SYLLABUS *2018*

[A] Global Engineering

Kyoto University, Faculty of Engineering

[A] Global Engineering

Global Engineering

30010

Introduction to Global Engineering

地球工学総論

【Code】30010 【Course Year】1st year 【Term】1st semester in 2018 【Class day & Period】Wednesday・4

【Location】kyotsu155 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture･Exercises 【Language】Japanese

【Instructor】Related Teachers,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Guidance	1	
Safety and Engineering Ethics	1	
General Lectures	5	
Seminars	6	
Laboratory Visit	2	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

30040

Computer Programming in Global Engineering

情報処理及び演習

【Code】30040 【Course Year】1st year 【Term】2nd semester in 2018

【Class day & Period】T1(Thursday・2)・T2(Monday・1)・T3(Monday・4)・T4(Thursday・4)

【Location】T1(Academic Center for Computing and Media Studies South Bldg.,201)、T2(kyotsu1・Research Bldg. No.9,The 1st seminar room・The 2nd seminar room)、T3(kyotsu1・Research Bldg. No.9,The 1st seminar room・The 2nd seminar room)、T4(kyotsu1・Research Bldg. No.9,The 1st seminar room・The 2nd seminar room)

【Credits】2 【Restriction】 【Lecture Form(s)】Lecture・Exercises 【Language】Japanese

【Instructor】S.Ushijima,S.Kimoto,Y.Shimada,M.hakamada,R.Matsunaka,S.Takaya,Y.Chen,D.Toriu,J.Yano,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	1	
	2	
	2	
	2	
	2	
	4	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

Introduction to Global Engineering

Introduction to Global Engineering

【Code】35010 【Course Year】1st year 【Term】1st semester in 2018 【Class day & Period】Wednesday・4

【Location】kyotsu2 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Related Faculty members,

【Course Description】This course focuses on improving students’ understanding about Global Engineering. The course also explores the way how global engineering contributes to the sustainability of human society on a global scale. In addition, this course is designed to provide students with a personal and professional foundation for working in professions and roles that utilize knowledge of global engineering.

【Grading】Coursework will be graded based on reports and attendance.

【Course Goals】To understand concepts of global engineering. To understand subjects and contents that students should study at the department of global engineering within 4 years.

【Course Topics】

Theme	Class number of times	Description
Guidance	1	Introduction to the course.
Safety & Engineering ethics	1	Introduction to safety on their study and research, and engineers' obligations to the public, clients, employers, and the profession.
Lecture	6	Major roles in solving problems on a global scale from civil, environmental, and resources engineering point of views.
Small group seminar	6	Each small group of participants visits a laboratory associated with global engineering and take a seminar. Students have to choose a theme relating to global engineering as a group project and perform the project under the supervision of a faculty member.
Introduction of latest research	2	Visit laboratories of the global engineering department to widen students' knowledge and to deepen their understanding of the role and importance of the global engineering.

【Textbook】A textbook is not required. Materials will be delivered by instructors as needed.

【Textbook(supplemental)】

【Prerequisite(s)】No prerequisite is required.

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【Web Sites】

【Additional Information】

35020

Exercises in Infrastructure Design

Exercises in Infrastructure Design

【Code】35020 【Course Year】1st year 【Term】1st semester in 2018

【Class day & Period】Monday・1/Thursday・1 【Location】N3 【Credits】2 【Restriction】

【Lecture Form(s)】Exercises 【Language】English 【Instructor】Related Teachers,

【Course Description】The purpose of this course is to understand how Civil Engineering relates to our society. In order to do this, this course firstly explains the target area and new topics related to Civil Engineering with some concrete examples. Then, students examine one of the social infrastructure in their countries and make a presentation. After introducing brainstorm and KJ method, which is a methods for structuring problems, students discuss desirable social infrastructure with group members and make a presentation about the results.

【Grading】Grade is scored based on class participation, presentations, and a final report.

【Course Goals】To understand how Civil Engineering relates to and contributes to our society. Furthermore, throughout the exercise, it is expected to enhance the ability of discussion for reaching solutions and the ability of making a presentation of the solutions.

【Course Topics】

Theme	Class number of times	Description
Guidance	1	Introduction of this course.
Introduction of Civil Engineering	5	To help the exercise, the target area of civil engineering is explained with some concrete examples.
Individual exercise	8	Students are asked to pick up one of the social infrastructure in their own countries and to summarize the outline about it.
Presentation	4	Each student is asked to make a presentation about the social infrastructure he/she examined.
Structuring problems	2	For designing infrastructures appropriately, it is important to reveal problems in the society and find their solutions. For the sake of this, the concept of brainstorm and KJ method, which can help structuring problems, is explained. Furthermore, to understand the concept of these method, the exercise is conducted.
Group exercise	8	Students are divided into several groups and discuss desirable social infrastructure with group members.
Presentation	2	Each group is asked to make a presentation about desirable social infrastructure based on the discussion.

【Textbook】Printed handouts will be distributed as appropriate

【Textbook(supplemental)】

【Prerequisite(s)】None

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【Web Sites】

【Additional Information】

Computer Programming in Global Engineering

Computer Programming in Global Engineering

【Code】35030 【Course Year】1st year 【Term】2nd semester in 2018 【Class day & Period】Thursday・5

【Location】Engineering Science Depts Bldg. The 2nd seminar room 【Credits】2

【Restriction】This class is intended mainly for students of the International Course. 【Lecture Form(s)】Exercises

【Language】English 【Instructor】Thirapong PIPATPONGSA, Giancarlo FLORES

【Course Description】This course aims to introduce the basic computational tools needed in Global Engineering fields, and to learn and practice a computer programming language Fortran 90. Not only the fundamentals of the Fortran language, but this course also focus on numerical algorithms that are actually encountered in researches and applications such as root finding, numerical differentiation and integration methods, sorting techniques and matrix inversion.

【Grading】Grading will be based on reports (30%), a mid-term exam (30%), and a final exam (40%).

【Course Goals】To understand basic IT processing capabilities in Global Engineering areas and to acquire basic logic and syntax of Fortran 90 programming knowledge.

【Course Topics】

Theme	Class number of times	Description
Overview	1	Overview on using computer terminals and description of programming language Fortran 90
Basic program and data types	1	Main parts of a basic program and data types (integer, real, character)
Branches and loops	2	Conditional branching to change the flow of a program and create repetition is explained
Array concepts	2	The array concept is explained for practical calculations such as sorting algorithms
Formats and basic I/O concepts	2	The basics of reading and writing of files to disk is presented. Methods and formats will be explained via an example
Subprograms	2	Explanation of the use of subroutines and function subprograms to work in large-scale programs.
Numerical analyses	2	Declaration and operation methods, I/O, multiplication, referencing are explained via a programming exercise
Exercise	2	Q&A practice of the topics studied so far.
Class feedback	1	Confirmation of understanding

【Textbook】Exercise book will be provided. Class materials are provided thru KULASIS.

【Textbook(supplemental)】Stephen Chapman: "Fortran for Scientists and Engineers: 1995-2003"
Brian Hahn: "Fortran 90 for Scientists and Engineers"

【Prerequisite(s)】None

【】Assignments are delivered and submitted thru PANDA

【Web Sites】

【Additional Information】Assoc.Prof. Thirapong PIPATPONGSA
Office: Department of Urban Management, C1-2-236
E-mail: pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

31850

Scientific English

科学英語（地球）

【Code】31850 【Course Year】2nd year 【Term】1st semester/2nd semester in 2018

【Class day & Period】1st semester：T1/Wednesday・4,Wednesday・5,Thursday・3,Thursday・4,T2/Thursday・3,Thursday・4,2nd semester :T3/Monday・4,Monday・5,Thursday・3,Thursday・4,T4/Thursday・3,Thursday・4

【Location】1st semester：T1(N3),T2(N3,W1), 2nd semester：T3(N3,W1),T4(N3,W1) 【Credits】1 【Restriction】

【Lecture Form(s)】Exercises 【Language】Japanese

【Instructor】R. Matsunaka,(Part-time lecturer)Stephen Gill,(Part-time lecturer)Karin Swanson,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	14	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

30030

Probabilistic and Statistical Analysis and Exercises

確率統計解析及び演習

【Code】30030 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3-4

【Location】T1(W1)、T2(W2)、T3(W3)、T4(W4) 【Credits】2 【Restriction】【Lecture Form(s)】Lecture・Exercises

【Language】Japanese 【Instructor】S.Tohno,E.Nakakita,T.Hori,M.Onishi,

【Course Description】Theory and methodology of probabilistic and statistical analysis is introduced as a basic tool to cope with uncertainty in natural and social systems dealt with in global engineering. The main topics are concept and basic theorems of probability, probability distributions and its use, statistical estimation and testing, and multivariate analysis.

【Grading】Grading is done based on the mark on regular examination. Performance in classes and exercises, marks in quiz and mid-term exams are also taken into account. Minimum passing grade is sixty percent.

【Course Goals】The goal is to understand fundamental theory of probability and to be capable of using well-known distributions to analysis and design. It is also required that students understand the fundamentals on population and samples, and principle of statistical estimation and testing.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Role of probabilistic and statistical approach in global engineering and in other engineering fields.
Basic theory for probabilistic analysis	4	The concept and basic theory on probability: random variables, probability mass function, probability density function, distribution function, Bayes ' theorem, moment generating function, characteristic function, multi-dimensional distribution, transform of random variables.
Probability distribution models	4	Probability distributions often used in global engineering are introduced: Bernoulli series and binomial distribution, Poisson series and distribution, normal distribution, return period.
Statistical estimation and testing	3	Basic theory on sampling. Chi-square, t-, and F-distributions. Methods for statistical estimation and testing.
Multivariate analysis	2	Basic methods in multivariate analysis: regression analysis and principal component analysis.
Attainment check	1	Evaluation of the attaiment level.

【Textbook】Kitamura,S and Hori,T(eds.): An Introduction to Probability and Statistics for Engineering, Asakura Publishing Co., Ltd., 3,600

【Textbook(supplemental)】Supplemental materials will be introduced in the class.

【Prerequisite(s)】Prerequisite courses are infinitesimal calculus and linear algebra.

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【Web Sites】

【Additional Information】

30050

Mathematics for Global Engineering

地球工学基礎数理

【Code】30050 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Friday・1

【Location】T1(W1)、T2(W3)、T3(kyotsu1)、T4(kyotsu3) 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Y.Ichikawa,T.Inui,S.Tanaka,Y.Nara,A.Hattori,T.Hama,Y.Hirai,M.Yokomatsu,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	7	
	3	
	4	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

Fundamental Mechanics

一般力学

【Code】30100 【Course Year】2nd year 【Term】1st semester in 2018

【Class day & Period】(T1T2)Monday・2/(T3T4)Monday・4, 【Location】(T1T2)kyotsu1/(T3T4)kyotsu155

【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】J.Saito,M.Hakamada,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	2	
	2	
	2	
	1	
	2	
	3	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

31810

Design for Infrastructure I

社会基盤デザインI

【Code】31810 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Thursday・2
【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese
【Instructor】N. Uno,K. Sugiura,K. Toda,S. Kimoto,A. Furukawa,
【Course Description】Civil Engineering is the study which provides the essential technology and knowledge to improve social infrastructures. Various science, technology and knowledge are required in order to realize "convenient and comfortable cities", "safe countries to live in", "eco-friendly global society" and "sustainable civilization based on resources and energy". As an introduction to learn Civil Engineering, this course explains the essence of Civil Engineering from four fields in Civil Engineering (Structural Engineering, Hydraulics and Hydrology, Geotechnical Engineering and Planning and Management). Throughout the lectures and exercises including visiting lecturers, it is expected to learn the essence of Civil Engineering and the ethic of the engineering.
【Grading】The score is evaluated comprehensively from reports for each lecture (including performance scores in the class) and the final examination. The full score is 100 marks which consists of 50 marks from reports and 50 marks from the final examination.
【Course Goals】To understand that Civil Engineering is the organization of the technology and knowledge related to social capital improvement, prevention or mitigation of disaster and creation of environment.
【Course Topics】

Theme	Class number of times	Description
Introduction to Civil Engineering	2	The content of the course is introduced. Then, the study field of Civil Engineering including latest topics and the ethic of Civil Engineers throughout the achievement of predecessors is introduced.
Structual Enginnering	3	Civil Engineering is introduced in the viewpoint of Structural Engineering, which includes natural disasters and structural engineering, introduction of new technology and research, the collaboration with other fields, etc.
Hydraulics and Hydrology	3	In order to resolve various problems caused by the rapid change of global environment, it is important to understand the formation processes of river basins in the world and the development processes of cities located along a river. Several river basins with well-known cities are introduced including the natural conditions, history & culture developed for many years. The Kyoto city, which is famous for a complicated water channel network system, is of course considered as a typical example.
Geotechnical Engineering	3	Civil Engineering is introduced in the view point of geotechnical Engineering, which includes soil mechanics, geo-hazard mitigation, geo-environment, international cooperation, etc.
Planning and Management	3	Civil Engineering is introduced in the view point of designing and managing social Infrastructure, which includes an asset management of social infrastructure, soft measures for traffic jam, logistic vehicles in urban area, etc.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】Handouts will be distributed as appropriate.
【Textbook(supplemental)】
【Prerequisite(s)】No specific prior knowledge is required
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【Web Sites】
【Additional Information】

31330

Resources and Energy

資源エネルギー論

【Code】31330 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Monday・3

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】K.Koike,M.Mabuchi,H.Kusuda,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	6	
	5	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

30140

Environmental Health

環境衛生学

【Code】30140 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Thursday・1

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】H.Takano,K.Ueda,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	3	
	2	
	1	
	1	
	2	
	4	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

Engineering Mathematics B1

工業数学 B1

【Code】20510 【Course Year】2nd year 【Term】2nd semester in 2018

【Class day & Period】T1.T2：Wednesday・5,T3.T4：Friday・3, 【Location】kyotsu155 【Credits】2

【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】T1.T2:E. Harada,T3.T4:J. Saitoh,

【Course Description】The course introduces theory of complex functions and its applications.

【Grading】Term-end examination and attendance.

【Course Goals】To understand the properties of regular function. To learn Taylor expansion and Laurent expansion. To calculate residues. To learn some applications for engineering.

【Course Topics】

Theme	Class number of times	Description
Introduction	2	Definition of complex numbers, complex plane and review of vector analysis
Basic theory of complex functions	8	Derivative of complex functions. Cauchy-Riemann equations. Concept and properties of regular functions. Cauchy's integral theorem. Cauchy's integral formula. Taylor series and Laurent series. Classification of singularities. Residue theorem. Various complex functions and their properties.
Application of theory of complex functions	4	Application of residue theorem to calculation of definite integrals. Multivalued functions.
Learning achievement test	1	Learning achievement test.

【Textbook】None.

【Textbook(supplemental)】Useful material is introduded during the lecture.

【Prerequisite(s)】Basic Calculus (From the university curriculum: Calculus A and B, Advanced Calculus A).

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【Web Sites】

【Additional Information】

30080

Structural Mechanics I and Exercises

構造力学 I 及び演習

【Code】30080 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Friday・1-2,
【Location】kyotsu155,Kyotsu2,Kyotsu3,Kyotsu4,W1,W2,W3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises
【Language】Japanese
【Instructor】Prof. Kiyono (Graduate School of Eng.), Prof. Sugiura (Graduate School of Eng.), Prof. Yagi (Graduate School of Eng.), Assoc. Prof. Furukawa (Graduate School of Eng.), Assoc. Prof. Matsumura (Graduate School of Eng.)
【Course Description】The following topics are covered: external forces exerted on structures; properties of forces; sectional forces; stress; strain and displacement/deformation; cross sectional properties; relationship between stress and strain; computation of displacement; buckling of column. Statically determinate structures are to be focused on.
【Grading】Grade is given based on the final examination, mid-term examination and reports.
【Course Goals】To understand the methods for studying structures at static equilibrium conditions; to understand stress and strain, and the relationship between them; to understand the buckling phenomenon in columns.
【Course Topics】

Theme	Class number of times	Description
Introduction	1	Structures and elements Purpose and application scope of structural mechanics Assumptions Examples related to engineer's ethics
Properties of forces	1	External forces Modeling of external forces Force equilibrium conditions Static determinate, static indeterminate and unstability
Sectional forces	9	Equilibrium of free body Sectional forces Sectional forces on differential portion Axial force Flexural moment and shear force Torsion moment Influence lines
Stress	2	Stress: force per unit area Stresses and coordinate system
Displacement and deformation	5	Displacement Deformation Strain Curvature and torsional ratio
Sectional properties	2	Geometrical moment of area Moment of inertia of area
Stress and strain	2	Hooke ’ s Law Sectional force and deformation Sectional modulus
Calculation of displacement	4	Element in tension/compression Deflection of beam Deflection of truss Statically determinate and indeterminate structures
Buckling of column	2	Buckling phenomenon Euler ’ s buckling load Eccentrically compressive column
Confirmation of the attainment level of learning	2	Confirm the attainment level of learning

【Textbook】To be informed by individual lecturer in his/her first lecture
【Textbook(supplemental)】To be announced by individual lecturer in his/her first lecture
【Prerequisite(s)】calculus A and B
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【Web Sites】
【Additional Information】There are five classes which will be taken in the meantime by corresponding teacher. Office hour (contact information and consultation hours) of the individual lecturer will be given in his/her first lecture.

Hydraulics and Exercises

水理学及び演習

【Code】30130 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・3-4
【Location】W1・Kyotsu155・Kyotsu1・Kyotsu2・Kyotsu3・Katsura-C1-192 【Credits】2 【Restriction】No Restriction
【Lecture Form(s)】Lecture・Exercises 【Language】Japanese
【Instructor】H. Gotoh,K. Toda,T. Hosoda,S. Onda,M. Sanjo,E. Harada,<DPRI>K. Kawaike,<DPRI>N. Yoneyama,
【Course Description】Hydrodynamics being fundamental of design for hydraulic structure is explained systematically in relation to fluid dynamics. Fluid statics, elementary fluid dynamics, viscous flow and turbulence, dimension analysis, and steady flow related to pipe flow and open channel are main topics. Systematic understanding of fundamental hydraulics through exercises are cultivated.
【Grading】Based on the results of examinations
【Course Goals】Systematic understanding of fundamental hydraulics through exercises
【Course Topics】

Theme	Class number of times	Description
Fluid Statics, Buoyancy, Flotation Stability	3	Hydrostatic pressure, buoyancy force, stability of floating body are explained and their exercises are implemented.
Elementary Fluid Dynamics	5	Continuum dynamics, control volume method, continuum equation, momentum equation and one-deimensional analysis are explained and their exercises are implemented.
Potential Flows	2	Bernoulli's theorem and two-dimensiional irrotational flow is explained and their exercises are implemented.
Viscous Flow and Turbulence	2	Deformation stress, Navier Stokes equation, shear stress for laminar flow and frictional loss, laminar and turbulent flow and velocity distribution of turbulent flow are explained.
Comprehensive Exercise	2	Comprehension check regarding to each term is implemented.
Intermediate examination	2	Intermediate examination is carried out.
Dimensional Analysis, Similitude	1	Dimensional analysis, pi-theorem and similarity rule are explained and their exercises are implemented.
Viscous Flow in Pipes	4	Energy equation, frictional law, form drag loss, siphon and pipe flow are explained and their exercises are implemented.
Open-Channel Flow	7	Energy equation, momentum equation, open channel equation, specific energy, specific force, hydraulic jump and analysis of gradually varied flow are explained and their exercises are implemented.
Achievement confirmation	2	Comprehension check of course contents.

