHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Geoinformatics is the science and technologies dealing with spatially distributed data acquired with remote sensing, digital photogrammetry, global positioning system, etc, to address the problems in natural phenomena or human activities. This course particularly focuses on remote sensing by using LiDAR and geographic information system (GIS) and explains the theory and applications. Unlike traditional surveying, LiDAR technique can sequentially obtain the data in a wide area within a short time, and thus it is now widely used in construction and management of civil infrastructure. GIS is a technique to handle digital maps and related information, and it is popular in the fields of urban planning, environmental management and infrastructure management. This course provides an understanding of remote sensing and GIS via applications presented by the exercises of remote sensing and lectures of GIS.

[Course Goals]

Students understand the basic theory and acquire the basic techniques of remote sensing for observation and analysis of environmental changes, disaster effects and human activities in urban areas. And, they understand the basic theory and applications of GIS.

[Course Schedule and Contents]

Object extration and landscape analysis from LiDAR data,1time,The principle of Light detection and ranging (LiDAR) and the method to generate digital surface model (DSM) from point clouds are explained. As applications of LiDAR data, methods to extract objects by using geometric features and estimate landscape indices are introduced.
(Exercise) Field measurement by using LiDAR,2times,Field measurement by using LiDAR is conducted in Katsura Campus.
(Exercise) Co-registration of LiDAR data and its assessment,1time,LiDAR data are co-registered and its accuracy is assessed.
(Exercise) Vegetation extraction from LiDAR data and green space ratio estimation,1time,Vegetation is extracted by using scattergram of point clouds. Green space ratio from an arbitrary viewpoint is calculated, and the vegetation landscape is assessed.
Satellite remote sensing,1time,Basic terms on electromagnetic radiation including radiation and reflection are introduced, and calculation of suface reflectance and temperature is explained. In addition, principles and applications of visible and infrared sensors are introduced.
(Exercise) Vegetation coverage ratio estimation from satellite images,1time,Vegetation index is calculated from an optical satellite image, and vegetation coverage ratio is estimated.
Introduction to GIS,1time,Structure of GIS (Geographic Information System) and its utilization for spatial analysis are outlined.
GIS and Network Analysis,1time,Basic idea of network structure, evaluation indices and methods of network analysis are explained.
GIS and Spatial Correlation Analysis,1time,Focusing on spatial correlation analysis useful for developing spatial model, regression analysis and spatial auto correlation analysis are explained.

Continue to リモートセンシングと地理情報システム(2)↓↓↓

リモートセンシングと地理情報システム(2)

Classification Method of Spatial Attribute,1time,Classification method of spatial attribute is explained in order to classify the target area using attribute information in GIS.
Transportation Big Data Collected by Mobile Objects Observation and Its Utilization,1time,The changes in transportation observation led by progress of location identification technologies is stated. In addition, utilizations and issues of big data in transportation are explained.
Realization of Smart City and Big Data Utilization,1time,The concept of Smart City and corresponding projects are introduced, and utilization and issues of big data for smart city are explained.
Analyses of Big Data,1time,Analysis methods to utilize information of big data are explained. Especially, multivariate analysis and machine learning are outlined.
Assessment of understanding,1time,Assess students#039 understanding levels

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Grading is based on the achievements in exercise and assignments.

[Textbook]

[Reference books, etc.]

（Reference books）

- Junichi Susaki and Michinori Hatayama, Geoinformatics, Corona Publisher, 2013\ - W. G. Rees, Physical Principles of Remote Sensing 3rd ed., Cambridge University Press, 2013.\ - J. A. Richards and X. Jia, Remote Sensing Digital Image Analysis: An Introduction, 5th ed., Springer-Verlag, 2013.\ -M. Netler and H. Mitasova, Open Source GIS: A GRASS GIS Approach 3rd ed., The International Series in Engineering and Computer Science, 2008.

（Related URLs）

(http://www.gi.ce.t.kyoto-u.ac.jp/user/susaki/rsgis/index.html)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Students may be required to use their own laptop computer for exercise. Two exercises offered in the 1st and 2nd hour in a row are planned in April.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	景観デザイン論 Civic and Landscape Design	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KAWASAKI MASASHI Graduate School of Engineering Associate Professor,YAMAGUCHI KEITA Part-time Lecturer,OKABE KEIICHIRO

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Tue.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Lecture for Landscape Design, Design of Urban infrastructure, and Landscape Architecture Practice

[Course Goals]

Total points will be scored in results of design practice and reports.

[Course Schedule and Contents]

Guidance. Landscape and image,1time,Guidance, Lecture on landscape and image.
Architectural Design of city and urban facilities,3times,Lecture on planning and designing about landscape design of urban facilities such as roads and plazas, parks, waterfront and waterfront and public space.
Landscape Design and Management,4times,The history of landscape policy, the method of evaluating landscape, the case and method of landscape planning, examples and methods of urban design both in Japan and abroad
Landscape Architecture Practice,6times,Designed for streets, parks
Feedback,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Reports (Kawasaki: 50%) and design practice (50%)

[Textbook]

Instructed during class

[Reference books, etc.]

（Reference books）
Introduced during class

[Regarding studies out of class (preparation and review)]

design practice and reports

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	リスクマネジメント論 Risk Management	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,Cruz Ana Maria Disaster Prevention Research Institute Associate Professor,YOKOMATSU MUNETA

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The aim of the class is to provide the basic knowledge of risk management methods for various types of risks such as natural disaster, environment and natural resources in urban and rural areas. Students will learn the decision making principle under risks in Economics and asset pricing methods in Financial Engineering as well as have exercises of application on public project problems.

[Course Goals]

It is targeted to understand 1) representative concepts of risk and risk management process, 2) expected utility theory and 3) foundation of Financial Engineering, and examine 4) public project problems by applying the above knowledge.

[Course Schedule and Contents]

Basic framework of risk management,2times,1-1 Representative concept of risk\\1-2 Risk management technologies
Decision making theory under risks,3times,2-1 The Bayes#039 theorem\\2-2 The Expected utility theory
Financial engineering,6times,3-1 The Capital Asset Pricing Model\\3-2 Option pricing theory\\3-3 The arbitrage theorem\\3-4 The Black-Scholes formula
Decision making methods for projects,3times,4-1 The decision tree analysis\\4-2 The real option approach
Comprehension check,1time,5 Comprehension check

[Class requirement]

Fundamental understanding of probability

[Method, Point of view, and Attainment levels of Evaluation]

20% of score is valuated on attendance and discussion in classes, and 80% on reports.

[Textbook]

[Reference books, etc.]

（Reference books）

1.Ross, S.M.: An Elementary Introduction To Mathematical Finance, Cambridge University Press, 1999\2. Sullivan W.G.: Engineering Economy, Pearson, 2012

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	災害リスク管理論 Disaster Risk Management	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,TATANO HIROKAZU Disaster Prevention Research Institute Associate Professor,YOKOMATSU MUNETA Disaster Prevention Research Institute Associate Professor,SAMADDAR, Subhajyoti

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Natural disasters have low frequencies but high impacts. It is very important to make an integrated risk management plan that consists of various countermeasures such as prevention, mitigation, transfer, and preparedness. This class will present economic approaches to natural disaster risk management and designing appropriate countermeasures.

[Course Goals]

Students are expected to understand fundamental ways of economic analyses of disaster prevention such as economic valuation of disaster losses, decision making principle under risks, derivation of benefits of risk management.

[Course Schedule and Contents]

Introduction to disaster risk management,1time,Introduction and Explanation of Course Outline, The Global Trends of Natural Disasters
1. Decision making theory under uncertainty,1time,Bayes#039 theorem, Expected utility function
Methods of disaster risk management,1time,Risk control and risk finance
Economic valuation of catastrophic risk mitigation,1time,Cost-Benefit analysis, conventional valuation method, catastrophic risks and economic valuation of disaster mitigation
Risk perception bias, land-use and risk communication,2times,Risk perception bias, land-use model, risk communication
Disaster risk finance,2times,Recent issues of risk finance market, reinsurance, CAT bond, roles of government, derivatives
Risk curve and risk assessment,1time,Fragility curve and risk assessment
General equilibrium analysis under disaster risk,1time,General equilibrium model under disaster risk
Macrodynamics under disaster risk,1time,GDP, economic growth
Disaster accounting,1time,Accounting systems
Exercise and presentation,2times,Students#039 exercise and presentation
Confirmation of the learning achievement degree,1time,Confirmation of the learning achievement degree

[Class requirement]

Nothing

Continue to 災害リスク管理論(2)↓↓↓

災害リスク管理論(2)

[Method, Point of view, and Attainment levels of Evaluation]

Evaluate mainly by the presentations in the class as well as end-of-term report, taking active and constructive participation in the class into account.

[Textbook]

Tatano,H., Takagi,A.(ed.):Economic Analysis of disaster prevention, Keiso pub.,2005 (in Japanese).

[Reference books, etc.]

（Reference books）

Froot ,K.A.(ed) ldquoThe Financing of Catastrophic Riskrdquo, the University of Chicago Press Kunreuther H. and Rose, A., ldquoThe Economics of Natural Hazardsrdquo, Vol.1 amp 2, The International Library of Critical Writings in Economics 178, Edward Elgar publishers, 2004\ Okuyama, Y., and Chang, S.T.,(eds.) ldquoModeling Spatial and Economic Impacts of Disastersrdquo (Advances in Spatial Science), Springer, 2004.

（Related URLs）

(No web site)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	資源開発システム工学 Resources Development Systems	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MURATA SUMIHIKO

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Fri.1	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Development of mineral resources and energy resources is essential to the sustainable development of our society. In this class, the exploration and development process of natural resources are reviewed including the environmental conservation and harmony. In addition, fundamentals of reservoir engineering for the evaluation of production behavior and reserves of oil and natural gas are lectured.

[Course Goals]

The goal of this class is to understand the natural resources development concerning environment and master the reservoir engineering needed for the exploration and development of oil and natural gas resources.

[Course Schedule and Contents]

From exploration to development of natural resources,(1 time)
The exploration and development processes of mineral and energy resources, which are essential to the sustainable development of our society, are reviewed including the environmental conservation and harmony.

Fundamentals of reservoir engineering,(3 times)
The properties of reservoir fluids and the material balance method to evaluate the reserve of oil and natural gas are explained.

Fluid flow in reservoir,(7times)
Basic equations of multi-phase fluid flow in the reservoir and analytical solution for the flow of oil and natural gas around a well are explained. Furthermore, the concept and the method of well test analysis are also explained.

Enhanced oil and natural gas recovery,(5 times)
The displacement processes of oil and gas in a reservoir are explained. Furthermore, methods of enhanced oil and gas recovery (EOGR) are overviewed, and the essentials of each EOGR method are explained.

[Class requirement]

It is desirable to have knowledge of calculus of undergraduate level.

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation is made by the average score of report problems. They are presented 2 or 3 times in the semester.

Continue to 資源開発システム工学(2)↓↓↓

資源開発システム工学(2)

[Textbook]

Handouts are delivered.

[Reference books, etc.]

（Reference books）

L.P.Dake, Fundamentals of Reservoir Engineering, Developments in petroleum science Vol.8, Elsevir, ISBN 0-444-41830-X

（Related URLs）

(Web page of this class is not provided. Information is shown in the class when it is needed.)

[Regarding studies out of class (preparation and review)]

Self study is required using supplemental book.

（Others (office hour, etc.)）

Office hours are set 10:30-12:00 and 14:30-16:00 on the same day of the class.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	応用数理解析 Applied Mathematics in Civil & Earth Resources Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TSUKADA KAZUHIKO Graduate School of Engineering Associate Professor,SAITOU JIYUN

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Tue.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Linear inverse problems and nonlinear inverse problems are introduced as a basic tool to solve engineering problems. Application of data analysis to engineering problems is also introduced.

[Course Goals]

The goal is to acquire a systematic understanding of fundamental theory of the data analysis.

[Course Schedule and Contents]

Liner problems and Generalized inverses, 5 times,
Inverse problems, solution of linear inverse problems, generalized inverse, Application of vector space and singular-value decomposition

Maximum likelihood methods, Continuous inverse problems, 4 times,
Maximum likelihood Applied to inverse problem, nonlinear problems,
Continuous inverse problems

Application of data analysis, 5 times
Application of data analysis to Engineering problems

Achievement confirmation, 1 time
Comprehension check of course contents.

[Class requirement]

Fundamental knowledge of linear algebra and probabilistic analysis

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation is based on reports and the final examination.

Continue to 応用数理解析(2)↓↓↓

応用数理解析(2)

[Textbook]

Instructed during class

[Reference books, etc.]

（Reference books）

William Menke (**原著**), **柳谷 俊** (**翻訳**), **塚田 和彦** (**翻訳**) **『離散インバース理論―逆問題とデータ解析』（古今書院）**ISBN:4772215581**（原著**（Geophysical Data Analysis: Discrete Inverse Theory, 3rd Edition)**）**

[Regarding studies out of class (preparation and review)]

Review through the report.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	地殻環境工学 Environmental Geosphere Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KOIKE KATSUAKI Graduate School of Engineering Professor,HAYASHI TAMETO Part-time Lecturer,KINOSHITA MASATAKA

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.2	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Earth's crust environment engineering is an academic field closely related to our lives, and it covers many problems related to Earth science and engineering, such as the underground development and use of infrastructure facilities, the geological disposal of radioactive waste, underground storage of gas and liquid, natural disasters including landslides and earthquakes, as well as the exploration, development, and resource quantity evaluation of groundwater resources, metal/non-metal mineral resources, and geothermal and energy resources. This lecture covers topics that are important in Earth's crust environment engineering and their basic concepts, engineering applications, and the spatial information approach to clarify the geological, physical, and chemical properties of the Earth’s crust, while introducing research examples.

[Course Goals]

Thoroughly understand the positioning of the Earth’s crust as an element of the Earth, the physical and chemical properties, its importance as a resource germination place that benefits humanity, and the source of natural disaster threats that is contradictory to this. Along with that, finding out one's own direction in the relationship with the Earth’s crust, which can contribute to the welfare of humanity and a sustainable society; in other words, development and use methods of the Earth’s crust and environmental conservation laws.

[Course Schedule and Contents]

1. Introduction and fundamentals of water cycles (1 time)
In addition to explaining the program of this class, global environmental issues will be summarized as the starting point of this class. As examples of material circulation on a global scale, especially taking water environment issues into account that have recently attracted attention, the mechanism of the water cycle, the physical and geological factors that govern water flow, and so forth will be explained, and understanding of the importance of the Earth’s crust will be gained. [Koike]

2. Chemistry of the Earth System (2 times)
Since Earth’s crust environment engineering is an academic field targeting the Earth, it is first necessary to understand the structure, physics, and chemistry of the Earth. For that purpose, there will be a review on general geology and minerals, and the chemical properties of the rock minerals forming the Earth’s crust, mantle, core, the chemical composition of the crustal fluid, and the chemical reaction of rocks and fluids and so forth will be discussed. Additionally, the function of microorganisms on the Earth’s crust chemistry will be explained. [Koike]

3. Physics of the Earth system (3 times)
The materials and pressure structure of the Earth will be reviewed, and the dynamics of the Earth including crustal deformation will be explained (1 time). Next, the deep crustal fluid, which is important for the thermal

Continue to 地殻環境工学(2)↓↓↓

structure of the Earth, and the formation of mineral, oil, and gas deposits will be explained (2 times). [Hayashi and Kinoshita]