【Textbook】Handout is used in the Lectures and Exercises.
【Textbook(supplemental)】Non
【Prerequisite(s)】Differential and integral calculus, linear algebra etc., standard mathematics of general education course, and Dynamics and electromagnetism etc., standard physics of general education course
【】
【Web Sites】Non
【Additional Information】Lecture is opened along with exercise. How to get in touch with instructors is announced during lecture and exercise.

31620

Soil Mechanics I and Exercises

土質力学 I 及び演習

【Code】31620 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・3-4

【Location】Kyotsu155・W1・Kyotsu1・Kyotsu3 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture・Exercises 【Language】Japanese

【Instructor】H.Ohtsu, T.Katsumi,K. Kishida,T. Inui, S.Kimoto, Y.Higo

【Course Description】The student is expected to learn:the basics of soil formation, classification for engineering purposes, soil compaction, soil water and water flow, consolidation theory, problems on final and time rate of consolidation, the fundamentals of shear strength and deformation behaviour of different soils.

【Grading】Grading Policy:Final exam(70%), Midterm exams and assigned homeworks(30%)

【Course Goals】After undergoing this course, the student gains adequate knowledge on engineering properties of soil.
Course objective is to provide a fundamental understanding of mechanical behavior of soil materials, including soil classification, compaction, permeability, consolidation, and strength.

【Course Topics】

Theme	Class number of times	Description
Introduction	0.5	Introductory concepts:Understand the principles of soil behavior and the fundamentals of geotechnical practices in soils.
Soil classification and compaction	3.5	Understand the geology of soils, soil classification system, fundamental properties, effective stress, compaction, unsaturated soil and frozen soil
Water flow through soil	3	Understand the permeability and Darcy's law, quick sand condition, seepage and flow nets.
Midterm exam	0.5	
Consolidation and settlement	3.5	Understand Terzaghi's one dimensional consolidation theory, the total and effective stress distribution in soil.
Shear Strength of soil	3	Understand shear strength of cohesive and cohesionless soil, Mohr-coulomb failure theory, drained and undrained behavior of clay and sand.
Feedback	1	Understand the intentions and correct answers of the questions given in the examination.

【Textbook】Text book: Fusao Oka, "Soil Mechanics", Asakura publishing Co., Ltd .

【Textbook(supplemental)】Fusao Oka, "Soil Mechanics Exercises", Morikita publishing Co., Ltd .

【Prerequisite(s)】The course is designed for students in any major;an earth science background is not required.

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【Web Sites】http://geomechanics.kuciv.kyoto-u.ac.jp/lecture.html

【Additional Information】Kishida, Ohtsu, Higo & Kimoto: Contact Information will be delivered in their first lecture
Katsumi & Inui: Visit their office in Yoshida Campus directly

31340

Systems Analysis and Exercises for Planning and Management

計画システム分析及び演習

【Code】31340 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Monday・1-2

【Location】W2・W3・Kyotsu155・Kyotsu2 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture・Exercises 【Language】Japanese

【Instructor】S.Fujii,T.Yamada,H.Tatano,T.Oba,Y.Kawabata,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Basic concept for planning and management	6	
Linear Programming	5	
Non linear programming	5	
Dynamic programming, PERT	6	
Confirmation of progress	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31320

Fundamental Environmental Engineering I

基礎環境工学 I

【Code】31320 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Friday・4

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Related Teachers,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	3	
	3	
	3	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30150

Biology and Chemistry for Environmental Engineers

環境生物・化学

【Code】30150 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・1

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Y.Shimizu,T.Matsuda,

【Course Description】This course aims to learn basic chemistry and biology essential for environmental science and technology. This course is divided into two parts. The first half is basic water chemistry and analytical chemistry. The second half is biology including structure of major biomolecules, central dogma and respiratory system and energy metabolism.

【Grading】The grading is based on the score of a midterm examination and a regular examination.

【Course Goals】To learn basic chemistry and biology essential for environmental science and technology.

【Course Topics】

Theme	Class number of times	Description
Chemical parameters in the aquatic environment	1	pH, concentration,activity and activity coefficient,acid and bases in the aquatic environment
Acid and base reaction in the aquatic environment	3	Principle of acid base equilibrium. Logarithmic diagram and proton condition. carbonates in both closed and open systems.
Methods to control the aquatic environment	2	Alkalinity and Acidity. Coagulation, flocculation and sedimentation with logarithmic diagram.
Midterm examination	1	Midterm examination is on 7th time around.
Cell and biomolecules	2	Structure and function of cellar organelles and biomolecules such as lipids, protein, nucleic acids.
The central dogma	3	DNA replication, transcription and translation.
respiratory system and energy metabolism	2	Aerobic respiration and other type of respiratory systems of environmental microorganisms.
confirmation of achievement	1	confirmation of achievement

【Textbook】Handouts will be distributed.

【Textbook(supplemental)】James D. Watson "Molecular biology of the gene（7th）"
David L. Nelson"Lehninger Principles of Biochemistry(6th)"

【Prerequisite(s)】Nothing in particular.

【】Several reports will be given for preparation and review.

【Web Sites】

【Additional Information】We appreciate active discussions and questions.

32500

Introduction to Earth Resources Engineering

資源工学入門

【Code】32500 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday･2 【Location】kyotsu155 【Credits】2 【Restriction】【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】T.Ishida,K.Koike,H.Mikada,S.Murata,

【Course Description】Through the understanding of natural resources that are integral to the development of our human society, a series of lectures is given to bring the fundamental knowledge in earth resources engineering, i.e., a synthetic research area composed of plural scientific fields such as geology, geophysics, civil engineering, environmental sciences, and the other engineering areas of mechanical, electrical, and material sciences.

【Grading】Grading is based on the following shares: 20% for the attendance, reports, etc., and 80% for the final exam.

【Course Goals】The acquisition of fundamental knowledge on earth resources engineering and its related engineering fields as a synthetic research areas being covered in this academic domain.

【Course Topics】

Theme	Class number of times	Description
General introduction to earth resources problems	1	The discussion is on how the earth resources engineering has developed after the industrial revolution in a chronological way with a special interest to the relations with earth sciences such as geology, geophysics, and many other engineering fields.
Deposit Geology	4	The following is discussed: 1) earth's history, generation of igneous and hydrothermal deposits, sedimentary deposit, diagenesis, and hydrocarbon deposits, 2) Conventional hydrocarbon deposits and the current development situation, 3) non-conventional hydrocarbon deposits and the current development situation, 4) Ore and mineral deposit science for iron, base metal, rare metal and nonmetallic resources and the current development situation.
Exploration Geophysics	3	Exploration geophysics for the development of hydrocarbon, metallic and mineral deposits is outlined. Fundamentals on exploration seismology, exploration electromagnetics, petrophysics and related fields are covered. The future direction of exploration methodologies is discussed, too.
Rock physics and mechanics	3	Rock mechanics necessary to the development of ore deposit, the storage of carbon dioxide (CCS), radioactive waste, underground oil stockpiling is outlined in the lecture. Foundamental knowledge on the stress and the strain of elastic materials, geopressure to subsurface artificial structure, deformation due to geopressure, and the failure of rocks and subsurface structures will be shared in the lectures.
Reservoir engineering	3	The importance to understand subsurface porous flow through permeable rocks is discussed in terms of the following applications: the production of fluid resources, carbon dioxide capture and storage (CCS), storage of radioactive waste, underground stockpile of oil, etc. The understanding on important parameters of fluid saturation, permeability, etc. that are related to subsurface porous flow will be matured for the application of reservoir management, coal bed methane and CCS to utilize permeable nature of rocks.

【Textbook】None specified.

【Textbook(supplemental)】Lecturer for each theme may specify supplemental textbooks if necessary.

【Prerequisite(s)】Preferred students are whom has taken "Resources and Energy" in the first semester of the sophomore grade.

【】Lecturer for each theme may specify the title of reports in the lecture.

【Web Sites】None

【Additional Information】After the exam, modeled answers will be distributed through KULASIS with the best delay as a feedback material for each student to review the lecture.

35050

Probabilistic and Statistical Analysis and Exercises

Probabilistic and Statistical Analysis and Exercises

【Code】35050 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3-4 【Location】Kyotsu2 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture･Exercises 【Language】English

【Instructor】Kim, Sunmin (Assoc. Prof., Graduate School of Eng.),

【Course Description】Theory and methodology of probabilistic and statistical analysis is introduced as a basic tool to cope with uncertainty in natural and social systems dealt with in global engineering. The main topics are concepts and basic theorems of probability, probability distributions and their uses, statistical estimation and testing, and multivariate analysis.

【Grading】Evaluation is based on written tests (midterm exam: 40%, final exam: 40%), assignment (10%), and attendance (10%).

【Course Goals】The goal is to understand fundamental theory of probability and to be capable of using well-known distributions in analysis and design. It is also required that students acquire knowledge of fundamentals of statistical population and samples, and principle of statistical estimation and testing.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Role of probabilistic and statistical approaches in global engineering and in other engineering fields.
Basic theory of probabilistic analysis	4	The concepts and basic theories of probability: Conditional probability, Bayes' theorem and total probability. Random variables: probability mass function (PMF), probability density function (PDF), cumulative distribution function (CDF), moment generating function, characteristic function, multidimensional probability distribution, transform of random variables.
Probability distribution models	4	Probability distributions often used in global engineering are introduced: Bernoulli series and binomial distribution, Poisson series and distribution, normal distribution, geometric distribution (return period), etc.
Statistical estimation and testing	3	Basic theory on sampling. Chi-square distribution, t- distribution, and F-distribution. Methods for statistical estimation and testing.
Multivariate analysis	2	Basic methods in multivariate analysis: regression analysis and principal component analysis.
Computer-based simulation methods in probability	1	Introduction to the computer-based simulation methods such as Monte-Carlo simulation, will be given.

【Textbook】Not specified. Some handout materials will be provided during the class.

【Textbook(supplemental)】A.H.S. Ang and W.H. Tang: Probability Concepts in Engineering: Emphasis on Applications in Civil and Environmental Engineering.

【Prerequisite(s)】Prerequisite courses are calculus and linear algebra.

【】Self-review is strongly recommended after each lecture.

【Web Sites】

【Additional Information】No specific office hour. Email communication is preffered through [kim.sunmin.6 x@kyoto-u.ac.jp].

35040

Fundamental Mechanics

Fundamental Mechanics

【Code】35040 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Monday・4 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English 【Instructor】An Lin,

【Course Description】Newtonian mechanics and its application to engineering are interpreted with concentration on single particle, multi-partical system and rigid body. Especially,some mathematical approaches necessary for mechanics are introduced based on those mathematical knowledge learned in the first academic year. Meanwhile, the relationship between mechanical interpretation and mathematical treatment of some classical problems are specifically emphasized. Study of this lecture would not only make the students grasp basic principles of mechanics but also think more logically and systematically.

【Grading】Grade is evaluated based on the final examination and assignments.

【Course Goals】As an intermediate course in mechanics at undergraduate level, this course aims at training students to think about mechanical phenomena in mathematical terms, developing an intuition for the precise mathematical formulation of mechanical problems and for the mechanical interpretation of the mathematical solutions.

【Course Topics】

Theme	Class number of times	Description
Kinematics of a single particle in space	2	algebra and calculus of vectors tangent and normal vectors to a curve definition of velocity and acceleration in 2-D motion by plane polar coordinates definition of velocity and acceleration in 3-D motion by cylindrical polar coordinates and spherical polar coordiantes
laws of motion	3	Newton's laws of motion discussion of the general problem of 1-D motion linear differential equations with constant coefficient linear oscillations,resonance,principle of superposition discussion of the general problem of 2-D and 3-D motion
Problems in particle dynamics	1	the Law of Gravitation center of mass and center of gravity motion through a resisting medium constrained motion
energy conservation	2	energy theorems definition of potential energy, conservative force conservation of mechanical energy in 3-D conservative field energy conservation in constrained motion
motion of a system of particles	2	degrees of freedom, energy principle linear momentum principle, conservation of linear momentum, collision theory and two-body scattering angular momentum principle, conservation of angular momentum
Rotating reference frames	1	transformation formulae particle dynamics in a non-frame motion relative to the Earth multi-particle system in a non-inertial frame
motion of rigid body	2	dynamical problem of the motion of a rigid body rotation about an axis statics of rigid bodies statics of structures equilibrium of flexible strings and cables equilibrium of solid beams angular momentum of a rigid body inerital and stress tensors
foundation of analytical mechanics	1	Constraint condition,constraint force, generalized coordinate, generalized for, Lagrange's equations
confirmation of achievement	1	The achievement assessment is intended to measure students' knowlege, skill and aptitude on the subject using quiz and viva-voce.

【Textbook】R.DOUGLAS GREGORY: Classical Mechanics, Cambridge University Press, 2006

【Textbook(supplemental)】Keith R.Symon: Mechanics, Third Edition, Addision-Wesley, 1971

Fedinand P.Beer, E.Russell Johnston, etc.: Mechanics for Engineers, Dynamics, McGraw Hill, 2007

【Prerequisite(s)】calculus A and B, Linear Algebra A and B

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【Web Sites】

【Additional Information】

35060

Design for Infrastructure I

Design for Infrastructure I

【Code】35060 【Course Year】2nd year 【Term】1st semester in 2018 【Class day & Period】Thursday・3 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English 【Instructor】N. Uno,K. Sugiura,K. Toda,S. Kimoto,

【Course Description】Civil Engineering is the field that provides the essential technology and knowledge to improve the social infrastructure. Various science, technology, and knowledge are required to realize "convenient and comfortable cities", "safe countries to live in", "eco-friendly global society", and "sustainable civilization based on resources and energy". As an introduction to learn Civil Engineering, this course explains the essence of Civil Engineering from four fields in Civil Engineering (Structural Engineering, Hydraulics and Hydrology, Geotechnical Engineering and Planning and Management). Throughout the lectures and exercises including visiting lecturers, the student is expected to learn the essence of Civil Engineering and the ethics of engineering.

【Grading】Grade is evaluated comprehensively from reports for each lecture (including attendance) and a final examination. 50 percent of the final score is due to reports, and the other 50 percent from the final examination.

【Course Goals】To understand that Civil Engineering is the organization of the technology and knowledge related to social capital improvement, prevention or mitigation of disaster, and creation of environment.

【Course Topics】

Theme	Class number of times	Description
Introduction to Civil Engineering	2	The content of the course is introduced. Then, the study field of Civil Engineering including latest topics and the ethic of Civil Engineers throughout the achievement of predecessors is introduced.
Structual Enginnering	3	Civil Engineering is introduced from the viewpoint of Structural Engineering, which includes natural disasters and structural engineering, introduction of new technology and research, the collaboration with other fields, etc.
Hydraulics and Hydrology	3	Civil Engineering is introduced from the viewpoint of Hydraulics and Hydrology, which includes conservation and construction of river environment, prediction of rainfall and flood, prediction of environmental change, global warming etc.
Geotechnical Engineering	3	Civil Engineering is introduced from the viewpoint of Geotechnical Engineering, which includes soil mechanics, geo-hazard mitigation, geo-environment, international cooperation etc.
Planning and Management	3	Civil Engineering is introduced from the viewpoint of designing and managing social Infrastructure, which includes an asset management of social infrastructure, soft measures for traffic jam, logistic vehicles in urban area, etc.
Achievement confirmation	1	Achievement assessment is intended to measure students' knowledge, skill and aptitude on the subject.

【Textbook】Handouts will be distributed as appropriate.

【Textbook(supplemental)】

【Prerequisite(s)】No specific prior knowledge is required.

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【Web Sites】

【Additional Information】

35100

Engineering Mathematics B1

Engineering Mathematics B1

【Code】35100 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Thursday・2

【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Qureshi,

【Course Description】The course introduces the theory of complex functions and their applications.

【Grading】Class participation, quiz, mid-term and end of term examination.

【Course Goals】To understand the properties of holomorphic or analytic functions. To learn Taylor and Laurent series' expansion. To calculate the residue and to learn the engineering applications of complex function theory.

【Course Topics】

Theme	Class number of times	Description
Review	3	Definition of complex numbers, complex plane and review of vector analysis.
Basic theory of complex functions	3	Derivative of complex functions, Cauchy-Riemann equation. Concept and properties of holomorphic functions. Cauchy's integral theorem, Cauchy's integral formula, Taylor series and Laurent series. Classification of singularities. Residue theorem. Various complex functions and their properties.
Application of theory of complex functions	2	Application of residue theorem to calculate the definite integral. Deviation principle and its application. Solution of boundary value problems of partial differential equations.
	9	
	2	
	1	

【Textbook】

【Textbook(supplemental)】Materials given during the lecture.

【Prerequisite(s)】Basic Calculus (From the university curriculum: Calculus A and B, Advanced Calculus A)

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【Web Sites】

【Additional Information】Office hours will be allocated for students to consult with the instructor and ask relevant questions as needed.