4. Foundations of Geoinformatics (1) (Geological modeling method) (2 times)
The spatial informatics approach to clarify in detail the physical and chemical properties of the Earth's crust and its distribution over time-space will be explained in series.
First, as a method for modeling geological structure and physical properties from discretely distributed geological information, an overview will be given on mathematical geology, the general analytical method of geological data, and spatial correlation structure analysis by variogram. Next, a lecture will be given on spatial data estimation by kriging, geostatistical simulation, and the application of a neural network, which is a form of deep learning, will be provided along with a study example. [Koike]

5. Foundations of Geoinformatics (2) (Scaling of geological structure) (1 time)
Although what is underground cannot be seen directly, information on geology, geometric structure, crustal deformation, crustal chemistry, and so forth may appear in the topography. As a method for estimating the deep environment of the Earth's crust surface, a lecture will be given on the utilization of topographical and geological information, as well as estimating the local structure from limited information to wide scale, or the scaling of geological structure (what connects micro and macro, etc.). [Koike]

6. Fundamentals of Geoinformatics (3) (Remote sensing) (2 times)
An outline of remote sensing which is effective as a survey method concerning the physics/chemistry of geological crust, geological structure, variation, resource exploration, and environmental monitoring will be given. First, a lecture will be given on the interaction of materials and electromagnetic waves, and remote sensing by optical sensors, with research and survey examples. Next, the basics of remote sensing by microwave sensor, the identification of surface material by polarimetric SAR, topographic analysis by interference SAR, and crustal deformation analysis will be explained.

7. Fundamentals of Geoinformatics (4) (Earth measurement/geochemical exploration) (1 time)
As a visualization method of the crustal structure, the Earth measurement method using a physical response, the inversion analysis method of data by this method, and the geochemical exploration method for extracting and analyzing chemical anomalies in the shallow part of the surface will be outlined. [Koike]

8. Geosphere environmental and resource problems (2 times)
There are cases where the Earth's crust is used as a long-term storage location. The geological disposal of high-level radioactive waste, which is representative, and an underground reservoir of carbon dioxide will be described. Additionally, since there are abundant mineral resources and energy resources, such as methane hydrate, that are also at the bottom of the sea and under the seabed, the structure of the oceanic crust and the method of exploration and development of marine resources, as well as the utilization situation of global resources and the resource problem will be covered, and a lecture will be given on natural energy using geothermal heat, and its advantages and disadvantages. [Koike and Hayashi]

Feedback (1 time)
There will be a supplementary explanation, through classes, individual consultations, and so forth about the parts where students may have insufficient understanding of the lecture contents described above, based on the evaluation of reports.

Continue to 地殻環境工学(3)↓↓↓

地殻環境工学(3)

[Class requirement]

It is desirable that students have basic knowledge of geology, physics, and chemistry.

[Method, Point of view, and Attainment levels of Evaluation]

The grades will be evaluated by combining the report and points given for participation in class. The points given for participation in class will be evaluated based on attendance status, confirmation of comprehension level by quizzes, and so forth during class. The ratio between report and participation points is about 9:1.

[Textbook]

Handouts will be distributed during each class.

[Reference books, etc.]

（Reference books）

References will be introduced in the handouts.

[Regarding studies out of class (preparation and review)]

Reports will be assigned about three or four times in order to review the contents of the class. The aim is to deepen understanding by solving problems.

（Others (office hour, etc.)）

Office hours are not particularly set, but questions are accepted from time to time.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	応用弾性学 Applied Elasticity for Rock Mechanics	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MURATA SUMIHIKO

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

Theory of elasticity relating to the deformation and failure of rock and rock mass and design of rock structures is explained. Specifically, two-dimensional analysis of elasticity using the basic equations, constitutive equations, and the complex stress function are explained. In addition, poroelasticity is explained. Several applications of this analysis to rock mechanics, rock engineering, and fracture mechanics are also explained.

[Course Goals]

The goal of this class is to master the theory of elasticity so as to solve the elastic problem in rock mechanics, rock engineering, and fracture mechanics.

[Course Schedule and Contents]

Airy's stress function and complex stress function (2 times)
Airy's stress function used to solve a two-dimensional elastic problem is first explained, and then the complex stress functions that are the representation of Airy's stress function by the complex variables are explained.

Two-dimensional elastic analysis using the complex stress function (8 times)
Analytical solutions of two-dimensional elastic problems in fracture mechanics and rock engineering are derived by using the complex stress functions. The mechanical behavior of rock material is also explained based on the derived solutions.

Application of two-dimensional elastic analysis (2 times)
The theory of rock support, ground characteristic curve, theoretical equations used for the evaluation of rock stress, which are derived from the solution of two-dimensional elastic problem, are explained.

Poroelasticity (2 times)
Basic equations and parameters of poroelasticity are explained. Futhrermore, the applications of poroelasticity are explained.

Examination (1 time)

Feedback (1 time)
The contents of this class are summarized. In addition, the achievement of course goals is checked.

Continue to 応用弾性学(2)↓↓↓

応用弾性学(2)

[Class requirement]

The knowledge and calculation skill of calculus, vector analysis and complex analysis are required.

[Method, Point of view, and Attainment levels of Evaluation]

Evaluation is made by the score of two report problems or homeworks (25% each) and semester final examination (50%).

[Textbook]

Handouts are delivered.

[Reference books, etc.]

（Reference books）

J.C. Jaeger, N.G.W. Cook, and R.W. Zimmerman: Fundamentals of Rock Mechanics -4th ed., Blackwell Publishing, 2007, ISBN-13: 978-0-632-05759-7

（Related URLs）

(Web page of this lecture is not provided. When preparing it by need, the information is shown in the class.)

[Regarding studies out of class (preparation and review)]

Review of the each class is required.

（Others (office hour, etc.)）

Office hour is set 10:30-12:00 and 14:30-1600 on the same day of the class.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	物理探査の基礎数理 Fundamental Theories in Geophysical Exploration	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MIKADA HITOSHI Graduate School of Engineering Assistant Professor,TAKEKAWA JUNICHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Fri.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

We are outlining various basic mathematical principles used for the analysis of the dynamic and kinematic earth-scientific problems in conjunction with wave propagation, mass transfer, etc. in the crust, and presenting examples of such analysis techniques in the area of earth sciences and earth resources engineering.

[Course Goals]

The aims of the class is to understand various signal-processing theories, the applied seismology, and the applied geo-electromagnetics with respect to exploration geophysics as application tools in seismology and in geo-electromagnetics.

[Course Schedule and Contents]

Introduction to exploration geophysics,1time,General introduction to the lecture.
Seismic wave propagation and signal processing,8times,Acquire knowledge on the propagation phenomena of elastic waves to learn the equivalency of 1D propagation with the theory of system function. The topics included would be, z-transform, Levinson recursion, Hilbert transform, etc.
Fundamentals of geo-electromagnetics and their application to exploration geophysics,5times,Learn fundamental theories of magnetotellurics, instantaneous potential, spontaneous potential, and apparent resistivity methods, etc. that deal with geo-electromagnetic phenomena. Case studies are introduced to understand the advantages of geo-electromagnetic exploration schemes.
Wave propagation problem in seismic exploration,1time,Discussing fundamental theories of elastic wave propagation, used in subsurface structural surveys, in terms of the actual utilization and the theories of wave phenomena.

[Class requirement]

Students should understand exploration geophysics of undergraduate level.

[Method, Point of view, and Attainment levels of Evaluation]

Rating is performed by the combination of exams (40%) and the attendance to the class (60%).

[Textbook]

Continue to 物理探査の基礎数理(2)↓↓↓

物理探査の基礎数理(2)

[Reference books, etc.]

（Reference books）

Claerbout, J.F. (1976): Fundamentals of Geophysical Data Processing (Available online URL: http://sep.stanford.edu/oldreports/fgdp2/)

（Related URLs）

(Could be specified by the lecturers if any.)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	地下空間と地殻物性 Underground space and petrophysics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HAYASHI TAMETO Graduate School of Engineering Professor,SAKAKI TOSHIHIRO Part-time Lecturer,YOKOYAMA TATSUYA

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese

[Outline and Purpose of the Course]

In this course, we will give lectures on the physical properties and mechanical properties of rocks under large depths, in-situ stress, stability of underground spaces such as radioactive waste disposal and traffic tunnels.

[Course Goals]

Understand the representative physical properties of rocks under high temperature and high pressure, measurement methods of in-situ stress and their applications in radioactive waste disposal and traffic tunnels.

[Course Schedule and Contents]

Guidance,1time,Introduce the contents of the course.
Physical properties and strength of rocks,4times,Physical properties (elastic wave velocity, resistivity, fluid flow and thermal properties) and mechanical properties (strength and deformation).
Rock stress and its measurements,2times,Measurement methods of in-situ stress such as relief method, hydraulic method etc.
Underground stability and rock stress problems,2times,Stability of large underground spaces (e.g., South Africa gold mines) and their relations with in-situ stress.
Redioactive waste repository,3times,Concept and designs of radioactive waste repository for a long time scale
Tunnel,2times,Survey, designs, construction and maintenance of traffic tunnels
Feedback,1time,

[Class requirement]

Taking Underground Development Engineering and Rock Engineering (when undergraduate) are desirable.

[Method, Point of view, and Attainment levels of Evaluation]

[Textbook]

No set text

Continue to 地下空間と地殻物性(2)↓↓↓

地下空間と地殻物性(2)

[Reference books, etc.]

（Reference books）

Instructed in class

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	地殻環境計測 Measurement in the earth's crust environment	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SAKAKI TOSHIHIRO Graduate School of Engineering Associate Professor,NARA YOSHITAKA Part-time Lecturer,YAMAMOTO KOJI Part-time Lecturer,AMEMIYA KIYOSHI

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Information necessary to understand environment in the upper layer of the earth#039s crust will be explained for various engineering projects. Among them, measurements of rock stress and mechanical properties of rock will be focused in the relation to the projects of oil and gas exploitaiton, underground disposal of radio active waste, geological sequestration of CO2, construction of underground power houses and hot dry rock geothermal power extraction.

[Course Goals]

Goals of this course are the followings. 1) To understand effects of initial rock stress on stability of underground chambers for verious purposes. 2) To understand a stress relief method as one of typical rock stress measurement. 3) To understand the principle of a least square method though learning a procedure to determine initial rock stress condition from released strains measured on a borehole wall. 4) To understand effects of rock stress for oil and gas exploitation through borehole breakout problems and others. 5)To understand purposes and latest technologies for long term monitoring up to 100,000 years. 6) To understand mechanical properties of rock (strength, permeability, fracturing, etc.) under different environmental condition with methodology of their measurements.

[Course Schedule and Contents]

Importance of rock stress condition in underground development (by ISHIDA),3times,Necessity of rock stress measurements and their applications for various engineering projects will be explained. Among the projects, underground disposal of radio active waste, geological sequestration of CO2, construction of underground power houses and hot dry rock geothermal power extraction will be focused.
Stress relief methods to measure rock stress and applicaiton of least square method (by ISHIDA),3times, Actual field works of stress relief methods to measure initial rock stress condition will be explained. Though learning a procedure to determine an initial rock stress condition from released strains measured on a borehole wall, the principle of a least square method will be explained. The report subject will be shown in the last week.
Effect of rock stress on oil and gas exploitation,4times,Estimation of rock stress condition by hydraulic fracturing and logging, which is conducted at various steps for oil and gas exploitation, will be explained. Importance of rock stress affecting on borehole stability will be explained as well.
Monitoring in Deep Underground Facility - to ensure the long term stability-,2times,The purposes and latest technologies of monitoring are shown in this lecture, focusing on the methods of ensuring the long term (up to 100,000 years) safety assessment of radioactive waste disposal.
Measurement of mechanical properties of rock under various environment,2times,Mechanical properties of rock (strength, permeability, fracturing, etc.) under different environmental condition are shown, as well as

Continue to 地殻環境計測(2)↓↓↓

地殻環境計測(2)

the methodology of measurements. In addition, the relationship between the rock properties and radioactive waste disposal is described.
Confirmation of understanding ,1time,Feedback through tests and others.

[Class requirement]

Elasticity, Linear Algebra (Calculation of Matrices) and Computer Literacy (for example, Excel, Word and so on.)

[Method, Point of view, and Attainment levels of Evaluation]

Grading will be made from scores of the followings; report for subjects, achievement tests and number of attendance to the classes.

[Textbook]

None. Handouts will be given in classes when needed.

[Reference books, etc.]

（Reference books）

1) Amadei, B. amp Stephansson, O.: Rock Stress and Its Measurements, Capman amp Hall, 1977.\ 2) Vutukuri, V. S. amp Katsuyama, K.: Introduction to Rock Mechanics, Industrial Publishing amp Consulting, Inc., Tokyo, 1994.

[Regarding studies out of class (preparation and review)]

When you make a report, it is necessary to calculate matrixes by using a Microsoft Excel and others.

（Others (office hour, etc.)）

This class is made by English.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	地球資源学 Earth Resources Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KOIKE KATSUAKI

Target year		Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Wed.2	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Securance and development harmonious with natural environments of the mineral and fossil energy resources, and utilization of storage function of geologic strata have become important issues for constructing sustainable society. This subject introduces comprehensively the present situation of uses of mineral and energy resources, crust structure and dynamics, economic geology for the genesis and geologic environments of deposits, physical and chemical exploration methods of marine deposits, mathematical geology for reserve assessment, engineering geology for resource development and geological repository, and problems and promise of natural energy such as geothermal, solar, wind, and tide.

[Course Goals]

To find out directionality about the technologies required for constructing sustainable society by yourself with full understandings of genetic mechanism, biased distribution, and the present situation of demand and supply of the mineral and energy resources.

[Course Schedule and Contents]

Introduction of this course and resources(1)
Definition of renewable and non-renewable resources. Interaction among Earth environment, human society, and natural resources. Existence pattern of natural resources in the crust.

1. Internal structure of Earth and geodynamics(2)
Inner structure of the Earth, geodynamics, geologic composition, temperature structure, rock physics, and chemical composition of crust.

2. Present and future of energy resources(1)
Classification of energy sources, recent trend on social demand of energy, physical characteristics of each energy resources, and sustainability.

3. Present and future of mineral resources(1)
Classification of minerals used for resources, recent trend on social demand of mineral resources, industrial uses of each mineral, and sustainability.

4. Economic geology (1)(1)
Classification of ore deposits, distribution of each type of ore deposit, generation mechanism of deposit.

4. Economic geology (2)(1)
General structure and distribution of fuel deposits (coal, petroleum, and natural gas), generation mechanism of deposits, and geological process of formation.

5. Resource exploration (1): Terrestrial area(1)

Continue to 地球資源学 (2)↓↓↓

地球資源学 (2)

Physical and chemical exploration technologies for natural resources in terrestrial area. Representative methods are remote sensing, electric sounding, electromagnetic survey, and seismic prospecting.

6. Resource exploration (2): Sea area(1)
Introduction of marine natural resources such as methane hydrate, cobalt-rich crust, and manganese nodule, and exploration technologies for the deposits in sea area.

7. Assessment of ore reserves and deposit characterization(2)
Fundamentals of geostatistics, variography for spatial correlation structure, spatial modeling by kriging, geostatistical simulation, integration of hard and soft data, and feasibility study.