35110

Structural Mechanics I and Exercises

Structural Mechanics I and Exercises

【Code】35110 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Friday･1-2 【Location】W4
【Credits】2 【Restriction】For students except those of international course, please discuss with the instrcutor in advance.
【Lecture Form(s)】Lecture･Exercises 【Language】English 【Instructor】Kim Chul-Woo,An Lin,Chang Kai-Chun,
【Course Description】The following topics are covered: external forces acted upon structures; properties of forces; sectional forces; stress and strain; displacement/deformation; cross sectional properties; calculation of displacement; buckling of column. Statically determinate structures are to be focused on.
【Grading】Grade is given based on the final examination, mid-term examination, assignments and participation.
【Course Goals】To grasp the methods for studying structures at static equilibrium conditions; to understand stress and strain, and the relationship between them; to understand the buckling phenomenon in columns.
【Course Topics】

Theme	Class number of times	Description
Introduction	1	Structures and elements Purpose and application scope of structural mechanics Assumptions
Forces & Equilibrium condition	2	External forces Modeling of external forces Force equilibrium conditions Static determinate, static indeterminate and unstability
Internal force diagrams	9	Equilibrium of free body Sectional forces Axial force Flexural moment and shear force
Influence line	4	construction of Influence line use of Influence line
Sectional properties	2	Centroid Geometrical moment of area Moment of inertia of area
Stress and strain	4	Hooke’s Law stress state and stress transformation Mohr's Circle
Elastic curve and deflection	4	Deflection of beam Deflection of truss
Buckling of column	2	Buckling phenomenon Euler’s buckling load
Confirmation of achievement	2	confirmation of achievement

【Textbook】Kenneth M. Leet, Chia-Ming Uang, Anne M.Gilbert: Fundamentals of Structural Analysis, Mc Graw Hill, 2011
【Textbook(supplemental)】To be announced at the first lecture
【Prerequisite(s)】Classical mechanics
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【Web Sites】
【Additional Information】

35090

Hydraulics and Exercises

Hydraulics and Exercises

【Code】35090 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・3-4 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture・Exercises 【Language】English 【Instructor】H. Gotoh, K. Toda, T. Hosoda, A. Khayyer,

【Course Description】Hydrodynamics being fundamental of design for hydraulic structure is explained systematically in relation to fluid dynamics. Fluid statics, elementary fluid dynamics, viscous flow and turbulence, dimension analysis, and steady flow related to pipe flow and open channel are main topics. Systematic understanding of fundamental hydraulics through exercises are cultivated.

【Grading】Based on the results of examinations

【Course Goals】Systematic understanding of fundamental hydraulics through exercises

【Course Topics】

Theme	Class number of times	Description
Fluid Statics, Buoyancy, Flotation Stability	3	Hydrostatic pressure, buoyancy force, stability of floating body are explained and their exercises are implemented.
Elementary Fluid Dynamics	5	Continuum dynamics, control volume method, continuum equation, momentum equation and one-deimensional analysis are explained and their exercises are implemented.
Potential Flows	2	Bernoulli's theorem and two-dimensiional irrotational flow is explained and their exercises are implemented.
Viscous Flow and Turbulence	2	Deformation stress, Navier Stokes equation, shear stress for laminar flow and frictional loss, laminar and turbulent flow and velocity distribution of turbulent flow are explained.
Comprehensive Exercise	2	Comprehension check regarding to each term is implemented.
Intermediate examination	2	Intermediate examination is carried out.
Dimensional Analysis, Similitude	1	Dimensional analysis, pi-theorem and similarity rule are explained and their exercises are implemented.
Viscous Flow in Pipes	4	Energy equation, frictional law, form drag loss, siphon and pipe flow are explained and their exercises are implemented.
Open-Channel Flow	7	Energy equation, momentum equation, open channel equation, specific energy, specific force, hydraulic jump and analysis of gradually varied flow are explained and their exercises are implemented.
Achievement confirmation	2	Comprehension check of course contents.

【Textbook】Handout is used in the Lectures and Exercises.

【Textbook(supplemental)】Non

【Prerequisite(s)】Differential and integral calculus, linear algebra etc., standard mathematics of general education course, and Dynamics and electromagnetism etc., standard physics of general education course

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【Web Sites】Non

【Additional Information】Lecture is opened along with exercise. How to get in touch with instructors is announced during lecture and exercise.

35080

Soil Mechanics I and Exercises

Soil Mechanics I and Exercises

【Code】35080 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・3-4
【Location】W2 【Credits】2 【Restriction】This class is intended mainly for students of the International Course.
【Lecture Form(s)】Lecture・Exercises 【Language】English
【Instructor】H. Otsu,T. Katsumi,K.Kishida,T. Inui,S. Kimoto,Y. Higo,FLORES Giancarlo,PIPATPONGSA Thirapong,
【Course Description】By the end of the semester, the student is expected to understand the basics of soil formation, classification for engineering purposes, soil compaction, seepage and water flow through soil, consolidation theory, settlement due to consolidation, rate of consolidation, shear strength, and deformation behaviors of different soils.
【Grading】Final Exam (70%), Midterm exam and classworks (30%)
【Course Goals】This course aims at providing a fundamental understanding of the mechanical behavior of soils including soil classification, compaction, seepage, permeability, effective stress, consolidation, and shear strength as well as problem-solving skills through exercises in gravimetric-volumetric relationships, Darcy's law, flow nets, consolidation theory, Mohr's stress circle, and failure criteria.
【Course Topics】

Theme	Class number of times	Description
Introduction	0.5	Introductory concepts and roles of soil mechanics, engineering aspects of soil behaviors and geotechnical practices dealing with disasters and environments
Soil classification and compaction	3.5	Soil classification and soil formation, basic soil properties and Atterberg ’s limits, compaction, unsaturated soil and frozen soil
Water flow through soil	3	Fundamentals of water flow through soil, permeability and Darcy's law, quick sand condition, seepage and flow nets
Midterm Exam	0.5	
Consolidation and settlement	3.5	Principle of effective stress and Terzaghi's one dimensional consolidation theory, characteristics and mathematical descriptions of consolidation, prediction of ground settlement due to consolidation
Shear strength of soil	3	Visualization of stress states using Mohr ’s stress circle, interpretation of shear strength using the Mohr-Coulomb failure criterion, experiments and behaviors of clay and sand under drained and undrained conditions
Class feedback	1	Confirmation of understanding

【Textbook】Soil Mechanics I & II Tutorial Exercises and Soil Mechanics Laboratory Manual
Handouts will be distributed
【Textbook(supplemental)】J.A. Knappett and R.F. Craig, “ Craig ’ s Soil Mechanics ”
T. William Lambe and R.V. Whitman, “ Soil Mechanics ”
Braja M. Das,"Fundamentals of Geotechnical Engineering"
K. Terzaghi, R. B. Peck, G. Mesri, “ Soil Mechanics in Engineering Practice ”
Fusao Oka, "Soil Mechanics Exercises", Morikita publishing Co., Ltd.
【Prerequisite(s)】
【】
【Web Sites】http://geomechanics.kuciv.kyoto-u.ac.jp/lecture/text/kakomon.html
【Additional Information】G. Flores (flores.giancarlo.3v@kyoto-u.ac.jp)
T. Pipatpongsa (pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

35070

Systems Analysis and Exercises for Planning and Management

Systems Analysis and Exercises for Planning and Management

【Code】35070 【Course Year】2nd year 【Term】2nd semester in 2018 【Class day & Period】Monday・1-2 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture･Exercises 【Language】English 【Instructor】Schmcker,

【Course Description】Attendants of this course should already have a basic knowledge about planning of civil engineering projects. In this course students will learn about this subject in a more systematic way. Students will be introduced to policy-making, management and planning and in particular to useful mathematical tools for doing so. They will gain a deeper understanding of linear, nonlinear and dynamic programming. This is achieved through lectures, and practical exercises with these methods.

【Grading】Assignments, Midterm Exam 40%; Final Exam 60%

【Course Goals】This course aims to provide students with the basic knowledge required for planning of civil engineering projects and to provide an understanding of basic planning theory and its role. The focus is on mathematical planning methods for system design. By attending this lecture students should obtain the basic knowledge and thinking of planners. Further, students should understand the importance of the above mentioned three programming methods as useful mathematical tools for creating plans. Finally students should obtain practical skills through exercises.

【Course Topics】

Theme	Class number of times	Description
Basic Theory of Civil Engineering Planning (CEP)	3	These lectures provide a basic overview of CEP and teach about the science underpinning CEP. Therefore lectures introduce the students to the role of OR, economics, psychology, sociology and political science in CEP.
Linear programming (LP)	10	Lectures about LP as basic method for mathmatecial planning. Various issues of LP are discussed and in particular the Gauss Jordan Elimination Method and the Simplex methods are taught. Further the dual problem, marginal value and sensitivity analysis are introduced.
Non linear programming (NLP)	10	NLP formulation of problems, global optimality, and description as programming problem. Optimality conditions of nonlinear programming problems (Lagrange function, Kuhn Tucker conditions) are examined.
Dynamic programming (DP)	7	These lectures will introduce DP as a useful tool to solve complex systems. Formulation and solution of DP problems are discussed. Further, PERT as DP network method is introduced, describing process management based on arrow diagrams.

【Textbook】Handouts distributed during lectures

【Textbook(supplemental)】Hillier,F.S. Lieberman,G.J.: Introduction to Operations Research

Iida, Y.: Civil Engineering Planning System Analysis (Optimization Guide)

Iida, Y./ Okada, N.: Civil Engineering Planning System Analysis (Behaviour Analysis)

Fujii, S.: Infrastructure planning studies

【Prerequisite(s)】Students are assumed to have taken the calculus courses.

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【Web Sites】Presented during the first lecture.

【Additional Information】

Surveying and Field Practice

測量学及び実習

【Code】30400 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Friday・2-4
【Location】Kyotsu155・Outdoor 【Credits】3 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Practice
【Language】Japanese 【Instructor】N. Uno,M. Hatayama,J. Susaki,T. Ohba,Y.Kawabata,Y. Kimura,S. Segi,
【Course Description】Lectures and field practice of the surveying are conducted. In the lectures, survey techniques, details on the instruments, adjustment of the errors contaminated in the measured data are introduced. In the field practice, the student will understand the survey procedure using the instruments.
【Grading】Evaluate considering the scores of the intermediate and final examinations, and the reports and attendance of the field exercise.
【Course Goals】The student will understand the background and theory to reduce the errors contaminated in the measured data and to estimate the reliable parameters.
The student will be able to derive the most probable value and standard error using the least square method and the law of error propagation.
The student will understand the purpose of the various kinds of survey.
In the field exercise, the student will acquire the preparedness to plan the survey and the attitude to cooperate with other students for the accomplishment of the survey.
【Course Topics】

Theme	Class number of times	Description
Introduction of survey	1	The purpose, history and content of the surveys are introduce. In addition, the survey applications and the advanced technology of the surveys are also introduced.
Distance and angular measurement	3	Distance and angular measurement, simple and fundamental surveys, are introduced. The student will learn how to set the instrument properly, and the technique to measure the angles using theodolite.
Control survey	8	The survey plan for the control survey is introduced, and the practice of the traverse survey, one of the most traditional control surveys, is conducted.
Leveling	3	The methodology of leveling and the adjustment of the errors are introduced, and the practice is conducted.
Plane survey and topographic survey	4	The methodology of the plane survey and topographic survey is introduced. The features of the topographic map produced through the survey are explained.
Theory of errors	2	The concept of the errors and the law of the error propagation are introduced.
Least square method	3	The concept of the least square method (LSM), popular approach to the processing of the survey data, is introduced. The student will learn how to apply the LSM for the practical application through the exercise.
Error adjustment	4	The methodology to adjust the errors in the traverse survey is introduced, and the student will learn how to obtain the most probable parameters through the exercise.
Photogrammetry	2	The overview of photogrammetry is introduced, and the practice using the instrument is conducted.
GPS survey	3	The theory of GPS and GPS survey are introduced, and the practice of GPS survey is conducted.
Evaluation of understanding	1	The student will be evaluated for their understanding of the contents offered by the course.

【Textbook】Masayuki Tamura and Junichi Susaki, "Surveying" (in Japanese)
【Textbook(supplemental)】
【Prerequisite(s)】Linear Algebras, Mathematical Statistics
【】
【Web Sites】
【Additional Information】

31170

Continuum Mechanics

連続体の力学

【Code】31170 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3
【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese
【Instructor】T.Hosoda, Y. Higo, PIPATPONGSA Thirapong,
【Course Description】Continuum Mechanics is a branch of the physical sciences dealing with the deformation and motion of continuous media under the influence of external effects.

The following basic items are explained with exercises: Fundamentals of tensor analysis, Mathematical formulation of deformation, motion and stress, Conservation laws of continuous media (mass, momentum, angular momentum, energy conservation laws), Constitutive laws of elastic body and Newtonian fluids, Principle of virtual work and minimum potential energy based on the calculus of variations, Finite Element Method, Applications in Elasticity and Fluid Dynamics.

【Grading】Mainly regular examination. Reports and attendance are also considered for grading.
【Course Goals】Based on the clear understanding of the mathematical formulation on deformation, stress and constitutive laws, students are requested to understand the derivation of the Equation of motion, Conservation laws of angular momentum and energy, certainly. Principle of vurtual work and minimum potential energy are attached inportance as the basis of Finit Element Method.
【Course Topics】

Theme	Class number of times	Description
Elementary knowledge on tensor analysis	2	Definition of tensors, Integral theorem, Material derivative over a material volume, Transformation of components of tensors, etc.
Stress, strain and strain rate tensors	2	Definition of stress, strain and strain rate tensors, Transformation of components of these tensor variables, Invariants under coordinates transformation, Compatibility condition of strain, etc.
Mathematical formulation of conservation laws	2	Mathematical expression of conservation laws of continuous media (mass, momentum, angular momentum, energy)
Constitutive law of solids and fluids	2	Constitutive laws of elastic & visco elastic body and Newton fluids
Principles based on the calculus of variations and FEM	2	Principle of vurtual work and minimum potential energy based on the calculus of variations, Finite Element Method, etc.
Applications in elasticity and fluid dynamics	4	Applications in Elasticity and Fluid Dynamics. Wave propagation in elastic body, Thermal convection and Lorentz Chaos, etc.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】Printed materials on the contents of this subjetc are distributed in class.
【Textbook(supplemental)】
【Prerequisite(s)】Basic understanding on differential and integral calculus and linear algebra
【】
【Web Sites】
【Additional Information】Students can contact with Prof. Hosoda by sending e-mail to hosoda.takashi.4w@kyoto-u.ac.jp (Katsura C1-3-265).

31730

Engineering Mathematics B2

工業数学 B2(土木工学コース)

【Code】31730 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Friday・1

【Location】Kyotsu155【Credits】2【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】H. Gotoh,

【Course Description】This course deals with Fourier analysis and with the solution of partial differential equations as its application. It discusses Fourier series for periodic functions and its relation to integrable non-periodic functions. Once the student gets familiar with its characteristics, the course aims to develop the ability to apply Fourier analysis to various engineering problems. The lecture emphasises the relationship between the numerical analysis and today ’ s applications.

【Grading】Attendance, homeworks, midterm exam, and term-end exam.

【Course Goals】To get students acquainted with an understanding of Fourier series analysis and its basic concepts. Further, to get students familiar with the various types of partial differential equations and their applications.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	What is Fourier Analysis? How to apply it? Clarify the necessary background knowledge.
Fourier series	5	A periodic function which is expanded into an infinite series of trigonometric functions is called a Fourier series. Convergence behaviour and series properties are discussed with specific example calculations.
Fourier transform	2	Fourier analysis of non-periodic function leads to the Fourier transform. The lecture discusses how to represent the non-periodic functions and shows the various properties of the Fourier transform using examples. The relationship to the Laplace transform is further discussed.
Application to Partial Differential Equations	4	Second order partial differential equations (Laplace equation, wave equation, thermal equation, etc.) are discussed. The applications of Fourier series and Fourier transform to initial-boundary problems are discussed.
Discrete Fourier transform	1	Discrete Fourier transform for digital signals is explained.
Exercise	1	Exercise the typical problems about Fourier analysis and partial differential equations.
Achievement confirmation	1	Achievement of knowledge is confirmed.

【Textbook】None.

【Textbook(supplemental)】Useful material is introduded during the lecture.

【Prerequisite(s)】Calculus, Linear Algebra, Engineering Mathematics B1.

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【Web Sites】

【Additional Information】KULASIS

31640

Structural Mechanics II and Exercises

構造力学 II 及び演習

【Code】31640 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・4-5
【Location】Kyotsu1・Kyotsu3・Kogishitsu2 【Credits】3 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises
【Language】Japanese 【Instructor】Prof. Takahashi (Graduate School of Eng.),Prof. Igarashi (DPRI), Prof. Sawada (DPRI),
【Course Description】Fundamentals of structural analysis based on energy principle
Principle of virtual work and some energy principles for structural analysis
Approaches for study of statically indeterminate structures
Fundamentals of elastic stability
Fundamentals of structural analysis by matrix methods
【Grading】Grade is given based on the final examination, mid-term examination and reports.
【Course Goals】To solve structures such as truss and beam by the principle of virtual work/energy principles
To solve statically indeterminate structures by force method and displacement method
To understand the stability of equilibrium
to get the stiffness matrix of simple trusses
【Course Topics】

Theme	Class number of times	Description
Work, energy and virtual work	13	Introduction Work, virtual work and energy Castigliano ’s theorems and principle of minimum potential energy Virtual work and complementary virtual work Principle of virtual work (virtual displacement) Principle of complementary virtual work(virtual force) Reciprocal theorems
Static determinate and indeterminate	1	Degree of freedom and degree of indeterminacy
Solutions to statically indeterminate structures	6	Introduction of force method and displacement method By equations of elasticity By displacement method
Structural stability	3	Stability criteria Deformation of rigid body-elastic spring system Deformation of elastic beam- column system
Basis of matrix method of structural analysis	4	Matrix adapted to equilibrium equations/displacement conditions Analysis of plane truss
Structral analysis engineer's ethics	1	Examples on structral analysis engineer's ethics related to safety of structure analyses such as application scope, precision of analysis and reliability of structural analysis
Confirmation of the attainment level of learning	2	Confirm the attainment level of learning

【Textbook】To be informed by individual lecturer in charge in his/her first lecture
【Textbook(supplemental)】M. Matsumoto, E. Watanabe, H. Shirato, K. Sugiura, A. Igarashi, T. Utsunomiya, Y. Takahashi: Structure mechanics Ⅱ, Maruzen Ltd.
【Prerequisite(s)】calculus A and B, Linear Algebra A and B, Structure mechanics Ⅰ and Exercises
【】
【Web Sites】
【Additional Information】There are four classes which will be taken in the meantime by corresponding teacher. Office hour (contact information and consultation hours) of the individual lecturer will be given in his/her first lecture.

Construction Materials

材料学

【Code】30240 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday･2 【Location】Kyotsu 155

【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】A. Hattori, T. Yamamoto,

【Course Description】Knowledge and techniques to use construction structural materials from micro-structures to macro-structures are introduced.

【Grading】Evaluate considering the scores of final examination and the submitted reports.