8. Resource development(1)
Development and management technologies of energy resources related to coal, petroleum, and natural gas.

9. Engineering geology(1)
Fundamentals of deep geological repository for high-level nuclear waste, CCS (carbon dioxide capture and storage), and underground storage of petroleum and gas.

10. Sustainability(1)
Characteristics of natural energy related to geothermal, solar, wind, and tide, aand ssessment of natural energy resources. Co-existence of natural resource development with environment, low-carbon society, and problems for human sustainability.

Feedback(1)
Based on evaluation of the reports, contents that are not well understood will be explained additionally using KLUSIS or by personal interview.

[Class requirement]

Elementary knowledge of engineering, mathematics, physics, and geology are required.

[Method, Point of view, and Attainment levels of Evaluation]

The grades will be evaluated by combining the report and points given for participation in class. The points given for participation in class will be evaluated based on attendance status, confirmation of comprehension level by quizzes, and so forth during class. The ratio between report and participation points is about 9:1.

[Textbook]

Prints will be distributed during each class.

[Reference books, etc.]

（Reference books）
Introduced during class

Continue to 地球資源学 (3)↓↓↓

地球資源学 (3)

[Regarding studies out of class (preparation and review)]

Reports will be assigned about three or four times in order to review the contents of the class. The aim is to deepen understanding by solving problems.

（Others (office hour, etc.)）

Office hours are not particularly set, but questions are accepted from time to time.This class is opened every two years, and opened in 2019.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	都市基盤マネジメント論 Urban Infrastructure Management	Affiliated department, Job title,Name	Graduate School of Engineering Professor,OOTSU HIROYASU

Target year		Number of credits	2	Course offered year/period	2019/First semester

Day/period	Mon.3	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This lecture aims to provide interdisciplinary knowledge associated with how urban infrastructure is comprehensively management, from viewpoints of not only economy but also ldquohuman security engineeringrdquo. In detail, the contents of lectures consist of following topics: Urban Infrastructure Asset Management, Urban Disaster Risk Mitigation Management, Urban Transport/Logistics Management and Urban Food/Water Supply Management.

[Course Goals]

Aquisition of interdisciplinary knowledge associated with how urban infrastructure is comprehensively management, from viewpoint of not only economy but also human security engineering.

[Course Schedule and Contents]

Guidance, Introduction of Urban Infrastructure Asset Management,1time,Guidance amp Introduction to Urban Infrastructure Asset Management
Urban Infrastructure Asset Management,4times,Urban Infrastructure Asset Management on Geotechnical structures and Bridge
Urban Disaster Risk Mitigation Management ,3times,Urban Disaster Risk Mitigation Management
Urban Food/Water Supply Management ,3times,Urban Food/Water Supply Management
Urban Transport/Logistics Management,2times,Urban Transport/Logistics Management
Report,1time,Report
Feed back,1time,Feed back
,,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

Attendance(20), Report(80)

[Textbook]

Continue to 都市基盤マネジメント論(2)↓↓↓

都市基盤マネジメント論(2)

[Reference books, etc.]

（Reference books）

Hand-out

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Addtional information is available by visiting the following professors. Appointment shall be made in advance by e-mail.

ohtsu.hiroyasu.6n@kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	グローバル生存学 Global Survivability Studies	Affiliated department, Job title,Name	Graduate School of Advanced Integrated Studies in Human Survivability Professor,TAKARA KAORU Graduate School of Engineering Professor,KIYONO JIYUNJI Graduate School of Engineering Professor,FUJII SATOSHI Disaster Prevention Research Institute Associate Professor,SAYAMA TAKAHIRO Graduate School of Advanced Integrated Studies in Human Survivability Project Associate Professor,SHIMIZU MIKA

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.5	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Modern global society is facing risks or social unrests that are caused by huge natural hazards and disasters, man-made disasters and accidents, regional environmental change/degradation including infectious diseases, and food security. Introducing such examples at global and regional scales, this subject lectures how to cope with them at national, local and community levels for making the society sustainable/survivable. Future countermeasures are also discussed under the uncertain circumstances such as climate change, population growth, energy and socio-economic issues.

[Course Goals]

The objectives of this class are to have basic knowledge about global issues threatening safety and security of the earth society such as catastrophic natural disasters, man-made disasters and accidents, regional environmental change (including infectious diseases) and food security, and to enhance studentrsquos ability to express his/her own ideas and discuss with professors and students from other study areas.

[Course Schedule and Contents]

Introduction of Global Survivability Studies,1time,Introduction of Global Survivability Studies.
Earthquake disaster mitigation,1time,Discuss on earthquake disaster mitigation focusing on lessons learnt from Tohoku EQ.
Mitigation of earthquake damage to historic structures,1time,Discuss on the mitigation of earthquake damage to historic structures.
Why we need GSS?,1time,Discuss on why we need Global Survivability Studies (GSS).
Global agendas for sustainable development and resilient societies,1time,Discuss on global agendas for sustainable development and resilient societies.
Building national resilience in Japan,1time,Discuss on building national resilience based on Japanese experiences.
Globalism as totalitarianism,1time,Discuss on globalism as totalitarianism.
Public policy and systems approach for global changes in disaster risks,1time,Lecture and group work on public policy and systems approach for global changes in disaster risks.
Disaster risk management and governance for global changes,1time,Lecture and group work on disaster risk management and governance for global changes.
Water-related disaster risk management,1time,Discuss on water-related disaster risk management: concept and recent experiences.
Water cycle and climate change,1time,Discuss on water cycle and climate change.

Continue to グローバル生存学(2)↓↓↓

グローバル生存学(2)

Presentation by students amp discussions,4times,Presentation by students related to this lectures and discussions on the presented topics.

[Class requirement]

Nothing special.

[Method, Point of view, and Attainment levels of Evaluation]

Attendance to lectures (40%) and Presentation and discussion (60 %).

[Textbook]

Nothing special.

[Reference books, etc.]

（Reference books）

Nothing special.

[Regarding studies out of class (preparation and review)]

If handouts (teaching materials) are distributed (or downloaded from the website), students should read them prior to the class. They may be distributed at the classroom (or put on the website). Students can make use of them after the class for reviewing lectures and preparing presentation materials and discussion sessions which will be organized in the latter half of the semester.

（Others (office hour, etc.)）

This subject is compulsory for students enrolled in the Inter-Graduate School Program for Sustainable Development and Survivable Societies. Students other than ones in Graduate School of Engineering should submit a registration card for taking this class.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	強靭な国づくりのためのエンジニアリングセミナー Engineering Seminar for Disaster Resilience in ASEAN countrie	Affiliated department, Job title,Name	Graduate School of Engineering Professor,OOTSU HIROYASU

Target year		Number of credits	2	Course offered year/period	2019/Intensive, First semester

Day/period	Intensive	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

The purpose of this course is to provide practical lessons in ASEAN countries associated with disaster risk mitigation such as early warning and evacuation program, and disaster recovery/restoration from viewpoints of problems-finding/problem-solving through short term intensive lecture and field work. By taking the applied practical programs of shared major classes under the instructions of teachers in charge, the students can improve the ability of resolving issues on practical projects. Topics taught in this seminar are earthquake, flood, landslide, land subsidence, and geo-risk engineering.

[Course Goals]

Course aims to foster international leaders who are able to solve and manage problems concerned about natural disaster, disaster mitigation, health and environmental issues, especially about case studies in ASEAN countries.

[Course Schedule and Contents]

Introduction: Engineering for Disaster Resilience,1time,
Earthquake Disaster,2times,
Landslide Disaster,2times,
Geo-Risk Engineering,2times,
Flood Disaster,2times,
Land Subsidence,2times,
Site Visit,5times,
Evaluation of understanding,1time,

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

40% for course work assignments and reports, 60% for final exam.