【Course Goals】The student will understand the properties, production and testing methods of concrete, steel, composite materials etc. In addition, the student will understand the way of thinking for construction materials.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Classification of materials, history of construction materials, ethics for civil engineers and current topics are introduced
Basic structure	1	Bond between atoms, ideal strength, dislocation, yield, and mechanical properties are introduced.
Metallic materials & steel	1	Metallic material, iron, blast furnace, refine, steel, transformation, heat treatment and metallic new materials are introduced.
Matellic corrosion & protection	1	Corrosion and corrosion protection of metals are explained.
Polymer materials	1	Resin, rubber, fiber, polymer concrete and organic new materials are explained.
Cement	1	Types of cements, chemical composition, chemical compound, hydration, hydration heat and blended cement are introduced.
Admixture for concrete	1	Chemical admixture, water-reducing admixture, air-entraining admixture, mineral admixture, pozzolanic reaction, latent hydraulic property and high-range admixture are introduced.
Aggregate & mixing water, fresh concrete	1	Aggregate, mixing water and fresh concrete (workability, rheology, consistency, segregation) are explained.
Mechanical properties of concrete	1	The water cement ratio, compressive strength, flexural strength, tensile strength and toughness are introduced.
Durability of concrete	1	Durability, alkali-silica-reaction, shrinkage are introduced.
Corrosion of reinforcing steel in concrete	1	Corrosion of reinforcing steel, carbonation, chloride induced corrosion are introduced.
Mix design of concrete	1	Mix desig of concrete is explained.
HIgh performance concrete and reinforcement	1	High performance concrete and special reinforcement are introduced.
Inspection & investigation methods for concrete structures	1	Surface hardness, ultrasonic pulse, elastic wave, thermography, half cell potential and polarization resistance are explained.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】Toyoaki Miyagawa and Keitetsu Rokugo: Construction materials, Asakura ltd (in Japanese)

【Textbook(supplemental)】

【Prerequisite(s)】"Basic Physical Chemistry" in Liberal Arts and General Education Courses.

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【Web Sites】

【Additional Information】Visiting Hattori at rm C1-218, Katsura and/or Yamamoto at rm C1-456, Katsura are welcome.

31110

Dynamics of Soil and Structures

波動・振動学

【Code】31110 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・1 【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】J. Kiyono, A. Igarashi

【Course Description】This course deals with fundamentals and application of vibration theory and elastic wave propagation in civil engineering.

【Grading】Based on the performance during the course (including homework) and the results of a final examination.

【Course Goals】At the end of this course, students will be required to have a good understanding of:

- Vibration phenomena, response to dynamic loads, fundamental principle of vibration measurement, including manipulation of mathematical manipulation and calculation
- Treatment of vibration problems for multi-degree-of-freedom systems and elastic media
- Fundamental properties of elastic waves that propagate in elastic media and layers

【Course Topics】

Theme	Class number of times	Description
Vibration of structures and equation of motion	1	Vibration phenomena encountered in civil engineering structures. Impotance and engineering issues of vibration. Derivation of equation of motion.
Free vibration	1	Definition of the natural period and damping ratio for single degree-of-freedom systems. Derivation of free vibration response.
Force vibration	1	Resonance curves and phase response curves for forced harmonic vibration. Frequency response characteristics.
Principle of vibration measurement	1	Background theory of vibration measurement. Accelerometers and seismometers.
Response to arbitrary input	2	Evaluation of dynamic response to arbitrary forcing and earthquake excitation. Response spectra.
Nonlinear vibration	1	Fundamental properties of nonlinear dynamic response of structures associated with elasto-plastic behavior.
Vibration of 2-DOF systems	1	Solution of equations of motions for 2-degree-of-freedom systems representing free vibration. Concept of normal vibration modes.
Natural frequencies and natural modes of vibration	1	Relationship between the natural frequencies, normal vibration modes of multi-degree-of-freedom systems and eigenvalue analysis.
Damped free vibration of MDOF systems	1	Vibration of multi-degree-of-freedom systems with damping. Analysis of MDOF systems using damping using normal vibration modes.
Forced vibration and response to arbitrary input for MDOF systems	1	Modal analysis to evaluate the dyanmic response of multi-degree-of-freedom systems for harmonic and arbitrary excitation.
Vibration of continuum	1	Vibration of shear beams. Flexural vibration. Wave equation. Solution of shear vibration problem.
Elastic wave	2	Properties of elastic waves travelling in elastic media and elastic layers. Fundamental concept in deriving solutions of elastic wave propagation problems.
Achievement evaluation	1	Students' achievements in understanding of the course material are evaluated.

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

【Textbook(supplemental)】

【Prerequisite(s)】Calculus, Linear algebra, Structural Mechanics I and Exercises (35110), Structural Mechanics II and Exercises (35140)

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【Web Sites】

【Additional Information】Office hours are not specified; Questions to instructors are accepted by appointment

30300

Fundamentals of Hydrology

水文学基礎

【Code】30300 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・5

【Location】Kyotsu155・Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Y. Tachikawa, K. Takara, Y. Ichikawa, T. Sayama, K. Yorozu,

【Course Description】The fundamental concept of hydrology is the hydrological cycle, which is various scale physical processes of water movements in the atmosphere, land surfaces, and oceans. Solar energy and gravity forces play major roles for the hydrological cycle. Solar energy drives the dynamic processes of water vapor formation from oceans and land surfaces, and transport of vapor in the atmosphere. The vapor changes to liquid and fall on the land surfaces as precipitation, then the flow of water on and under the land surfaces are driven by gravity. Hydrology is the study of the movement of water on and under the land surface and its applications to mitigate water-related disasters, develop water resources and preserve the environment. In the class, basic hydrological processes such as solar radiation, precipitation, evapotranspiration, infiltration, surface and subsurface flow, and river flow are described.

【Grading】The score is evaluated comprehensively with quiz, report, and the final examination.

【Course Goals】The aim of the course is to understand the basic hydrological processes to obtain the knowledge for analyzing hydrological phenomenon and the engineering background for water resources development.

【Course Topics】

Theme	Class number of times	Description
The hydrologic cycle	1	The contents of the class is overviewed and the concept of the hydrological cycle is provided. The role of hydrology in the field of civil engineering is described.
Precipitation	1	The mechanism of precipitation is described. A numerical rainfall prediction model and the mechanism of radar rainfall observation are described.
Interception and infiltration	1	The process of precipitation interception by trees is introduced. Then the governing equation of unsaturated flow and the basic equations of potential infiltration are explained.
Groundwater flow	1	The mechanism of groundwater is explained. The physical equation to represent groundwater flow is derived from the continuity and momentum equations of water flow.
Surface runoff	3	The mechanism of rainfall-runoff in mountainous slope is explained. The kinematic wave equation is derived from the momentum equation of water flow, and then the analytical solutions of the kinematic wave model are provided.
Solar radiation and energy balance	1	Energy and water cycle driven by solar radiation is described. Basic mechanism of global warming ant its influence on hydrologic cycle is introduced.
Evaporaion and transpiration	3	The mechanism of water and energy cycle through evapotranspiration is described. Energy balance at land surface and the wind of boundary layer is introduced. Then, methods to measure the evapotranspiration is described.
Flood routing	1	The mechanism of flood routing is explained. Numerical representation method to represent channel network structure is introduced, then typical flow routing methods are described.
Hydrological model	1	A physically-based hydrological model which consists of various hydrological processes is described. Typical lumped hydrological models are also introduced.
Society and hydrology	1	How the hydrological sciences are related to the society is described through various examples.
Achievement confirmation	1	Quiz, report and the final examination is conducted to measure students' knowledge, skill and aptitude on the subject.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】It is desiarable to study Hydraulics (2nd year) and probability and statistical analysis (2nd year).

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【Web Sites】

【Additional Information】

31360

Hydraulics and Hydrodynamics

水理水工学

【Code】31360 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・2

【Location】Kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】K. Toda, E. Nakakita, M. Sanjou, K. Yamaguchi,

【Course Description】Lecture of fundamental theories of fluid dynamics and applications to hydraulic engineerging Basic equations, potential flow theory, boundary layer theory and turbulent flow Introduction of basic modelings about fluid motion and heat transfer in atmosphere related to hydrology and meteorology

【Grading】Attendance, reports and final examination

【Course Goals】Learning elementary knowledge of hydraulics and important topics of hydrodynamics science

【Course Topics】

Theme	Class number of times	Description
Open channel flow (1)	1	Basic equations of non-uniform flow, longitudinal profile
Open channel flow (2)	1	Non-uniform flow computation
Unsteady pipe flow	1	Basic equations of unsteady pipe flow, application to water hummer phenomenon and surge tank
Unsteady open-channel flow	1	Basic equations of unsteady open-channel flow, theories of flood flow and hydraulic bore
Introduction of fluid dynamics (1)	1	Boundary theory and application to hydraulic engineering
Introduction of fluid dynamics (2)	1	Primer of turbulence theory and application to hydraulic engineering
Applied hydraulics (1)	1	Seepage flow and its analysis
Applied hydraulics (2)	1	Fundamentals of sediment transport
Applied hydraulics (3)	1	Sediment related topics of rivers
Hydrometeorology (1)	1	Introduction to hydrometeorology
Hydrometeorology (2)	1	Thermodynamics of atmosphere, Dry-adiabatic process
Hydrometeorology (3)	1	Vertical stability of atmosphere for infinitesimal displacement
Hydrometeorology (4)	1	Moisture in atmosphere, Moist-adiabatic process
Hydrometeorology (5)	1	Latent instability, Land surface process of atmosphere
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】Hydraulics and Exercises

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【Web Sites】

【Additional Information】

30870

Experiments on Hydraulics

水理実験

【Code】30870 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday･3-4 【Location】Kyotsu155

【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Practice 【Language】Japanese

【Instructor】H. Gotoh,Y. Tachikawa,K. Toda,T. Hosoda,Y. Ichikawa,S. Onda,M. Sanjou,E. Harada,K. Kawaike,T. Sayama,H. Takebayashi,N. Mori,K. Yamaguchi,N. Yoneyama,H. Ikari,T. Okamoto,T. Tanaka,K. Yorozu,D. Toriu,D. Nohara,H. Mizutani,

【Course Description】Guidance of laboratory experiments in hydraulics and measurement instruments.

Eight experiments are conducted about pipe flow, open-channel flow, waves, flow in porous media, density flow, hydrodynamic force, sediment transport

【Grading】Attendance : 40 points

Reports and homework : 60 points

total : 100 points

【Course Goals】Understanding hydraylic phenomena through various flows observed in the hydraulic laboratory

【Course Topics】

Theme	Class number of times	Description
Guidance	1	Guidance of hydraulics laboratory and course goals
Instruments in hydraulics laboratory	1	Introduction of measurement instruments Methods and principles of hydraulic experiments
Experiments 1 - 4	8	Rotation for eight experiments A to H as mentioned below
Guide for writing reports	4	Guide for writing reports
A)Transition from lamiar to turbulent flows, friction law in pipe flows	(1)	Observation of dye patterns in lamiar and turbulent flows in pipes Understanding Hagen-Poiseuille flow and Prandtl-Karman flow
B)Velocity and free-surface profiles in open-channel flows	(1)	Measurements of free-surface and velocity profiles Comparison measured results with theories
C)Hydraulic jump in horizontal bed	(1)	Understanding hydraulic jump Comparison measured free-surface variations with theories
D)Transmission and deformation behaviors of waves	(1)	Measurements of wave deformations, wave height and orbits of water particles Comparison measured data with small amplitude wave theory and breaking-wave formula
E)Flow in porous media and underground water	(1)	Measurments steady flows in porous media by using pipenet model and Hele-Shaw model
F)Density flow	(1)	Measurement and understanding transport mechanisms in density flows Evaluations of front speed and related friction laws
G)Hydraulic force on cylinder	(1)	Measurements of pressure distributions on cylinder surface in open-channel flows Observation of Karman vortex behind cylinder
H)Sediment transport	(1)	Measurements and observations of bed load in open-channel flows. Comparison with theories and formulae
Presentations of experimental resutls	1	Presentations for experimental results and related discussions

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】Hydraulics and Exercises

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【Web Sites】

【Additional Information】

31860

Coastal Engineering

海岸工学

【Code】31860 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・4
【Location】Kyotsu3・KatsuraC1-192 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture
【Language】Japanese 【Instructor】H. Gotoh,E. Harada,H. Ikari,

【Course Description】Fundamental items related to coastal engineering (i.e., coastal process, sediment transport, near shore current, shoaling, irregular wave, tsunami, storm surge, tidal wave, wave force)are to be lectured. Especially, sediment transport controlling physical environment significantly around coastal area is to be explained systematically together with river sediment transport.

【Grading】Based on the results of examinations

【Course Goals】Our goal is systematic understanding of fundamental hydraulic phenomena around coastal zone which is indispensable for designing coastal environment.

【Course Topics】

Theme	Class number of times	Description
Introduction to Coastal Engineering	1	Introduction to coastal engineering with focusing on beach deformation
Small Amplitude wave theory	2	Characteristics of small amplitude wave theory and its application are explained.
Wave Statistics / Wave Transformation	2	Developing process of wind wave and expression method of irregular waves are explained. Mechanics of wave transformation is outlined.
Wave Force on Coastal Structures	1	Several experimental formulae of wave force acting on coastal structures are introduced. Problems for stability of rubble mound is mentioned.
Design of Coastal Structures (Exercise)	1	Exercise of design of coastal structures.
Introduction to Computational Design of Coastal Structures	1	State-of-the-art numerical wave flume and its applications are explained.
Sediment Hydraulics	4	Sediment hydraulics (i.e., basic characteristics, calculation of river-bed, bed load and suspended load, non-equilibrium sediment transport) is explained.
Nearshore Current / Coastal Sediment Transport	1	Near-shore current due to wave deformation and resultant coastal sediment transport are outlined.
Tsunami and Storm Surge: Evacuation Planning under Coastal Disasters	1	Characteristics of tsunami and storm surge are explained. Additionally, evacuation process and evacuation planning are introduced.
Achievement confirmation	1	Comprehension check of course contents.

【Textbook】Handout is used in the lectures as needed.

【Textbook(supplemental)】Supplemental textbook is announced in the first lecture.

【Prerequisite(s)】It is desirable to study Hydraulics and Exercises.

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【Web Sites】Non

【Additional Information】How to get in touch with instructors is announced in the first lecture.

31070

Soil Mechanics II and Exercises

土質力学 II 及び演習

【Code】31070 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday・1-2
【Location】Kyotsu155・Kyotsu1 【Credits】3 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises
【Language】Japanese 【Instructor】M. Kimura, M. Mimura, R. Uzuoka, Y. Higo,

【Course Description】The student is expected to learn:soil consolidation and stress distribution in soil media, shear strength of soil, lateral earth pressure-active and passive conditions, bearing capacity of shallow and deep foundations, stability of slope and soil dynamics.

【Grading】Grading Policy:Final exam(70%), Midterm exam and assigned homework(30%)

【Course Goals】The course objective is to provide an understanding of key engineering properties and mechanical behavior of soil materials including consolidation, shear deformation and strength properties, bearing capacity of foundations, stability of slopes and excavations, and dynamic properties of soil.

At the end of the course, students will be able to:

1.Understand the principles of strength and deformation behavior of different soils.

2.Understand and apply the fundamentals of soil mechanics and geotechnical compitation methods.

3.Understand the soil-structutes interaction.

【Course Topics】

Theme	Class number of times	Description
Consolidaton	2	Understand Terzaghi's theory of consolidation, laboratory consolidation test, field consolidation curve, normally consolidated condition and over consolidated condition, and problems on final and time rate of consolidation.
Stresses in ground	1	Understand stresses in the ground due to loading, soil strength and pressure distribution below foundation.
Shear derormation and shear strentgh	2	Understand measurement of shear strength and triaxial compression tests, strength parameters, drained and undrained behavior of clay and sand, and stress path for conventional triaxial test.
Theories of earth pressure	2	Understand the lateral earth pressure in active and passive states, Rankine's theory in cohesive and cohesionless soil, Coloumb's wedge theory with condition for critical failure plane, earth pressure on retaining walls of simple configurations.
Midterm exam	0.5	
Bearing capasity of foundation	1.5	Understand the definition of bearing capacity, ultimate bearing capacity, net ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure, and derivation of Terzaghi's general bearing capacity equation for continuous footing and basic numerical problems associated with it.
Slope stability	2	Understand the failure mechanisms of both infinite and finite slopes and methods of slope stability analysis.
Soil dynamics	2	Understand the nature of dynamic loads, mchanism of liquefaction and liquefaction parameters, and stress conditions on soil element under earthquake loading.
Infrastructure and ground	1	Understand the recent geoengineering projects and ethical responsibility for geoengineers.
Feedback	1	Understand the intentions and correct answers of the questions given in the examination.

【Textbook】Text book:Fusao Oka,"Soil Mechanics",Asakura publishing Co., Ltd .

【Textbook(supplemental)】Fusao Oka,"Soil Mechanics Exercises",Morikita publishing Co., Ltd .

【Prerequisite(s)】A required prerequisite is knowledge of soil mechanics. Soil mechanics I and Exercises(31620) would be helpful as a prerequisite.

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【Web Sites】http://geomechanics.kuciv.kyoto-u.ac.jp/lecture.html

【Additional Information】Contact Information will be delivered in their first lecture.

31380

Experiments on Soil Mechanics and Exercises

土質実験及び演習

【Code】31380 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday・3-4

【Location】Kyotsu1・Kyotsu3・Engineering Science Depts Bldg.,The 1st seminar room 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Practice・Exercises 【Language】Japanese

【Instructor】K. Kishida,M. Mimura,T. Inui,S. Kimoto,Y. Higo,H. Gotoh,T. Kitaoka,M. Sawada,Y. Sawamura,A. Takai,K. Ueda,

【Course Description】The first aim of this course is to acquire laboratory and in situ testing methods to assess engineering properties of soil, which were taught in the soil mechanics course.

【Grading】Laboratory: Each student is expected to conduct the experiments to gain hands on experience.

Attendance: Full attendance to lecture and laboratories is compulsory.

Grading policy:Laboratory Report, 100% of the course grade.

【Course Goals】To help students in understanding the soil mechanics concepts given in the Soil Mechanics course with hands on experience.

To be able to carry out all soil mechanics fundamental experiments.

To collect, analyze and interpret experimental data.

To have a feeling of engineering properties of geomaterials.

【Course Topics】

Theme	Class number of times	Description
Introduction and Orientation	1	
Physical properties of soils	1	Structure of soil, Engineering classification of soils, Consistency Limits, Grain size distribution
Compaction Test	1	Laboratory compaction tests, Factors affecting compaction
Hydraulic Conductivity Test & Particle size distribution test	1	Permeability and seepage, Darcy's law, Hydraulic gradient, Determination of hydraulic conductivity, Particle size distribution of soils
Model test on seepage flow in soil	1	Model test on seepage flow in soil, Flow net analysis
Consolidation Test	1	Fundamentals of consolidation, Laboratory tests, Settlement-time relationship
Unconfined compression test	1	Stress-strain and strength behavior of clays
Direct Shear Test	1	Mohr-Coulomb failure criterion, Laboratory tests for shear strength determination
Sounding methods	0.5	N-values of standard penetration test and elastic wave exploration
Centrifuge model test	0.5	Experiments using the similarity law of centrifuge test
Shaking table test	1	Experkiments using the shaking table test on dynamic behaviours of soils and foundations
Computer Exercise and numerical analysis	2	Fundamentals of math and physics for geotechnical engineering
Special Lecture	1	Special lecture on soil mechanics
Exercise	1	Practical application of laboratory testing data
Feedback	1	Summary of experiments on soil mechanics

【Textbook】To be announced in the class.

【Textbook(supplemental)】

【Prerequisite(s)】Soil mechanics I and exercises(31620)

It is recommended to take soil mechanics II and exercises in parallel.

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【Web Sites】

【Additional Information】Contact information will be announced in the orientation.

30440

Planning and Management of Social Systems

社会システム計画論

【Code】30440 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・1 【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】K.Kobayashi,H.Tatano,M.Onishi,

【Course Description】The aim of“Planning and Management of Social Systems”is to provide the basic knowledge of infrastructure planning and management. In the first half of the class, the basic concepts and frameworks of typical mathematical models are explained. In the second half, theories in social science that includes social psychology and disaster information science are introduced. Furthermore, objectives and methods of social survey and the action research are instructed.

【Grading】On the presumption of sufficient attendance, 30% of score is valuated on reports and 70% on examination.

【Course Goals】It is targeted to understand roles of infrastructure planning and management, typical models for systems analysis, fundamental viewpoints of social science and methods of social survey.

【Course Topics】

Theme	Class number of times	Description
What is planning and management of social systems?	4	Guidance, Systems analysis Systems analysis in port infrastructure Structured analysis of social problems and its implication for infrastructure planning
Multivariate analysis	2	Principal component analysis, Quantification theory
Queuing phenomenon and its modeling	1	Queuing theory
Decision making theory under uncertainty	2	Decision tree Markov decision process modeling
Institutional design	3	Game theory Function of contract and its design Function of law and its design
Policy management	2	Public participation planning, legitimacy and trust risk governance
Test of understanding	1	Test of understanding

【Textbook】Systems analysis for Infrastructure planning: phenomenal analysis, Morikita pub. (in Japanese)

【Textbook(supplemental)】Wordmap: Human science for disaster prevention and reduction science, Shinyosha pub. (in Japanese)

【Prerequisite(s)】Fundamental understanding of probability

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【Web Sites】None

【Additional Information】Office-hours are not specified whereas the ways to make contact with teachers are informed in classes.

30850

Public Economics

公共経済学

【Code】30850 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・2

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】K. Kobayashi,K. Matsushima,S. Yokomatsu,S. Segi,

【Course Description】

【Grading】Final Exam:70-80%, Reports during classes: 20-30%

【Course Goals】To understand basic concept of micro economics for project evaluation about infrastructure

【Course Topics】

Theme	Class number of times	Description
Introduction	1	
Consumers' behavior	2	
Exercise (1)	1	
Firms' behavior	2	
Exercise (2)	1	
Perfect Comititive Market	1	
Imperfect Competition	1	
Measurement for economic evaluation	1	
Externality	1	
Public Goods	1	
Exercise (3)	1	
Cost benefit analysis	1	
feedback	1	

【Textbook】Hal R. Varian: Intermediate Microeconomics: A Modern Approach, Nineth Edition, W. W. Norton & Company, 2014

【Textbook(supplemental)】

【Prerequisite(s)】Students are supposed to have earned a credit for "Systems Analysis and Exercises for Planning and Management".

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【Web Sites】

【Additional Information】Contact email: pub@psa2.kuciv.kyoto-u.ac.jp

31390

Fundamental Environmental Engineering II

基礎環境工学 II

【Code】31390 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・1

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】T. Katsumi,T.Sakaki,Y. Shimizu, M. Yoneda

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	2	
	3	
	3	
	3	
	1	
	3	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

31470

Spot Training
学外実習

【Code】31470 【Course Year】3rd year 【Term】2nd semester in 2018

【Class day & Period】During the summer break for about one month 【Location】Noticed by the bulletin bord

【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Practice 【Language】Japanese

【Instructor】Related Teachers(Civil Engineering Course),K.Kosaka(Environmental Engineering Course),

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

Geoinformatics

空間情報学

【Code】31480 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Thursday・3

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】M. Hatayama, J. Susaki,

【Course Description】Techniques to collect, manage and analyze the spatial data and information related to the terrain and environment are introduced. Especially, Geographic Information System (GIS), satellite remote sensing and digital photogrammetry are focused on.

【Grading】Evaluate considering the scores of intermediate examination (GIS) and final examination (remote sensing and photogrammetry), and the submitted reports.

【Course Goals】The student will understand the techniques to obtain the spatial data, e.g. remote sensing and photogrammetry, and the system to effectively show and analyze such data, e.g. GIS. In addition, the student will understand the relationship between the techuniques and the system.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	The purpose and role of geoinformatics, and the techniques related to geoinformatics are introduced. In addition, the student will understand the concept of CIM (Construction Information Modeling) to share 3D data among different stages, e.g. design, construction and management. The student will also understand the future trend about CIM.
GIS	6	The student will understand how to represent geographic information and the geographic information system.
Digital photogrammetry	2	The student will understand (1) interior orientation, (2) exterior orientation, and (3) colinearity condition.
Remote sensing	4	The student will understand (1) visible and reflective infrared remote sensing, (2) thermal remote sensing, (3) microwave remote sensing.
3D point cloud data processing	1	The concept and techniques to process point cloud data measured by light detection and ranging (LiDAR) will be introduced.
Evaluation of understanding	1	The student will be evaluated for their understanding of the contents offered by the course.

【Textbook】Susaki, J. and Hatayama M., "Geoinformatics" Corona Publishing Co., Ltd.,

【Textbook(supplemental)】Japan Association on Remote Sensing, "Remote Sensing Note" ,
Kohei Cho , "Spatial Data Analysis using GIS"

【Prerequisite(s)】It is expected that the student has completed the courses,
(1) Statistics (first semester in the second year), and
(2) Surveying and practice (first semester in the third year).

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【Web Sites】

【Additional Information】

31490

Computer Programming and Experiment on Structural Mechanics

構造実験・解析演習

【Code】31490 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・4-5

【Location】W1・Kyotsu1・Kyotsu3・Kyotsu4・Research Bldg. No.9 ,The 1st seminar room 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture・Practice・Exercises 【Language】Japanese

【Instructor】Prof. Sugiura (Graduate School of Eng.), Prof. Takahashi (Graduate School of Eng.), Prof. Igarashi(Disaster Prevention Research Institute), Prof. Sawada (Disaster Prevention Research Institute), Assoc. Prof. Saito (Graduate School of Eng.), Assoc. Prof. Furukawa (Graduate School of Eng.), Assoc. Prof. Matsumura (Graduate School of Eng.), Assoc. Prof. Goto (Disaster Prevention Research Institute), Assist. Prof.Noguchi (Graduate School of Eng.),Assist. Prof.Matsumoto (Graduate School of Eng.)

【Course Description】Practical understanding and application of the theory that have been learned in “Structure mechanics Ⅰ and Exercises ”and “Structure mechanics Ⅱ and Exercises”.
To learn the measurment technique on strain, deflection and vibration in experiment, and the fundamentals/application on computer programming for matrix methods for structural analysis in computational exercise which are needed for understanding of the mechanical properties of member and/or structure.

【Grading】Grade is given based on attendance and reports.

【Course Goals】To understand the fundamentals of measurement of strain, deflection and vibration
To deeply understand theory of structure mechanics by beam experiment
To understand numerical analysis approach of structures by use of matrix methods
To deeply and synthetically understand mechanical behaviors and validation methods of structures by comparing the experimental results with those resulted from matrix methods

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Explanation of the significance and the role of structural experiment and computer analysis Introduction of relationship among structural mechanics, structural experiment and computer analysis, and examples of practical failure structures
Structural Experiment	6	Introducing fundamentals of experiment method and measurement technique for structure model Experiment of cantilever beam under static load and vibration, and its results and discussion Some practical application cases on techniques of experiment and analyses
Computer Analysis	6	Structural analysis for truss, beam and frame by matrix Calculation of stiffness matrix, steps of formation of stiffness equations and the solution Explanation on a few of attention points of practical numerical approaches and analyses Exercises of computer programming
Exercise	1	Review structural experiments and computer analysis.
Confirmation of the attainment level of learning	1	Confirm the attainment level of learning

【Textbook】To be distributed in lectures

【Textbook(supplemental)】

【Prerequisite(s)】CompuTer Programming in Global Engineering, Structure mechanics Ⅰ and Exercises, Structure mechanics Ⅱ and Exercises

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【Web Sites】

【Additional Information】Office hour (contact information and consultation hours) of the individual lecturer will be given in his/her first lecture.

30250

Concrete Engineering

コンクリート工学

【Code】30250 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・2 【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】H. Kawano, Y. Takahashi, A. Hattori, T. Yamamoto,

【Course Description】The basic theory and the design technique of reinforced concrete (RC) and prestressed concrete (PC) structure are explained with the mechanical behavior of the materials introduced in ‘Construction Materials’.

Be sure and attend the lecture with your text book. Some homework are assigned to enlarge your knowledge.

【Grading】Grading is based on the result of a term-end examination with the homework and attendance.

【Course Goals】Students of this class learn to understand the basic theory and the design technique of reinforced concrete (RC) and prestressed concrete (PC) structure, and calculate the resistance and the response of simple RC/PC member.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Concrete structure and its characteristic are introduced.
Fundamental of design	2	The design method, the safety factor and etc. are explained.
Structural materials	1	The mechanical behavior of concrete, reinforcing steel and polymer material is explained.
Bond behavior and anchorage	2	The mechanism of bond and anchorage is explained.
Flexural and compression behavior	2	The cracks and deflection of RC member are explained.
Shear and torsion behavior	2	The mechanical behavior and the capacity of RC section subjected to the flexural moment and/or the normal force are explained.
Crack and deflection	2	The mechanical behavior and the capacity of RC section subjected to the shear force and/or the torsional moment are explained.
Verification method of performance over time	1	The verification method of performance over time including the corrosion of the reinforcing steel is explained.
Others	1	The latest research and technique relating to concrete engineering are introduced.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】K. Kobayashi: Concrete Engineering, Morikita Publishing Co., Ltd., 3,240JPY

【Textbook(supplemental)】S.Inoue, et al.: Zusetu Concrete structures, Gakugei Publishing Co., Ltd., 3,024JPY

【Prerequisite(s)】Students of this class had better take ‘Structural Mechanics I and Exercises (30080)’ in 2nd year and ‘Construction Materials (30240)’ in 3rd year.

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【Web Sites】

【Additional Information】

31500

Earthquake and Wind Resistance of Structures, and Related Structural Design Principles

耐震・耐風・設計論

【Code】31500 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・3 【Location】Kyotsu1
【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese
【Instructor】Prof. Shirato (Graduate School of Eng.), Prof. Sugiura (Graduate School of Eng.), Prof. Takahashi (Graduate School of Eng.), Assoc. Prof. Goto (Disaster Prevention Research Institute)
【Course Description】To understand fundamentals of design theory for civil infrastructures. To explain various design loads, including dead load, live load, temperature load, seismic load, and wind load, limit states of structures and their evaluation, demand performance. To design structures considering reliability, optimal design, serviceability, aesthetics, and environment.
【Grading】Based on the performance during the course (including homework) and the results of a final examination.
【Course Goals】To understand fundamentals of design for civil infrastructures.
To understand fundamentals of load, limit state of structures, reliability design and optimal design.
To understand fundamentals of characteristics of natural wind, aerodynamics of structures, design wind and wind resistant design.
To understand fundamentals of earthquake mechanism and seismic response of structures, seismic load, and seismic design.
【Course Topics】

Theme	Class number of times	Description
Introduction of design theory of civil infrastructure	2	Design theory of civil infrastructures is introduced. The concept and significance of design, objective of design, characteristics of civil infrastructures, flow of design process, mechanical design, multi-level decision making are discussed. Engineering ethics are also explained.
Introduction of load	3	Design loads for civil infrastructures are introduced. The characteristics and classification of design loads are explained and their quantitative expression is discussed. Especially statistic characteristics of random loads, i.e. seismic load and wind load, are explained.
Prediction of earthquake ground motion and earthquake response of structure	2	Methods for predicting earthquake ground motion are introduced based on the theories of earthquake mechanism and ground vibration. Equation of motion for the single degree of freedom system and its solution are also explained in order to estimate earthquake response of structure. Design methods for infrastructures are interpreted on the basis of theories of elasticity and plasticity.
Characteristics of natural wind and aerodynamics of structures	2	The characteristics of natural wind and strong wind are explained and process of design wind for structures is discussed. And various aerodynamics (vortex-induced vibration, galloping, flutter, buffeting, and etc.) acting on structural section with various geometric shape and their generation mechanism are explained.
Limit state of structure and reliability analysis	3	The outline of structural safety analysis is introduced for serviceability, ultimate and fatigue limit of structures. As for uncertainties in various actions to structures and the resistance of structures, the design methods such as allowable stress method, limit states method with partial safety factors will be discussed in conjunction with reliability analysis.
Seismic design, wind resistant design, optimal design, and landscape design	3	Seismic design, wind resistant design, optimal design and landscape design for various structures, including long span bridge

【Textbook】Hand-outs are distributed when necessary.
【Textbook(supplemental)】
【Prerequisite(s)】Probabilistic and Statistical Analysis and Exercises(30030), Dynamics of Soil and Structures(31110), Structural Mechanics I and Exercises(30080), Structural Mechanics II and Exercises(31640), and Fluid Mechanics(31650)
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【Web Sites】
【Additional Information】Office hour (contact information and consultation hours) of the individual lecturer will be given in his/her first lecture.

30460

River Engineering

河川工学

【Code】30460 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・1 【Location】kyotsu155
【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】T. Hosoda, Y. Takemon,
【Course Description】This subject deals with a wide range of basic knowledge on rivers required to make an integrated river basic management plan based on natural & social sciences and engineering& technology. The contents included in this subject are described as follows: various view-points in relation to river systems, long term environmental changes of rivers and their factors, river flows and river channel processes, river and lake ecological systems, recent characteristics of flood disasters, integrated river basin planning including flood control, sustainable reservoir management, nature restoration, and sediment transport management.
【Grading】Mainly regular examination. Quiz in a class, attendance and report submission are also considered for grading to some extent.
【Course Goals】To learn the basic knowledge to consider river environments from the various points of view such as flood control, natural environment conservation, water utilization based on natural sciences, social sciences and engineering & technology.
【Course Topics】

Theme	Class number of times	Description
Various viewpoints on rivers and river basins	1	Various viewpoints on rivers and river basins, Vvrious rivers and their landscapes on the Earth, formation processes of river basins, long term environmental changes of rivers and main factors
Precipitation, water cycle and run-off phenomena	1	Basic knowledge on Meteorology, Water Resources, Statistical Hydrology of precipitation and Rain Fall Run-off Analysis
River flow and river channel processes	2	Basics on unsteady open channel flows and flood flow simulation, sediment transport in alluvial rivers, formation processes of meso-scale and micro scale sand waves, etc.
Application of numerical hydraulics to environmental issues	1	Relation between the behavior of an endangered bird called 'Kamogawa-Chidori' and sand-bar formation, Mechanism on DO depletion near the bottom of the northern part of Lake Biwa due to the climate changeon the earth, Dam reservoir sedimentation due to sediment run-off from a catchment area, etc.
Structure and functions of river and lake eco-system	3	(1) Hierarchical structure and classification of river ecosystems, Relations between river geomorphology and habitat structure, Classification of microhabitats and their maintenance mechanisms, Longitudinal distribution of biological communities (2) Function of river ecosystems, Roles of biodiversity, Sustainable conditions of habitats for biological communities, Mass transfer mechanism in rivers, Nutrient spiraling, Impact assessment of river environments and Physical Habitat Simulation Model (3) Function of lake ecosystems, Classification of natural lakes and ponds by thermal stratification and thermal convection, Relations between lake types and biota (fauna and flora), Characteristics of man-made reservoir ecosystems
Integrated river basin planning	3	(1) River law, Fundamental river management plan, River improvement plan, Procedures to make a flood control planning (2) Flood invasion analysis and Hazard Map, Excessive floods and comprehensive flood disaster prevention measures, River structures(groines and levees) (3) Cost-Benefit Analysis of flood control projects, Evaluation of people ’s awareness to river improvement projects by means of CVM and Conjoint Analysis in view of flood control, water utilization and natural environmental conservation
Integrated river basin planning	3	(1) River environmental improvement plan, Normal discharge, River restoration projects, Environmental assessment, etc. (2) Classification of river structures and their functions, Impact assessment for construction of dam reservoirs and estuary barrages, etc. (3) Comprehensive management of sediment outflow and sediment budgets in river basins, concepts of recent sediment control dams, asset management of dam reservoirs, management of sediment dynamism for integrated river planning, etc.
Achievement confirmation(feedback)	1	Achievement of learning is confirmed.

【Textbook】Printed materials on the contents will be circulated in each lecture.
【Textbook(supplemental)】
【Prerequisite(s)】Elementary knowledge of Hydraulics, Hydrology and Ecology
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【Web Sites】http://www.geocities.jp/kyoto$_{ur}$ivereng/
【Additional Information】Students can contact with instructors by sending e-mail to hosoda.takashi.4w@kyoto-u.ac.jp & takemon.yasuhiro.5e@kyoto-u.ac.jp.

30320

Water Resources Engineering

水資源工学

【Code】30320 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday･2 【Location】kyotsu155 【Credits】2 【Restriction】In principle, students at third grade and above can take this course. 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】Y. Tachikawa,T. Hori,Kim Sunmin,

【Course Description】Methodology for water resources development, management and conservation is introduced from the engineering viewpoint. Main topics are distribution of water resource on the earth, grasp and prediction of water demand, planning and design of water resources systems, estimation and prediction of river flow, policy and water rights, and operation of reservoirs.