[Textbook]

Lecture notes provided by the instructors.

Continue to 強靭な国づくりのためのエンジニアリングセミナー(2)↓↓↓

強靱な国づくりのためのエンジニアリングセミナー(2)

[Reference books, etc.]

（Reference books）

（Related URLs）

(Consortium for International Human Resource Development for Disaster-Resilient Countries, Kyoto University http://www.drc.t.kyoto-u.ac.jp/rsdc/eng/)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Those who want to take this course have to apply for Study area of Approaches for Disaster Resilience. Refer the website above.

*Please visit KULASIS to find out about office hours.

未更新

Numbering code			
Course title <English>	安寧の都市のための災害及び健康リスクマネジメント Disaster and Health Risk Management for Liveable City	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KIYONO JIYUNJI Graduate School of Engineering Program-Specific Assistant Professor,OOTOMO NAO

Target year		Number of credits	2	Course offered year/period	2019/Intensive, First semester

Day/period	Intensive	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

Various types of disasters constantly attack to Asian countries, and those countries sometimes are very vulnerable to the natural disasters and health risk. The interdisciplinary approach of engineering and medical science is indispensable to construct disaster-resilient countries. The 2011 Tohoku earthquake was one of the worst disasters in recent Japanese history. However many lessons to mitigate and manage the disaster are learnt from the event. In order to solve the related issues, the course provides selected topics about natural disaster, disaster-induced human casualty, emergency response, urban search and rescue, emergency medical service, principle of behavior based on neuroscience, urban search and rescue, reconstruction and rehabilitation policy, social impact of disaster, transportation management, logistics during earthquake disaster and so on.

[Course Goals]

Course aims to foster international leaders who are able to solve and manage problems concerned about natural disaster, disaster mitigation, health and environmental issues, logistics and amenity for constructing liveable city.

[Course Schedule and Contents]

Guidance and Group Work,2times,
ORT,3times,
Earthquake disaster and human casualty,1time,
Earthquake protection and emergency responses,1time,
Human brain function and behavior,1time,
Disaster medicine and epidemiology,1time,
Resilient society,1time,
Transition of the design for amenity in the river-front,1time,
Concern that elderly people in rural area have over health and mobility,1time,
Differences in logistics and humanitarian logistics,1time,
Unique challenges of humanitarian logistics,1time,
Advancement on humanitarian logistics,1time,
Achievement evaluation,1time,

[Class requirement]

No special knowledge and techniques are necessary.

Continue to 安寧の都市のための災害及び健康リスクマネジメント(2)↓↓↓

安寧の都市のための災害及び健康リスクマネジメント(2)

[Method, Point of view, and Attainment levels of Evaluation]

Course work assignments and reports

[Textbook]

Textbook for the course is provided by the instructor on the first day.

[Reference books, etc.]

（Reference books）

Some literatures would be introduced by professors.

（Related URLs）

(Consortium for International Human Resource Development for Disaster-Resilient Countrie, Kyoto University http://www.drc.t.kyoto-u.ac.jp/)

[Regarding studies out of class (preparation and review)]

（Others (office hour, etc.)）

Contact person: Prof.Kiyono ltkiyono@quake.kuciv.kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	エンジニアリングプロジェクトマネジメント Project Management in Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,ASHIDA RIYUUICHI Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU Graduate School of Engineering Associate Professor,Juha Lintuluoto

Target year		Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.4	Class style	Lecture	Language	English

[Outline and Purpose of the Course]

This course provides a basic knowledge required for the project management in various engineering fields such as process design, plant design, construction, and R&D project. Some lectures are provided by visiting lecturers from industry and public works who have many experiences on actual engineering projects.

[Course Goals]

This course will help students gain a fundamental knowledge of what project management in engineering is. Throughout the course, students will learn various tools applied in project management. Students will also understand the importance of costs and money, risks, leadership, and environmental assessment in managing engineering projects. This course is followed with the course Exercise on Project Management in Engineering in the second semester.

[Course Schedule and Contents]

Week 1, Course guidance
Week 2-3, Introduction to project management
Week 4, Project scheduling
Week 5-7, Tools for project management, cost, and cash flows
Week 8-9, Team organization and administration
Week 10, Negotiation skills/tactics/examples in business marketing
Week 11, Environmental impact assessment
Week 12-13, Risk management
Week 14, Project management for engineering procurement construction business
Week 15, Feedback

[Class requirement]

We may restrict the class size to enhance students' learning.
Students who intend to join the course are required to attend the first class.

Continue to エンジニアリングプロジェクトマネジメント(2)↓↓↓

エンジニアリングプロジェクトマネジメント(2)

[Method, Point of view, and Attainment levels of Evaluation]

Evaluated by class contribution (or level of understanding) at each class (60%) and assignments (40%)

[Textbook]

Course materials will be provided.

[Reference books, etc.]

（Reference books）

Lock, Dennis 『Project Management, 10th edition』 （Gower Publishing Ltd.）ISBN:1409452697
Cleland, David L., and Ireland, Lewis R. 『Project Management: Strategic Design and Implementation, 5th edition』 （McGraw-Hill Professional）ISBN:007147160X
Miller, Roger and Lessard, Donald R. 『The strategic management of large engineering projects, Shaping Institutions, Risks, and Governance』 （The MIT Press）ISBN:9780262526982

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

This course requests students to prepare a class in advance becouse some classes will be done by an interactive style as necessary.

（Others (office hour, etc.)）

We may restrict the class size to enhance students' learning.
Students who intend to join the course are required to attend the first class.

*Please visit KULASIS to find out about office hours.

Numbering code			
Course title <English>	エンジニアリングプロジェクトマネジメント演習 Exercise on Project Management in Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,ASHIDA RIYUUICHI Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU Graduate School of Engineering Associate Professor,Juha Lintuluoto

Target year		Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.4,5	Class style	Seminar	Language	English

[Outline and Purpose of the Course]

In this course, students will apply the engineering know-how and the skills of management, and group leadership which they learned in the course of Project Management in Engineering to build and carry out a virtual inter-engineering project. This course provides a forum where students' team-plan based on ideas and theories, decision making, and leadership should produce realistic engineering project outcomes. The course consists of intensive group work, presentations, and a few intermediate discussions. A final report will be required.

[Course Goals]

This course prepares engineering students to work with other engineers within a large international engineering project. In particular this course will focus on leadership and management of projects along with applied engineering skills where the students learn various compromises, co-operation, responsibility, and ethics.

[Course Schedule and Contents]

Week 1, Introduction to Exercise on Project Management in Engineering, Lecture on tools for the Project management in engineering, Practice and Project proposal.
Week 2, Group finalizations & Project selections.
Week 3-7, Group work, Project preliminary structures, Task list, WBS, Cost, Gant chart.
Week 8, Mid-term presentation.
Week 9-11, Group work, Leadership structuring, Risk Management, Environmental Impact Assessment.
Week 12, Presentation.
Each project group may freely schedule the group works within given time frame. The course instructors are available if any need is required.
Some lectures will be provided such as Task list, WBS, Cost, Gant chart, Leadership structuring, Risk Management, Environmental Impact Assessment, and more.

Continue to エンジニアリングプロジェクトマネジメント演習(2)↓↓↓

エンジニアリングプロジェクトマネジメント演習(2)

[Class requirement]

Fundamental skills about group leading and communication, scientific presentation.
We may restrict the class size to enhance students' learning.
Students who intend to join the course are required to attend the first class.

[Method, Point of view, and Attainment levels of Evaluation]

Report, presentations, class activity (at least 10 times attendance including mid-term and final presentations).

[Textbook]

Course materials will be provided if necessary.

[Reference books, etc.]

（Reference books）

Will be informed if necessary.

（Related URLs）

http://www.glc.t.kyoto-u.ac.jp/grad(The home page of the engineering education research center)

[Regarding studies out of class (preparation and review)]

Students are requested to prepare for group work, mid-term presentation and finel presentation.