【Grading】Grading is done based on the mark on regular examination with reference to the degree of positive participation to classes and assignments. Minimum passing grade is sixty percent.

【Course Goals】The goal is to understand the basic theory and methodology for water demand prediction, water resources systems design, river flow estimation, water resources policy and reservoir operation.

【Course Topics】

Theme	Class number of times	Description
Water resources systems planning	1	Target of water resources engineering. Temporal and spatial distribution of water resources on the earth.
Development of water resources	2	Concept and measures of water resources develeopment. Efficiency and limit of water resources development.
Design of water resources systems	1	Estimation of water demand and design of water resources systems.
Operation and management of water resources systems	2	Planning and management, off-line and real time operation, optimization of reservoir control.
Social and legislation system for water resources	1	Social and legislation system for water resources, water right, public and private water, management and defect.
Water resources evaluation (1): Hydrologic predictions	1	Hydrologic predictions play an important role for water resources evaluation. The basic role of hydrologic predictions for a river planning and river management are explained.
Water resources evaluation (2): Hydrologic frequency analysis	4	The basis of the hydrologic frequency analysis is explained. Hydrologic variables used for the river planning and water resources planning are introduces as probabilistic variables; the concept of non-exceedance and exceedance probability and T-year probabilistic hydrologic variables are explained. Then, the procedure of hydrologic frequency analysis, distribution functions used for the frequency analysis, and estimation methods of parameters of a distribution function is described.
Water resources evaluation (3): Real-time hydrologic forecasting	2	Methods for real-time rainfall forecasting and river discharge forecasting are focused.
Achievement confirmation	1	Achievement assement is intended to measure students' knowledge, skill and aptitude on the subject.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】It is desirable that students have already learned fundamental hydrology and systems analysis for planning and management.

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【Web Sites】

【Additional Information】

Geoenvironmental Engineering

地盤環境工学

【Code】31510 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・2

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】T. Katsumi, M. Kimura, Y. Uzuoka,

【Course Description】This course provides the knowledge on geotechnical engineering related to soft ground improvement, natural disaster mitigation, and geo-environmental issues.

【Grading】Grading will be made based on the final exam and attendances.

【Course Goals】The goal of this course is to understand the geotechnical engineering contributing to disaster prevention and environmental issues.

【Course Topics】

Theme	Class number of times	Description
Soft ground improvement	4	(1) Foundations of structures, (2) countermeasures against soft ground, (3) principle of ground improvement, (4) innovative materials including geosynthetics, and (5) road and pavement engineering, are introduced.
Environmental Geotechnics	5	(1) Remediation of contaminated soils and groundwaters, (2) waste containment, and (3) reuse of waste materials in geotechnical applications, are introduced.
Geo-disaster	5	(1) Rainfall-induced geo-disaster, (2) earthquake-induced geo-disaster, (3) mechanism of liquefaction, and (4) prediction and countermeasure of liquefaction, are introduced.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】Handouts will be provided.

【Textbook(supplemental)】

【Prerequisite(s)】"Soil mechanics I and Exercises (31620)" would be helpful as a prerequisite.

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【Web Sites】

【Additional Information】Contact Information: Professor T. Katsumi at katsumi.takeshi.6v@kyoto-u.ac.jp.

31750

Rock Engineering

岩盤工学 (土木工学コース)

【Code】31750 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・1 【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】H. Ohtsu, K. Kishida,

【Course Description】Design and construction technology of rock structure (Underground cavern, tunnel, rock slope, etc.), geology, mechanical properties of rock and rock fracture, laboratory tests and field measurements of rock and rock mass are introduced and lectured. Design exercise of rock structure is also introduced.

【Grading】Evaluation is decided overall as 35% first examination, 45% final examination and 20% of reports and subjects.

【Course Goals】Understanding of mechanical properties of rock, distributions of rock discontinuities and fractures, mechanical and hydra-mechanical properties of rock discontinuities and fractures. Also basic knowledge of design and construction method of rock structures will be studied.

【Course Topics】

Theme	Class number of times	Description
Introduction of Rock Engineering and Underground Space Techonology	1	Introduction of real examples and problems in rock engineering field in relation to rock and civil engineering, disaster prevention, energy and environmental areas. Also, outline of underground space technology which includes the benifit of underground space for human being, effective underground space utilization, etc., will be described. In addtion, the basic knowledge of geology required to study rock engineering will be explained.
Mechanical propeties of rock and rock joint	3	Understanding to strength and deformation characteristics of rock, experimental methods to determine those characteristics and method of interpreting the experimental results. Also, difference between rock and rock masses, non-homogeneity, anisotropy and scale effects will be explained.
Classification and identification of discontinuity (rock fracture)	2	Explaination of mechanical and hydraulic charactersics of discontinuity planes such as fault, joint, etc. and understanding the modelling of crack network .Also, understanding of stereographic projection of notation used for three dimensionaly distributed discontinuity planes.
Hydraulics in rocks and groundwater investigation	2	Methods of understanding the behavior of underground water that flows through the rockbeds, their analysis methods and environmental problems related with it will be explained.
Methods of investigation and testing of rock masses	4	Introduction of ground investigation methods such as geological survery, load test and borehole test of rock masses, geophysical exploration, intial stresses, etc. which are carried out for the design and construction of rock structures will be introduced. Understanding of principles of those methods, interpretation of data measured and the proper use of those data will also be explained.
Application of Rock Mechnicas in Engineering for Underground Opening, Rock Slop, Tunneling and Foundation	3	Explaination of methodolgy and the problems for the construction of structures on the bedrocks such as foundation of dams and bridges and slopes is made. Also, methods of constrution of tunnels in the mountain region and representative shield method for tunneling at city area are also explained. Simple design exercises and special lecture from experienced person
Confirmation of understanding	1	Students are examined on the understanding of this subjet through a paper test.

【Textbook】

【Textbook(supplemental)】Society of Materials Science, Japan: Rock Mechanics

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】Office hour will be explained at the guidence.

30450

Urban and Regional Planning

都市・地域計画

【Code】30450 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・4

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】R.Matsunaka,T.Ohba,

【Course Description】This lecture aims to learn the process of urban planning and basic measures in urban facility planning, land use planning and transportation planning and to understand the basic theory and models for urban planning.

【Grading】Grades will be based on the results of the final examinations, report and class participation.

【Course Goals】To learn fundamental knowledge on urban planning and to understand the structure of urban problems.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	
Basic measures in urban planning	2	
Land use plan and district plan	2	
Urban models	2	
Urban environmental problems	3	
Funding systems for urban planning	2	
Urban transport policy	2	
Summary	1	

【Textbook】No textbook

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31520

Transportation Management Engineering

交通マネジメント工学

【Code】31520 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・3

【Location】Kyotsu155【Credits】2【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】S. Fujii,T. Yamada,

【Course Description】This lecture is aimed at explaining methodologies of survey, desigin and operation for urban traffic and transportation system, which may contribute to enhancement in safety and efficiency of travel.

【Grading】Students will be graded considering both assingnments and term paper.

【Course Goals】The students who complete this course are expecting to explain well the significance in the methodologies used for survey, desgin and operation of transportation planning and traffic engineering. In addition, these students are expecting to apply the methodolgies for the actual case.

【Course Topics】

Theme	Class number of times	Description
Outlines of Traffic and Transportation Engineering	1	
Road Transportation Planning	2	
Survey and Analysis of Travel Behavior	2	
Approaches for Travel Management	2	
Survey and Analysis of Road Network	3	
Traffic Flow Theory	1	
Plannig and Design of Road	1	
Traffic Operation	2	
Feedback	1	

【Textbook】Y. Iida and R. Kitamura: Traffic Engineering (written in Japanese), Ohmsha, 2008 .

【Textbook(supplemental)】

【Prerequisite(s)】The students are recommended to take 'Probabilistic and Statistical Analysis and Exercises' and 'Systems Analysis and Exercises for Planning and Management' in advance.

【】The exercises related to the class are assigned to the students in order to encourage them to review the contents of class.

【Web Sites】

【Additional Information】The way to contact with the professors for Q & A is provided at the first class of this course.

31630

Urban and Landscape Design

都市景観デザイン

【Code】31630 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday･3-4

【Location】W2 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises

【Language】Japanese 【Instructor】M. Kawasaki,K. Yamaguchi,

【Course Description】To design the urban facilities, open spaces, landscapes of streets and districts, is to create the place for the people and their activities. It enables to make places in harmony with the environment by making connections of each space of the city, region, and nature. The course aims to consider vision of urban landscape and learn practical skills of design and representation.

【Grading】Total points will be scored in attitude of attendance (30%) and results of design practice and reports (70%).

【Course Goals】To understand the ways of design of the urban facilities, open spaces, landscapes of streets and districts. To acquire basic skills of landscape design. Students are expected to get design-mindsets as civil engineers in the end.

【Course Topics】

Theme	Class number of times	Description
What is urban landscape?	1	Guidance　Definition of landscape, recognition of landscape, visual perception, climate and landscape, living landscape, social system of landscape
What is design?	1	Landscape Architecture of Urban structures, roads, streets, waterfront, parks, Design methods, spaces and scales, landscape prediction
Basic practice	5	Techniques of drawings: lines and elements, plans(Paley Park), Perspective drawings, sketches
Design practice	5	Site survey, Group work (task arrangement and planning), concept making, space design, presentation
Landscape History	1	Formation of urban and rural villages in Japan and history of civil engineering, urban planning and urbanization in modern times
Landscape Planning	1	Landscape Conservation, town planning methodology, examples of urban / region revitalization by public space design
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】Office hours are not especially set. Ask any questions by mailing or visiting professors (Kawasaki, rm.202; Yamaguchi, rm.201 at C1-1, Katsura Campus). The theme of design practice could be changed partially.

31820

Design for Infrastructure II

社会基盤デザイン II

【Code】31820 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・5

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Related Teachers

【Course Description】Civil Engineering is the study which provides the essential technology and knowledge to improve social infrastructures. In this course, the fields of Civil Engineering are explained clearly in terms of how technologies and knowledge, which have been evolved as academic disciplines, have been applied and integrated to realize a safe, comfortable and sustainable society. It is expected to learn the essence of Civil Engineering, especially on expected roles of civil engineers including engineering ethics. Also, lecturers are invited from outside of school.

【Grading】Grade is given based on the examination (or reports) and attendance to class.

【Course Goals】To understand how technologies and knowledge developed in Civil Engineering can be applied in the field of development of infrastructure, disaster management and mitigation, creation of environment and so on; to understand challenges of Civil Engineering and its directions of development, through recent research trends.

【Course Topics】

Theme	Class number of times	Description
Expected roles of civil engineers	2	Introduction Explanation on roles of civil engineers, active areas for them and engineering ethics, introducing the recent examples
Application of Civil Engineering to real world	9	Explanation on how technologies and knowledge developed in Civil Engineering can be applied in the field of development of infrastructure, disaster management and mitigation, creation of environment Explanation on the relation between Civil Engineering as a discipline and its practical application, and real facts of Civil Engineering as global engineering, including recent topics in major business fields of civil engineer, such as civil service, construction, electricity, gas, transportation and communications, consulting and so on
Research trends in Civil Engineering	3	Explanation on recent research trends in Civil Engineering, which aims to realize a safe, comfortable and sustainable society Aim to learn independently status, issues and possibility of developing in the specified research field
Confirmation of the attainment level of learning	1	Confirm the achievements of learning

【Textbook】Distribute printed materials as needed

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31740

Engineering Mathematics B2

工業数学 B2(資源工学コース)

【Code】31740 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・2

【Location】Kyotsu2 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】K. Tsukada,

【Course Description】Fourier transform & Laplace transform and their application to the solution of differential equations,

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Fourier Series and Fouier Transform	1	
Fourier Transform Appllied to Boundary Value Problem of Differential Equation	3	
Interporation and Approximation	3	
Laplace Transform	3	
Solution of Differential Equations by Laplace Transform	4	
Liniar System and Laplace Transform	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

32400

Engineering Geology
地質工学

【Code】32400 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3

【Location】Kogishitsu3【Credits】2【Restriction】No Restriction【Lecture Form(s)】Lecture【Language】Japanese

【Instructor】K.Koike,T.Hayashi,Y.Nara,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31350

Geophysical Prospecting

物理探査学

【Code】31350 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・4

【Location】Kogishitsu3【Credits】2【Restriction】No Restriction【Lecture Form(s)】Lecture【Language】Japanese

【Instructor】Katsuaki Koike,Hitoshi Mikada,Tada-nori Goto,

【Course Description】Geo-exploration principles, data acquisition, data processing, and interpretation methodologies for earth's surface down to deep are explained in this lecture. Applications of such geo-exploration technologies are introduced in terms of energy, earth resources, geo-environment, geotechniques, civil engineering areas.

【Grading】The grading is based on the result of paper-test. Any detailed explanation could be given by each of the lecturers.

【Course Goals】The final goal of the lectures is to deepen the understanding of geoelectromagnetics, seismology, geochemistry, and petrophysics that are used in geo-exploration.

【Course Topics】

Theme	Class number of times	Description
Geoelectromagnetics and geo-exploration	5	Geoelectromagnetic exploration technologies will be explained. The understanding of the fundamentals of survey methods and targeted physical properties with their physical meanings are the major objective of the lectures.
Seismology and geo-exploration	6	The fundamental theories of seismology with application to geo-exploration are given. The understanding of physical meaning of parameters derived from seismological methods are aimed.
Geochemical exploration and remote sensing	3	Geochemical properties of earth's crust, mantle and core, and the fundamentals of geochemical measurements for the exploration of metal mines and energy resources are given first. Then the interactions between materials and electromagnetic waves, the fundamental principle of optical sensors and synthetic aperture radars, data processing of remote sensing images, topographic interpretation, resources exploration, and geoenvironmental modeling are briefly explained.
Performance evaluation	1	The understanding of enrolled students is checked.

【Textbook】No textbook particular.

【Textbook(supplemental)】K. Sassa, Y. Ashida, and T. Sugano, itGeo-exploration for construction and disaster mitigation engineers, Morikita Publ.,
Japan Remote Sensing Society, itRemote sensing for beginners, Rikoh Publ., .

【Prerequisite(s)】Physics, chemistry of the level of the general education of universities.

【】

【Web Sites】Could be provided in the course.

【Additional Information】Modeled answers will be distributed within the best delay after the final exam for students to review the classwork.

32000

Fundamental Theory of Elasticity and Stress Analysis

弾性体の力学解析

【Code】32000 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・1-2 【Location】Kyotsu2 【Credits】4 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese
【Instructor】Assoc. Prof. Tsukada & Assoc. Prof. Murata,
【Course Description】Stress, strain, displacement and basic equations in linear elasticity are first lectured, and then Airy's stress function and its application to solve two dimensional problems in linear elasticity are explained. Moreover, energy theorems and their application to a numerical stress analysis method are explained.
【Grading】Several Exercises are presented in the term. Midterm exam and final exam are also presented. Grade is evaluated by the sum of the exercises and the exams with the weight of 30% and 70% respectively.
【Course Goals】One objective of this course is to master the basis to solve the boundary value problems in linear elasticity analytically or numerically. Another one is to obtain the basic knowledge of numerical stress analysis methods such as FEM and BEM.
【Course Topics】

Theme	Class number of times	Description
Stress, strain and displacement	2	Introduction of linear elasticity containing its history is first presented, and then stress, strain, displacement, equations between them, principal stress and strain, Mohr's circle of stress and strain, and etc. are lectured.
Basic equations of linear elasticity and boundary condition	2	Basic equations of linear elasticity in Cartesian coordinate system and polar coordinate system are presented, and then the methods to solve the equations are lectured.
Airy's stress function and solution of 2D problem of elasticity	5	Airy's stress function that is a biharmonic function is presented for Cartesian coordinate system and polar coordinate system, and a method to obtain the stress and displacement in a two dimensional elastic body using Airy's stress function is lecured.
Energy theorems in elasticity and solution of boundary value problem	4	Strain energy function, principle of virtual work, and principle of minimum potential energy are lectured, and then the relation between basic equations in linear elasticity and these energy princile is lectured. Moreover the method to solve a boundary value problem in linear elasticity based on the energy theorems is explained.
Basis of numerical stress analysis methods	1	Overview of FEM, FDM and BEM is presented, and then formulation of FEM using the energy theorems is explained. Moreover some examples of stress analysis using FEM and BEM are shown.
Learning achievement check and summary	1	Students are asked to solve several problems. The solution of them are shown. Student can check their achievement to the course goals and summarize this course.

【Textbook】Not specified.
【Textbook(supplemental)】Shigeo Takezono et al., Introduction of Mechanics of elasticity-from basic theory to numerical analysis-, Morikita Publishing Co., ISBN:978-4-627-66641-2
【Prerequisite(s)】Differential calculus, integral calculus, and linear algebra are necessary for taking this course.
【】It is strongly recommended to solve again the example problems explained in the lecture by yourself.
【Web Sites】This course does not have a web site. But some lecture documents may be deribered by the net. The URL to download the lecture documents will be announced in the class.
【Additional Information】Additional information is presented in the first class of each teacher.

Fluid Mechanics

流体力学

【Code】31650 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・3

【Location】Kyotsu2 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】H.Takuda,H.Fujimoto,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	2	
	1	
	1	
	7	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31660

Physical Chemistry
物理化学

【Code】31660 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday・3

【Location】kyotsu155 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】M.Mabuchi,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	2	
	4	
	4	
	2	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

32200

Experimental Basics in Earth Resources and Energy Science, Laboratory.

資源工学基礎実験

【Code】32200 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・3-5

【Location】Kyotsu1 【Credits】2 【Restriction】 【Lecture Form(s)】Experiment 【Language】Japanese

【Instructor】H.Kusuda,T.Goto,K.Tsukada,Y.Nara,E.Kusaka,J.Takekawa,M.Naoi,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	2	
	2	
	6	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

32310

Geological and Geophysical Survey,Field Excursion

資源工学フィールド実習

【Code】32310 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・3-5 【Location】W3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Practice・Exercises 【Language】Japanese 【Instructor】K. Koike, T. Hayashi, T. Goto, K. Kashiwaya, J. Takekawa, Y. Chen,
【Course Description】In the resource engineering, data acquirement and observation in the field are essential skills. For learning these knowledge, two field experiments are conducted; geological and geophysical surveys.
【Grading】Evaluation based on reports and presentations. Details will be explained at the beginning of class.
【Course Goals】Geological Survey

Students can understand the relationship between the geology and topography by field observations, and also become familiar with the observation of the geological outcrops from the view point of resource geology. In addition, they can explain how the topography and geology are deeply related each other, and obtain the basic geological information, such as strike, dip, rock type (mineral species) in the field observation (measurement).

Geophysical Survey

Students carry out the field training and data analysis of seismic refraction survey and electrical resistivity exploration. In the field training, they learn deployment of geophones for land seismic survey, together with arrangement of current/potential electrodes for electrical survey. In addition, they can understand the vibration at seismic source wave and recording method of the seismic wave, together with the transmission of electric current and the measurement of potential. In the data analysis, students can deeply learn the knowledge about the estimated physical quantity from the recorded data, and also understand the imaging method for underground structure.

【Course Topics】

Theme	Class number of times	Description
Topographic Analysis (Geology)	2	The topographic analysis method is lectured as a pre-study of geological field trip, then students carry out the analysis by using topographic maps and aerial photos of the excursion destination.
Field Excursion I, II（Geology)	6	Students observe the outcrops in the field, and compare the real geological structure with the results done as the exercises. Two excursions on the different locations are conducted.
Presentation	2	Students make presentations what they learned in the excursion and analysis.
Seismic Survey (Geophysics)	2.5	Along the Kamo river side, the seismic refraction survey is conducted. The data acquired is analyzed using the "stripping method", and used for estimating the subsurface structure based on the seismic wave velocity.
Electrical Resistivity Survey (Geophysics)	2.5	Along the Kamo river side, the electrical resistivity survey using the Wenner array is conducted. The data acquired is analyzed , then students learn the theoretical basis of this method together with a way for estimation of subsurface resistivity structure.

【Textbook】It will be presented in the lecture.
【Textbook(supplemental)】It will be presented in the lecture.
【Prerequisite(s)】
【】
【Web Sites】
【Additional Information】

31440

Advanced Resources and Energy Engineering

先端資源エネルギー工学

【Code】31440 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・3(4)

【Location】Kyotsu2 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】T.Ishida,K.Koike,T.Sakaki,H.Takuda,M.Mabuchi,H.Mikada,T.Hayashi,H.Kusuda,Y.Nara,

【Course Description】

【Grading】

【Course Goals】['', '']

【Course Topics】

Theme	Class number of times	Description
	1	
	1-2	
	1-2	
	1-2	
	1-2	
	1-2	
	1-2	
	1-2	
	1-2	

【Textbook】['', '']

【Textbook(supplemental)】['', '']

【Prerequisite(s)】

【】

【Web Sites】['', '']

【Additional Information】

31760

Rock Engineering

岩盤工学 (資源工学コース)

【Code】31760 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・1

【Location】W1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】T.Ishida,Y.Nara,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	1	
	3	
	3	
	2	
	3	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31900

Mechanical Properties of Solids and Fracture Mechanics

固体の力学物性と破壊

【Code】31900 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・2

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Assoc. Prof. Tsukada and Assoc. Prof. Murata,

【Course Description】For crystalline materials such as rock and metal, macroscopic deformation behavior and destruction behavior is explained from the microscopic standpoint of fracture mechanicas and solid mechanics.

【Grading】A quiz or a report problem is given in every class. The grade is evaluated by the sum of scores of the quiz or the report and the final exam. The grading weights of them are 30% and 70% respectively.

【Course Goals】The goals of this course are to master the evaluation of elastic modulus of crystalline materials considering its anisotropy and to master the fracture mechanics for a crack containing material by estimating stress intensity factor, energy release rate and J integral. By taking this course, students can understand the elastic deformation and strength of the crystalline materials and the crack containing material.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Overview of this course is presented, and then material testing method is simply explained.
Structure of crystalline material	3	Basic form of space lattice of crystalline materials are lecutured, and then the indication method of each crystalline form is presented.
Elastic modulus and theoretical strength	3	Elastic modulus of single crystal and crystalline material is lectured from the point of atomic bond form, and then theoretical strength of a material is explained from atom level.
Fracture mechanics	5	Linear fracture mechanics and nonlinear fracture mechanics for a crack containing material are lectured. Stress intensity factor, energy release rate, J integral etc. are explained. Fracture in mixed mode is also explained.
Mechanical model of composite	1	Mechanical models of composite such as Vogit model, Reuss model, and Eshelby's equivalent inclusion method are lectured.
Rheology	1	Macroscopic rheology models are reviewed, and then microscopic rheology based on the Eyring's rate process theory is explained.
Summary of this course	1	The solutions of exam are explained, and the contents of this course are summarize.

【Textbook】Not specified

【Textbook(supplemental)】Naohiro Igata, Strength of matrials, Baifukan Co., ISBN:4-563-03186-0
Keiichiro Togo, Zairyo Kyodo Kaiseki-gaku, Uchida Rokakuho Publishing Co., Ltd, ISBN: 4-7536-5132-0

【Prerequisite(s)】Differential calculus, integral calculus and linear algebra are necessary for this course.

【】Review the lecture materials and note by yourself. In the next lecture, make a qustion about the points that you could not understand well.

【Web Sites】This course does not have a web site.

【Additional Information】Additional information is presented in the first class of each teacher.

31550

Wave Motions for Engineering

波動工学

【Code】31550 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・4
【Location】Research Bldg. No.8,Kogishitsu4 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture
【Language】Japanese 【Instructor】H. Mikada,J. Takekawa,
【Course Description】All the attendance students understand correctly vibration and the wave motion phenomenon which are seen by the nature, and put on the practical skills which are needed by resource engineering. Learn about the wave motion in the elastic body and electromagnetic waves which spreads the underground. This knowledge becomes important for engineers in resource engineering field. Furthermore, in order to understand the micro phenomenon which is needed by oil engineering, the first step about the wave motion of quantum mechanics is described. Although the lesson is based on a lecture, an understanding is deepened by studying an exercise problem according to circumstances.
【Grading】Although experimental mark is based on fundamental score, attendance to a lesson and report results may be taken into consideration.
【Course Goals】Students will be able to manipulate vibrations and wave motion phenomena freely using mathematical formula. Moreover, the ability to explain vibration and wave motion phenomena is mastered during this class.
【Course Topics】

Theme	Class number of times	Description
Simple harmonic motion and its superposition	1	The oscillating phenomenon and the wave motion phenomena of appearing in the resource engineering are described focusing on using examples. Furthermore, simple harmonic motion and its superposition are described.
Damping oscillation, forced oscillation, and coupled vibration	3	An attenuation coefficient is defined about the damping oscillation of one degree of freedom, and it finds for an oscillatory wave form. Furthermore, after finding for the resonance curve and phase curve to harmony wave external force and clarifying a frequency response characteristic, vibration is described when two or more vibration systems are interacting mutually.
The traverse wave which spreads the string	1	A one-dimensional wave equation is drawn taking the case of a string, and the character of a wave is stated.
Analytic Mechinics	2	The analytic mechanics which is needed when you understand the mathematical principle of a wave motion phenomena is described, and the solution by the Lagrange equation of an oscillating phenomenon is described.
Elastic Waves	2	About the wave motion which spreads an elastic body, from the equation of motion of an elastic body, a wave equation is drawn and existence of a longitudinal wave and a traverse wave is described. Furthermore, the distributed phenomenon is described about a surface wave.
Electromagnetic Waves	2	From Maxwell's equation, the wave equation with which an electromagnetism phenomenon follows is drawn, and the solution is described.
Diffraction Phnonena	2	The diffraction phenomena of a wave are described using Kirchhoff's integration theorem.
Numerical Simulation of Wave Phenomena	1	The fundamentals of numerical methods are introduced to simulate wave phenomena.
Check of Progress	1	Furthermore, the degree of study achievement is checked about whether an understanding of the wave phenomenon progressed through this whole lecture.

【Textbook】
【Textbook(supplemental)】有山正孝「振動・波動」裳華房
Walter Fox Smith, Waves and Oscillations, Oxford University Press
【Prerequisite(s)】Vector Analysis, Classical Dynamics, Electromagnetics
【】
【Web Sites】
【Additional Information】Depending on the annual schedule in the academic calendar and of the lecturer, there could be cancellation and supplementary lectures in the semester. Modeled answers will be distributed as a feedback material within the best delay after the final exam.

32100

Numerical Methods for Engineering and Exercises

数値計算法及び演習

【Code】32100 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・1-2

【Location】W4・Engineering Science Depts Bldg. , The 1st seminar room 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture・Exercises 【Language】Japanese 【Instructor】T.Ishida,H.Takuda,T.Hama,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	3	
	2	
	3	
	4	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31560

Thermo-Fluid Engineering

熱流体工学

【Code】31560 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・2

【Location】Research Bldg. No.8,Kogishitsu4【Credits】2【Restriction】No Restriction 【Lecture Form(s)】Lecture

【Language】Japanese 【Instructor】H.Takuda,H.Fujimoto,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3-4	
	4	
	4	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30770

Separation Technology

分離工学

【Code】30770 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Thursday・2

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】H.Kusuda,,E.Kusaka,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	3	
	2	
	3	
	1	
	1	
	1	
	1	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30760

Measurement Systems

工業計測

【Code】30760 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・1

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】K. Tsukada,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Configulations and Characteristics of Measurement Systems	2	
Physics on Transducers	2	
Measurement of Fundamental Physical Quantities	4	
Transformation and Recording of Signals	2	
Statictical Processing of Data	2	
Modern Instrumentation	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】http://www.kumst.kyoto-u.ac.jp/kougi/instrm/

【Additional Information】

31570

Materials testing for mineral science and technology

資源工学材料実験

【Code】31570 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・3-4

【Location】Faculty of Engineering Integrated Research Bldg.,102 【Credits】1 【Restriction】

【Lecture Form(s)】Experiment・Practice 【Language】Japanese

【Instructor】Prof. Mabuchi, Associate Prof.Nara, Associate Prof. Hakamada, Associate Prof. Hama, Assistant Prof. Chen, Assistant Prof. Naoi

【Course Description】Fundamental experiments and microscopic observation of rock and metal materials are conducted. Through the experiments and microscopic observation, students can learn how to measure mechanical properties of these materials and how to use the equipments to carry out the experiments and observation.

【Grading】Students are divided into several groups. Every student is asked to conduct the experiments and microscopic observation with group members and to make an experimental report individually for every theme. Grading is made by the attitudes to the experiments and the grade points of every experimental report. The grading weights of them are even.

【Course Goals】The goal of this course is to master the evaluation method of mechanical properties for both rock and metal materials and the mineralogical observation method and the metallographic observation method.

【Course Topics】

Theme	Class number of times	Description
Orientation	1	The course goals, schedule of this class, and various attention for safety are presented.
Material testing and failure criterion of rock	4.5	Overview of the rock material testing, the method to obtain Young's modulus, Poisson's ratio, uniaxial compressive strength, and tensile strength are explained. First, in this theme, rock specimen is prepared. Second, uniaxial compression test is conducted. During the uniaxial compression test, strain measurement using strain gauges is performed, and the uniaxial compressive strength, Young's modulus and Poisson's ratio are determined. Third, Brazilian test is conducted and the tensile strength is determined. Finally, the failure criterion of the specimen is determined.
Tensile test and mechanical properties of sheet metals	4.5	Overview of the testing for sheet metals is explained. A uniaxial tensile test of steel and aluminum alloy sheets is conducted, and then the stress-strain curves and the mechanical properties are evaluated.
Metallographic observation and petrographic observation	4.5	The metallographic observation for metal specimens and the petrographic observation for rock specimens are conducted. At the first step, observation procedures including how to use a microscope are explained. In the metallographic observation, every group makes a specimen and observes the metal crystal. In the petrographic observation, every student observes the thin sections of rocks using a petrographic microscope and learns how to identify minerals and rocks on thin sections.

【Textbook】This course does not specify a textbook. Lecture documents may be deribered from teachers in each experimental theme.

【Textbook(supplemental)】Not specified

【Prerequisite(s)】It is desirable that students take the "Experimental Basics in Earth Resources and Energy Science, Laboratory" offered in the previous semester. It is also desirable to take "Materials and Plasticity", "Rock Engineering", and "Geological and Geophysical Survey, Field Excavation" of the Undergraduate Course Program of Earth Resources and Energy Engineering that are offered in the same semester.

【】

【Web Sites】This course does not have a web site.

【Additional Information】It is desirable that all students belonging to the Undergraduate Course Program of Earth Resources and Energy Engineering take this course. Additional information is presented in the first class.

31800

Materials and Plasticity

材料と塑性

【Code】31800 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・2

【Location】Faculty of Engineering Integrated Research Bldg.,102 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】H.Takuda,M.Mabuchi,T.Hama,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	3	
	3	
	4	
	3	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31400

Atmospheric and Global Environmental Engineering

大気・地球環境工学

【Code】31400 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday･1 【Location】Kyotsu3
【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Associate Professor, Shinichiro Fujimori

【Course Description】The history of global environmental issues are lectured with a special focus on climate change, 地球環境問 ozone depletion and acid rain. Moreover, the energy consumption and its environmental relationship would be discussed. The governmental and international organization roles are also presented. Finally the air pollution, its mechanism, health impact and abatement technologies are lectured.

【Grading】There to be writing test every class and final exam are evaluated as well.

【Course Goals】To understand the systematic knowledge about global environment and air pollution problem

【Course Topics】

Theme	Class number of times	Description
Global environmental change	1	Structural change in society and environmental problem changes are discussed. History of global environment and current situation are explained. The sustainable development and environmental efficiency, environmental capacities follow.
Climate change	4	Why climate change happens, greenhouse gas emissions, their reaction in the environment, climate change perspective and impacts are explained. Finally, climate change mitigations are presented.
Ozone layer protection and acd rain	1	Ozone depletion history, the source substance, ozone layer distribution, ultraviolet effect on health, international ozone layer protection, Montreal protocol effectiveness and Japanese countermeasures are explained. Acid rain mechanism, its ecosystem effect, and the mitigation measures for acid rains are presented.
Energy and environment	2	Environmental load associated with energy consumption, indoor pollution, urban air pollutions caused by energy consumption and intervention to the material cycle induced by energy consumptions are lectured.
Global environmental protection	1	International activities for global environmental issues, and Japanese policy as well as private sector ’s role are explained.
Air pollution	1	Global and Japanese air pollution history is introduced. Then, industrial development and its relationship with air pollutions are discussed.
Air pollutants and health impact	1	Individual air pollution species and its chemical characteristics, as well as health impacts are lectured.
Air pollution law and abatement technology	1	Environmental standard and emissions regulations for air pollutions are explained. Also, abatement technologies are presented
Air pollution mechanism	1	Diffusion of pollution, reaction, and deposition are discussed with from the physical chemistry phenomena. Stability of air and air quality model is also explained
Air pollution simulation	1	Emissions source data, meteorological data, and air chemical transport model simulations are lectured.
Confirmation of understanding	1	Confirm the understanding

【Textbook】Distribute handout copy

【Textbook(supplemental)】3R・低炭素社会検定実行委員会編 :3R・低炭素社会検定公式テキスト（ミネルバ書房） 公害防止の技術と法規編集委員会：新・公害防止の技術と法規（大気編）（産業環境管理協会）

【Prerequisite(s)】none

【】non

【Web Sites】

【Additional Information】Explain in the first lecture

30530

Water Quality

水質学

【Code】30530 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・2

【Location】Kyotsu3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】S.Fujii,S.Tanaka,F.Nishimura,H.Harada,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	2	
	4	
	4	
	3	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30590

Environmental Plant Engineering

環境装置工学

【Code】30590 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday・2

【Location】Kyotsu3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises

【Language】Japanese 【Instructor】Masaki Takaoka, Kazuyuki Oshita,Takashi Fujimori,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Introduction	1	
	2	
	2	
	2	
	1	
	2	
	2	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30570

Radiological Health Engineering

放射線衛生工学

【Code】30570 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・2

【Location】W3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】M.Yoneda,Y.Shimada,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	3	
	2	
	2	
	2	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31410

Environmental Engineering, Laboratory I

環境工学実験 1

【Code】31410 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday・3-5

【Location】W2 【Credits】3 【Restriction】No Restriction 【Lecture Form(s)】Experiment 【Language】Japanese

【Instructor】S.Fujii,S.Tanaka,F.Nishimura,T.Hidaka,N.Nakata,H.Harada,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	5	
	6	
	2	
	2	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30540

Water Supply Engineering

上水道工学

【Code】30540 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・2

【Location】Kyotsu3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】S. Itoh,K. Kosaka,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	1	
	1	
	4	
	2	
	4	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30550

Sewerage System Engineering

下水道工学

【Code】30550 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・1

【Location】Kyotsu 3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Faculty of Engineering Prof. Hiroaki TANAKA, Assoc. Prof. Fumitake NISHIMURA, Lecturer Taira HIDAKA

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	3	
	2	
	5	
	2	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

30580

Solid Waste Management

廃棄物工学

【Code】30580 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・3

【Location】Kyotsu1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】S.Sakai,Y.Hirai,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	5	
	2	
	1	
	2	
	2	
	2	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31540

Environmental Engineering , LaboratoryII

環境工学実験 2

【Code】31540 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・3-5

【Location】Kyotsu2・Research Bldg. No.4,First floor of the basement ,Laboratory 【Credits】3 【Restriction】

【Lecture Form(s)】Practice 【Language】Japanese

【Instructor】

M.Takaoka,M.Yoneda,K.Oshita,T.Kameda,Y.Shimada,Y.Matsui,T.Kusakabe,R.Gomi,T.Fujimori,K.Yamamoto,M.Ikegami,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	2	
	2	
	2	
	6	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

35150

Continuum Mechanics

Continuum Mechanics

【Code】35150 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday･5 【Location】kyotsu4 【Credits】2 【Restriction】This class is intended mainly for students of the International Course. 【Lecture Form(s)】Lecture 【Language】English 【Instructor】Hosoda, T., Higo, Y. and Pipatpongsa, T.

【Course Description】Continuum Mechanics is a branch of the physical sciences concerned with the deformations and motions of continuous media under the influence of external effects. The following basic items are explained with exercises such as fundamentals of tensor analysis, Mathematical formulation of stress, strain, motion and displacement, Conservation laws of continuous media (mass, momentum, angular momentum, energy conservation laws), constitutive laws of solids and fluids, principle of virtual work and minimum potential energy based on the calculus of variations and applications in elasticity, stress distribution, wave propagation and fluid dynamics.

【Grading】Mainly regular examination. Assignments are also considered to some extent.