（Others (office hour, etc.)）

We may restrict the class size to enhance students' learning.
Students who intend to join the course are required to attend the first class.

*Please visit KULASIS to find out about office hours.

Numbering code	G-INF02 63287 LJ12　G-INF02 63287 LJ46　G-INF02 63287 LJ24		
Course title <English>	防災情報特論 Disaster Information	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,YAMORI KATSUYA Disaster Prevention Research Institute Professor,HATAYAMA MICHINORI Disaster Prevention Research Institute Associate Professor,OONISHI MASAMITSU

Target year	1st year students or above	Number of credits	2	Course offered year/period	2019/First semester

Day/period	Wed.3	Class style	Lecture	Language	Japanese

Class type	専攻専門科目

[Outline and Purpose of the Course]

わが国及び諸外国の災害予防および災害対応の現状と、その中での情報課題について講述する。特に、防災における情報の意義と防災情報システムへの具体的適応例、および災害時等の危機的な社会状況における人間の心理過程を的確に組み込んだ情報処理のあり方を論ずる。

This lecture gives an outline of disaster prevention and reduction countermeasures both inside and outside Japan with special reference to disaster information related topics. Concrete examples of disaster information systems are introduced to show that psychological aspect of information users under critical social conditions is carefully taken into account in such current disaster information systems.

[Course Goals]

・学んだ内容と実務(現場)との関連について理解する。
・人間の行動と災害情報との関係を理解し、情報処理システムの設計や評価に反映できる。

[Course Schedule and Contents]

１．防災とは何か，２．災害リスク・マネジメント，３．災害時における情報システム，４．災害対応のための情報システム，５．防災情報システムの導入プロセス，６．避難計画と情報システム，７．レスキュー活動と情報システム，８．社会心理学から見た防災情報（その１），９．社会心理学から見た防災情報（その２），10．防災情報と避難行動（その１），11．防災情報と避難行動（その２），12．ゲーミングと災害リスクコミュニケーション（その１），13．ゲーミングと災害リスクコミュニケーション（その２），14．ゲーミングと災害リスクコミュニケーション（その３），15．レポート試験

1. What is disaster prevention?, 2. Disaster Risk Management, 3.Information system in emergency, 4. Information system for disaster correspondence, 5. Introduction process of disaster information system, 6. Information system for evacuation planning, 7. Information system for rescue activity, 8. Social psychological study of disaster information (1), 9.　Social psychological study of disaster information (2), 10. Disaster information and evacuation behavior (1), 11. Disaster information and evacuation behavior (2), 12. Gaming approach to disaster risk communication (1), 13. Gaming approach to disaster risk communication (2), 14. Gaming approach to disaster risk communication (3), 15. Test

[Class requirement]

None

Continue to 防災情報特論(2)↓↓↓

防災情報特論(2)

[Method, Point of view, and Attainment levels of Evaluation]

達成目標に対する達成度を、情報学研究科成績評価規定第７条による成績評価に則り行う。詳細は授業時に説明する。

Submit every class reports and end-of-term report
Every class reports:
“Point out 3 discoveries for you and 1 request which you want to know more with reasons in this class.
Submit report via Email by the following rules
1. Address: disaster_info@imdr.dpri.kyoto-u.ac.jp
2. subject:“Disaster Information Report [Date] Student ID, Name”
3. Don’t use attached file.
4. Deadline: Next Tuesday

[Textbook]

Not used

[Reference books, etc.]

（Reference books）
多々納裕一・高木朗義編著『「防災の経済分析」(2005)』（勁草書房）
亀田弘行監修、萩原良巳・岡田憲夫・多々納裕一編著『「総合防災学への道」(2006)』（京都大学学術出版）

[Regarding studies out of class (preparation and review)]

本科目の達成目標に到達するには、講義での学習のほかに予習・復習が必要である。

（Others (office hour, etc.)）

オフィスアワー：毎週水曜講義後，講義終了後にアポイントメントをとること．
質問等はEmailでも受け付ける．アドレス：disaster_info@imdr.dpri.kyoto-u.ac.jp
Office Hours: After Class, Make an appointment immediately after.
Questions via Email: disaster_info@imdr.dpri.kyoto-u.ac.jp

*Please visit KULASIS to find out about office hours.

Numbering code	G-GES32 63707 LJ74				
Course title <English>	環境デザイン論 Environmental Design Research	Affiliated department, Job title,Name	Graduate School of Global Environmental Studies Professor,KOBAYASHI HIROHIDE Graduate School of Global Environmental Studies Associate Professor,OCHIAI CHIHO		
Target year	Master's students	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese
Course Number	3707				

[Outline and Purpose of the Course]

本講義「環境デザイン論」は，人間とその周囲に存する物理的環境や社会的環境との相互関係にみられる課題に対して，生活質向上に資するデザインの方法やその役割を理解し考察することを目的とする．最初に多様な環境デザインの枠組みと，その中で本講義が扱う地域社会の環境デザイン(ソーシャルデザイン)の視点を概説し，地域での新たな環境デザイン試行や地域で培われた環境適応の方法など，事例を紹介しながら講義をおこなう．前半のテーマでは，風土建築の再建マネジメント，地域資源を活かす建築システム，環境親和型建築の可能性，後半のテーマでは，地域コミュニティの持続可能性，自然災害と人間居住に関わる環境デザインの方法をみる．

[Course Goals]

より快適で豊かな持続的人間環境の構築をめざすデザインの基本的な考え方と方法論を理解する．

[Course Schedule and Contents]

環境デザイン概論
１）環境デザインの枠組み：環境デザインの社会的役割やその対象について概説する．

風土建築の再建マネジメント
２）風土建築の持続可能性1：地域に根ざす建築の維持継承の条件や方法を海外の事例から探る．
３）風土建築の持続可能性2：地域に根ざす建築の維持継承の条件や方法を国内の事例から探る．

地域資源を活かす建築システム
４）地域資源活用の建築的試行1：地域資源としての竹材を用いた環境デザインの事例を紹介する．

５）地域資源活用の建築的試行2：地域資源としても木材を用いた環境デザインの事例を紹介する．

環境親和型建築の可能性
６）外部環境に応答する建築1：環境親和技術を用いた建築デザインの手法を概説する．
７）外部環境に応答する建築2：環境親和技術を用いた建築デザインの事例を紹介する．

地域コミュニティの持続可能性
８）集落環境改善のための取り組み：集落資源を活用した新たなコミュニティづくりの試みを紹介する．
９）ローカルコモンズと地域資源：コミュニティによる持続的地域資源利用の事例を紹介する．

Continue to 環境デザイン論(2)↓↓↓

環境デザイン論(2)

自然災害と人間居住
10）集落住民の居住環境適応1：洪水災害常襲集落の環境適応の術を紹介する.
11）集落住民の居住環境適応2：集落火災を防ぐための住民協働のしくみを紹介する.
12）災害後の居住環境構築：大規模自然災害後の居住環境構築に関する事例を紹介する.

環境デザインの拡張的議論
13）学生発表と議論1：学生プレゼンにより様々な分野の環境デザイン適用事例を共有し議論する.

14）学生発表と議論2：学生プレゼンにより様々な分野の環境デザイン適用事例を共有し議論する.

学習到達度の確認
15）一連の講義内容に関する理解度確認

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

出席状況や学生プレゼンテーション，課題レポートの内容により評価する.

[Textbook]

資料を配布する。

[Reference books, etc.]

（Reference books）
Introduced during class

[Regarding studies out of class (preparation and review)]

本講義の各テーマに関連する予習を行い，基礎的な理解をしておくことが望ましい．また，自らの専門分野や関心のある分野における環境デザインの適用事例を検索し，その社会的背景やデザインの方法論など，課題レポートにつながる準備作業をしておくことが望ましい.

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.

Numbering code	G-INF02 63291 LJ12　G-INF02 63291 LJ73　G-INF02 63291 LJ24		
Course title <English>	危機管理特論 Emergency Management	Affiliated department, Job title,Name	Disaster Prevention Research Institute Professor,HATAYAMA MICHINORI Disaster Prevention Research Institute Professor,TATANO HIROKAZU Disaster Prevention Research Institute Associate Professor,SAMADDAR, Subhajyoti

Target year	1st year students or above	Number of credits	2	Course offered year/period	2019/Second semester

Day/period	Mon.3	Class style	Lecture	Language	Japanese

Class type	専攻専門科目

[Outline and Purpose of the Course]

東日本大震災の発生など、わが国でも自然災害の発生が頻発化と激化の傾向を示すだけでなく、予想外のさまざまな原因による危機が増発しており行政組織さらには民間組織において危機管理に対する関心が高まっている。わが国の危機管理体制の現状を見ると、災害対策基本法にもとづいて自然災害を対象として整備されている防災体制がもっとも包括的である。本講座ではこうした現状をふまえて、自然災害への対応を基礎としながらどのような原因による危機にも一元的に対応できるわが国の社会風土に適した危機管理体制について考える。また、危機管理体制を踏まえた危機管理を支える情報システムの設計論について講義を行う。

Damage from disasters is defined by two factors: scale of hazard and social vulnerability. Two strategies exist to reduce damage from disasters - namely, crisis management as a post-event countermeasure and risk management as a pre-event measure. This course introduces students to a system for effective emergency management, consisting of response, recovery, mitigation, and preparedness.

[Course Goals]

危機管理の体制を理解し、それを支える情報システムを構築する際の検討要件について理解することを目的とする。

Understand risk and crisis management processes to maximize the capability of organizational operational continuity and requirements for effective support information system in emergency management.

[Course Schedule and Contents]

[1] 危機管理とは
[2] 災害対応と危機管理
[3] 災害対応のための情報処理の変遷
[4] 東日本大震災における危機管理の事例
[5] 熊本地震における危機管理の事例
[6] 民間支援による危機管理の高度化（1）
[7] 民間支援による危機管理の高度化（2）
[8] 民間支援による危機管理の高度化（3）
[9] 災害対応のための情報処理システムのデザイン（1）
[10] 災害対応のための情報処理システムのデザイン（2）
[11] 災害対応のための情報処理システムのデザイン（3）
[12] 災害対応のための情報処理システムのデザイン（4）
[13] NaTECH（自然災害に起因したプラント災害）における危機管理
[14] 事業継続計画、危機管理と標準化

Continue to 危機管理特論(2)↓↓↓

危機管理特論(2)

[15] **レポート試験**

[1] What is emergency management?
[2] Emergency management in disaster response
[3] History of information processing in disaster response
[4] Case study on emergency management in Great East Japan Earthquake 2011
[5] Case study on emergency management in Kumamoto Earthquake 2016
[6] Advanced emergency management with privete support group 1
[7] Advanced emergency management with privete support group 2
[8] Advanced emergency management with privete support group 3
[9] Design of disaster response support systems 1
[10] Design of disaster response support systems 2
[11] Design of disaster response support systems 3
[12] Design of disaster response support systems 4
[13] Natural-hazard triggered technological accidents(Natech)
[14] Business continuity plan, Sutandarization of disaster response
[15] Examination

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

達成目標に対する達成度を、情報学研究科成績評価規定第７条による成績評価に則り行う。詳細は授業時に説明する。
Every after lecture, please submit short report writing following things
1) Three points you could learn in this lecture, and reason
2) What you would like to explain more?

Please send your short report to following address by following formats
1.address: report_EM@dimsis.dpri.kyoto-u.ac.jp
2.subject:「Emergency Management Report“ date ”“ ID ” “ Name ”
3.No attach file

Deadline：Sunday of the next week

[Textbook]

Not used

[Reference books, etc.]

（Reference books）
土木学会 土木計画学ハンドブック編集委員会 編 『土木計画学ハンドブック(2017) 』（コロナ社）
京大・NTTリジエンス共同研究グループ 『しなやかな社会の創造～災害・危機から生命、生活、事業を守る』（日経BP企画）

Continue to 危機管理特論(3)↓↓↓

危機管理特論(3)

[Regarding studies out of class (preparation and review)]

本科目の達成目標に到達するには、講義での学習のほかに予習・復習が必要である。
Submit a short report about what they have learned in a lecture before next lecture.

（Others (office hour, etc.)）

電子メイルによる質問を受け付けています。(report_EM@dimsis.dpri.kyoto-u.ac.jp)

*Please visit KULASIS to find out about office hours.

Numbering code	P-MGT75 60458 LJ44		
Course title <English>	エネルギービジネス展開論 Business Development in Energy	Affiliated department, Job title,Name	Graduate School of Management Associate Professor,KIMOTO SAYURI Graduate School of Management Associate Professor,KIM KWANGMOON

Target year	1.2	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.5	Class style	Lecture	Language	Japanese
Course classification	専門科目	Designated program	P		
Term	2・4	Auditing other graduate school's courses	可	Cross-study with Kobe University	可

[Outline and Purpose of the Course]

本講義では、地球温暖化防止対策や北海道で発生した全道停電なども題材にしながら、これからのエネルギー市場を左右する主要な要因とそれがエネルギービジネス及ぼす影響について基礎的教養を養うとともに、経営、経済、政治などの観点から日本が向かうべき姿を考察する能力を養う。エネルギービジネスに携わる実務家（電力、ガス、建設会社、経済産業省元職員など）を講師として招き、第一線での現状とエネルギー問題の論点について講義する。また、グループディスカッション/ディベート形式で議論を行い、成果をまとめステークホルダーに伝える能力を高める。

[Course Goals]

エネルギー市場を左右する主要な要因とこれに関わるビジネスについて基礎的教養を養うとともに、経営、経済、政治などの観点から日本が向かうべき姿を考察する能力を養う。

[Course Schedule and Contents]

講義内容

(1) エネルギー問題概観、エネルギー政策の変遷 【1回】

(2) 地球環境とエネルギー（パリ協定と日本の削減目標）【3回】
ゼロエミッション、パリ協定　本部和彦・東京大学客員教授・大成建設
*ディスカッション「自然エネルギー利用のあるべき姿」とビジネス上の課題

(3) 公益事業論【5回】
エネルギー概論と公益事業論（ガス事業の視点から）　池島賢治・大阪ガス
エネルギー政策とビジネス（発電事業の視点から）　籔本晃・尾ノ井芳樹・JPOWER
*ディスカッション 「「日本のガス・発電事業をどう見通すか」競争市場の将来がエネルギービジネスに与える影響」

(4) エネルギーR&D：エネルギー施設の安全性確保【4回】
新エネルギー資源の開発　木元小百合
エネルギー施設の安全性確保　岸田潔・工学研究科

*最終ディスカッション 「「エネルギービジネスの今後の展開」エネルギーをとりまく市場は今後どう変化するか、新たなビジネスチャンス・ビジネスモデルの提案」【2回】

Continue to エネルギービジネス展開論(2)↓↓↓

エネルギービジネス展開論(2)

[Class requirement]

None

[Method, Point of view, and Attainment levels of Evaluation]

概ね以下のとおり予定しています。
授業への貢献（出席・発言）40点，プレゼンテーション30点，レポート30点

[Textbook]

Not used

[Reference books, etc.]

（Reference books）
Introduced during class

[Regarding studies out of class (preparation and review)]

講義資料（と課題）を毎回授業前に公開しますので，目を通してくることを推奨します。

（Others (office hour, etc.)）

*Please visit KULASIS to find out about office hours.