【Course Goals】Based on the clear understanding of the mathematical formulation on deformation, stress and constitutive laws, students are required to understand the derivation of the equation of motion, conservation laws of angular momentum and energy. Principle of energy, variational method and initial-boundary-value problems are appended for enhancing understanding through theoretical applications

【Course Topics】

Theme	Class number of times	Description
Elementary knowledge on tensor analysis	2	Definition of tensors, Integral theorem, Material derivative over a material volume, Transformation of components of tensors, etc.
Stress, strain and strain rate tensors	2	Definition of stress, strain and strain rate tensors, Transformation of components of these tensor variables, Invariants under coordinates transformation, Compatibility condition of strain, etc.
Mathematical formulation of conservation laws	2	Mathematical expression of conservation laws of continuous media (mass, momentum, angular momentum, energy)
Constitutive law of solids and fluids	2	Constitutive laws of elastic & visco-elastic body and Newton fluids
Principle of energy, variational method and initial-boundary-value problems	2	Principle of virtual work and minimum potential energy based on the calculus of variations as well as initial-boundary-value problems
Applications in elasticity and fluid dynamics	4	Applications in Elasticity and Fluid Dynamics. Stress distribution and Wave propagation in elastic body, Thermal convection and Lorentz Chaos, etc.
Class feedback	1	Achievement confirmation

【Textbook】Printed materials on the contents of this subject are distributed

【Textbook(supplemental)】P. Chadwick, "Continuum Mechanics: Concise Theory and Problems", Dover Publications

A.J.M. Spencer, "Continuum Mchanics", Dover Publications

G.E. Mase, "Schaum's Outline of Continuum Mechanics", McGraw-Hill

【Prerequisite(s)】Basic understanding on differential and integral calculus, linear algebra and matrix analysis

【】

【Web Sites】

【Additional Information】Students can contact with

Prof. Hosoda by e-mail: hosoda.takashi.4w@kyoto-u.ac.jp or office at Katsura C1-265

Assoc. Prof. Higo by e-mail: higo.yohsuke.5z@kyoto-u.ac.jp or office at Katsura C1-211

Assoc. Prof. Thirapong by e-mail: pipatpongsa.thirapong.4s@kyoto-u.ac.jp or office at Katsura C1-236

Engineering Mathematics B2

Engineering Mathematics B2

【Code】35220 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Friday・1

【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Schmcker,

【Course Description】This course deals with Fourier analysis and with the solution of partial differential equations as its application. It discusses Fourier series for periodic functions and its relation to integrable non-periodic functions. Once the student gets familiar with its characteristics, the course aims to develop the ability to apply Fourier analysis to various engineering problems. The lecture emphasises the relationship between the numerical analysis and today’s applications.

【Grading】Participation, assignment and 2 tests (mid and end)

【Course Goals】To get students acquainted with an understanding of Fourier series analysis and its basic concepts. Further, to get students familiar with the various types of partial differential equations and their applications.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	What is Fourier Analysis? How to apply it? Clarify the necessary background knowledge.
Fourier series	4	A periodic function which is expanded into an infinite series of trigonometric functions is called a Fourier series. Convergence behaviour and series properties are discussed with specific example calculations.
Fourier transform	5	Fourier analysis of non-periodic function leads to the Fourier transform. The first class of functions is the actual Fourier integral. The lecture discusses how it represents the non-periodic functions and shows the various properties of the Fourier transform. Students ability to use the Fourier transform is improved through examples. The relationship to the Laplace transform is further discussed.
Application to Partial Differential Equations	4	In the last part of this course well known partial differential equations (Laplace equation, wave equation, heat equation, etc.) are discussed. The application of Fourier series and Fourier transform is discussed to obtain specific solutions to boundary value.
Numerical Fourier analysis	1	Fast Fourier transform (FFT) is a basic Fourier transform algorithm. In this lecture it is explained and a software illustration provided.

【Textbook】None.

【Textbook(supplemental)】Pinkus, A. and Zafrany,S.: Fourier Series and Integral Transforms, Cambridge University Press.
Further material is introduced during classes.

【Prerequisite(s)】Calculus, Linear Algebra, Engineering Mathematics B1.

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【Web Sites】None

【Additional Information】

35140

Structural Mechanics II and Exercises

Structural Mechanics II and Exercises

【Code】35140 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday･4-5 【Location】Kyotsu2 【Credits】3 【Restriction】 【Lecture Form(s)】Lecture・Exercises 【Language】English 【Instructor】H. Shirato,

【Course Description】Fundamentals of structural analysis based on energy principle.

Principle of virtual work and some energy principles for structural analysis.

Approaches for study of statically indeterminate structures.

Fundamentals of elastic stability.

Fundamentals of structural analysis by matrix methods.

【Grading】Grade is given based on the final examination, mid-term examination and reports.

【Course Goals】To solve structures such as truss and beam by the principle of virtual work/energy principles

To solve statically indeterminate structures by force method and displacement method

To understand the stability of equilibrium

To get the stiffness matrix of simple trusses

【Course Topics】

Theme	Class number of times	Description
Work, energy and virtual work	13	Introduction Work, virtual work and energy Castigliano’s theorems and principle of minimum potential energy Virtual work and complementary virtual work Principle of virtual work (virtual displacement) Principle of complementary virtual work(virtual force) Reciprocal theorems
Static determinate and indeterminate	1	Degree of freedom and degree of indeterminacy
Solutions to statically indeterminate structures	6	Introduction of force method and displacement method By equations of elasticity By displacement method
Structural stability	3	Stability criteria Deformation of rigid body-elastic spring system Deformation of elastic beam-column system
Basis of matrix method of structural analysis	4	Matrix adapted to equilibrium equations/displacement conditions Analysis of plane truss
Structral analysis engineer's ethics	1	Examples on structural analysis engineer's ethics related to safety of structure analyses such as application scope, precision of analysis and reliability of structural analysis
Confirmation of the attainment level of learning	2	Confirm the attainment level of learning

【Textbook】To be informed by the lecturer in charge in his/her first lecture

【Textbook(supplemental)】M. Matsumoto, E. Watanabe, H. Shirato, K. Sugiura, A. Igarashi, T. Utsunomiya, Y. Takahashi: Structure mechanics Ⅱ, Maruzen Ltd. (in Japanese)

【Prerequisite(s)】Calculus A and B, Linear Algebra A and B, Structure mechanics Ⅰ and Exercises

【】

【Web Sites】

【Additional Information】Office hour (contact information and consultation hours) of the lecturer(s)will be given in his/her first lecture.

35130

Construction Materials

Construction Materials

【Code】35130 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday･2 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English 【Instructor】An Lin,

【Course Description】Knowledge and techniques to use construction materials, especially on concrete material, are introduced on micro-, meso- until macro-scale.

【Grading】Reports and Final examination.

【Course Goals】The students are expected to understand the microstructure, properties, production and testing methods of concrete, steel, composite materials etc employed in civil engineering

【Course Topics】

Theme	Class number of times	Description
introduction	1	Classification of materials, history of construction materials, ethics for civil engineers and current topics
crystal structure	1	Bond between atoms, ideal strength, dislocation, yield, and mechanical properties are introduced
Metallic material	1	Mechanical properties of metals, steel, phase diagrams, Dislocations and metallic new materials
Corrosion & protection	1	durability, corrosion, deterioration mechanism, carbonation, chloride induced corrosion and corrosion protection
Cement	1	Types of cements, chemical composition, chemical compound, hydration, hydration heat and blended cement
admixtures	1	Chemical admixture, water-reducing admixture, air-entraining admixture, mineral admixture, pozzolanic reaction, latent hydraulic property and high-range admixture are introduced.
aggregate	1	Moisture condition, Chloride ion, Total chloride ion content, alkali-silica reaction and total alkali content
fresh concrete	1	Workability, rheology, consistency, segregation and mix design
hardened concrete	1	water cement ratio, compressive strength, flexural strength, tensile strength, durability and testing methods
mechanical properties of concrete	1	Interfacial transition zone in concrete,strength-porosity relationship,Behavior of concrete under various stress states,Dimensional Stability,
Non-destructive testing method	1	Surface hardness, ultrasonic pulse, thermography, half cell potential and polarization resistance
Special concrete	1	Fiber reinforced concrete, flowing concrete, MDF cement and mineral new materials
Polymer material	1	Resin, rubber, fiber, polymer concrete and organic new materials
review	1	review mainly on concrete and steel
achievement assesment	1	The achievement assessment is intended to measure students' knowledge, skill and aptitude on the subject using quiz.

【Textbook】P.Kumar Mehta, Paulo J.M.Monteiro:Concrete microstructure, properties and materials, McGraw-Hill,2006
William D. Callister, Jr. David G. Rethwisch:Materials science and engineering an Introduction, John Wiley & Sons, Inc.,2014

【Textbook(supplemental)】宮川豊章、六郷恵哲共編：『土木材料学』、朝倉書店

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

35120

Dynamics of Soil and Structures

Dynamics of Soil and Structures

【Code】35120 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Monday･1 【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English 【Instructor】J.Kiyono, A. Furukawa

【Course Description】This course deals with fundamentals and application of vibration theory and elastic wave propagation in civil engineering.

【Grading】Based on the performance during the course (including homework) and the results of a final examination.

【Course Goals】At the end of this course, students will be required to have a good understanding of:

- Vibration phenomena, response to dynamic loads, fundamental principle of vibration measurement, including manipulation of mathematical manipulation and calculation.
- Treatment of vibration problems for multi-degree-of-freedom systems and elastic media.
- Fundamental properties of elastic waves that propagate in elastic media and layers.

【Course Topics】

Theme	Class number of times	Description
Vibration of structures and equation of motion	1	Vibration phenomena encountered in civil engineering structures. Importance and engineering issues of vibration. Derivation of equation of motion.
Free vibration	1	Definition of the natural period and damping ratio for single degree-of-freedom systems. Derivation of free vibration response.
Forced vibration	2	Resonance curves and phase response curves for forced harmonic vibration. Frequency response characteristics.
Principle of vibration measurement	1	Background theory of vibration measurement. Accelerometers and seismometers.
Response to arbitrary input	2	Evaluation of dynamic response to arbitrary forcing and earthquake excitation. Response spectra.
Vibration of 2-DOF systems	2	Solution of equations of motions for 2-degree-of-freedom systems representing free vibration. Concept of normal vibration modes.
Natural frequencies and natural modes of vibration	1	Relationship between the natural frequencies, normal vibration modes of multi-degree-of-freedom systems and eigenvalue analysis.
Damped free vibration of MDOF systems	1	Vibration of multi-degree-of-freedom systems with damping. Analysis of MDOF systems using damping using normal vibration modes.
Forced vibration and response to arbitrary input for MDOF systems	1	Modal analysis to evaluate the dyanmic response of multi-degree-of-freedom systems for harmonic and arbitrary excitation.
Elastic wave	2	Properties of elastic waves travelling in elastic media and elastic layers. Fundamental concept in deriving solutions of elastic wave propagation problems.
Achievement evaluation	1	Students' achievements in understanding of the course material are evaluated.

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

【Textbook(supplemental)】

【Prerequisite(s)】Calculus, Linear Algebra, Structural Mechanics I and Exercises (35110), Structural Mechanics II and Exercises (35140).

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【Web Sites】

【Additional Information】Office hours are not specified; Questions to instructors are accepted by appointment.

35170

Fundamentals of Hydrology

Fundamentals of Hydrology

【Code】35170 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3 【Location】kyotsu4
【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English
【Instructor】Y. Tachikawa,Y. Ichikawa,T. Sayama,K. Yorozu,
【Course Description】The fundamental concept of hydrology is the hydrological cycle, which is various scale physical processes of water movements in the atmosphere, land surfaces, and oceans. Solar energy and gravity forces play major roles for the hydrological cycle. Solar energy drives the dynamic processes of water vapor formation from oceans and land surfaces, and transport of vapor in the atmosphere. The vapor changes to liquid and fall on the land surfaces as precipitation, then the flow of water on and under the land surfaces are driven by gravity. Hydrology is the study of the movement of water on and under the land surface and its applications to mitigate water-related disasters, develop water resources and preserve the environment. In the class, basic hydrological processes such as solar radiation, precipitation, evapotranspiration, infiltration, surface and subsurface flow, and river flow are described.
【Grading】The score is evaluated comprehensively with quiz, reports and the final examination.
【Course Goals】The aim of the course is to understand the basic hydrological processes to obtain the knowledge for analyzing hydrological phenomenon and the engineering background for water resources development.
【Course Topics】

Theme	Class number of times	Description
The hydrologic cycle	1	The contents of the class is overviewed and the concept of the hydrological cycle is provided. The role of hydrology in the field of civil engineering is described.
Precipitation	1	The mechanism of precipitation is described. A numerical rainfall prediction model and the mechanism of radar rainfall observation are described.
Interception and infiltration	1	The process of precipitation interception by trees is introduced. Then the governing equation of unsaturated flow and the basic equations of potential infiltration are explained.
Groundwater flow	1	The mechanism of rainfall-runoff in mountainous slope The mechanism of groundwater is explained. The physical equation to represent groundwater flow is derived from the continuity and momentum equations of water flow.
Surface runoff	3	The mechanism of rainfall-runoff in mountainous slope is explained. The kinematic wave equation is derived from the momentum equation of water flow, and then the analytical solutions of the kinematic wave model are provided. Rainfall-runoff modeling using the kinematic wave equation is explained.
Solar radiation and energy balance	1	Energy and water cycle driven by solar radiation is described. Basic mechanism of global warming ant its influence on hydrologic cycle is introduced.
Evaporaion and transpiration	3	The mechanism of water and energy cycle through evapotranspiration is described. Energy balance at land surface and the wind of boundary layer is introduced. Then, methods to measure the evapotranspiration is described.
Flood routing	1	The mechanism of flood routing is explained. Numerical representation method to represent channel network structure is introduced, then typical flow routing methods are described.
Hydrological model	1	A physically-based hydrological model which consists of various hydrological processes is described. Typical lumped hydrological models are also introduced.
Society and hydrology	1	How the hydrological sciences are related to the society is described through various examples.
Achievement confirmation	1	Quiz, report and the final examination is conducted to measure students' knowledge, skill and aptitude on the subject.

【Textbook】An English text book is provided, which is compiled based of the text books used in Japanese hydrology class.
【Textbook(supplemental)】
【Prerequisite(s)】It is desiarable to study Hydraulics (2nd year) and probability and statistical analysis (2nd year).
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【Web Sites】
【Additional Information】

35160

Hydraulics and Hydrodynamics

Hydraulics and Hydrodynamics

【Code】35160 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・2

【Location】Kyotsu2 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】K. Toda,E. Nakakita,M. Sanjo,K. Yamaguchi,

【Course Description】Lecture of fundamental theories of fluid dynamics and applications to hydraulic engineerging Basic equations, potential flow theory, boundary layer theory and turbulent flow Introduction of basic modelings about fluid motion and heat transfer in atmosphere related to hydrology and meteorology

【Grading】Attendance, reports and final examination

【Course Goals】Learning elementary knowledge of hydraulics and important topics of hydrodynamics science

【Course Topics】

Theme	Class number of times	Description
Open channel flow (1)	1	Basic equations of non-uniform flow, longitudinal profile
Open channel flow (2)	1	Non-uniform flow computation
Unsteady pipe flow	1	Basic equations of unsteady pipe flow, application to water hummer phenomenon and surge tank
Unsteady open-channel flow	1	Basic equations of unsteady open-channel flow, theories of flood flow and hydraulic bore
Introduction of fluid dynamics (1)	1	Boundary theory and application to hydraulic engineering
Introduction of fluid dynamics (2)	1	Primer of turbulence theory and application to hydraulic engineering
pplied hydraulics (1)	1	Seepage flow and its analysis
Applied hydraulics (2)	1	Fundamentals of sediment transport
Applied hydraulics (3)	1	Sediment related topics of rivers
Hydrometeorology (1)	1	Introduction to hydrometeorology
Hydrometeorology (2)	1	Thermodynamics of atmosphere, Dry-adiabatic process
Hydrometeorology (3)	1	Vertical stability of atmosphere for infinitesimal displacement
Hydrometeorology (4)	1	Moisture in atmosphere, Moist-adiabatic process
Hydrometeorology (5)	1	Latent instability, Land surface process of atmosphere
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

35230

Experiments on Hydraulics

Experiments on Hydraulics

【Code】35230 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday･3-4 【Location】kyotsu2 【Credits】2 【Restriction】 【Lecture Form(s)】Practice 【Language】English

【Instructor】H. Gotoh,Y. Tachikawa,K. Toda,T. Hosoda,Y. Ichikawa,S. Onda,Khayyer Abbas,M. Sanjou,E. Harada,K. Kawaike,T. Sayama,H. Takebayashi,N. Mori,K. Yamaguchi,N. Yoneyama,H. Ikari,T. Okamoto,T. Tanaka,K. Yorozu,D. Toriu,D. Nohara,H. Mizutani

【Course Description】Guidance of laboratory experiments in hydraulics and measurement instruments. Eight experiments are conducted about pipe flow, open-channel flow, waves, flow in porous media, density flow, hydrodynamic force, sediment transport

【Grading】Attendance : 40 points Reports and homework : 60 points total : 100 points

【Course Goals】Understanding hydraylic phenomena through various flows observed in the hydraulic laboratory

【Course Topics】

Theme	Class number of times	Description
Guidance	1	Guidance of hydraulics laboratory and course goals
Instruments in hydraulics laboratory	1	Introduction of measurement instrumentsMethods and principles of hydraulic experiments
Experiments 1 - 4	8	Rotation for eight experiments A to H as mentioned below
Rotation for eight experiments A to H as mentioned below	4	Guide for writing reports
A)Transition from lamiar to turbulent flows, friction law in pipe flows	(1)	Observation of dye patterns in lamiar and turbulent flows in pipesUnderstanding Hagen-Poiseuille flow and Prandtl-Karman flow
B)Velocity and free-surface profiles in open-channel flows	(1)	Measurements of free-surface and velocity profilesComparison measured results with theories
C)Hydraulic jump in horizontal bed	(1)	Understanding hydraulic jump Comparison measured free-surface variations with theories
D)Transmission and deformation behaviors of waves	(1)	Measurements of wave deformations, wave height and orbits of water particlesComparison measured data with small amplitude wave theory and breaking-wave formula
E)Flow in porous media and underground water	(1)	Measurements steady flows in porous media by using pipenet model and Hele-Shaw model
F)Density flow	(1)	Measurement and understanding transport mechanisms in density flowsEvaluations of front speed and related friction laws
G)Hydraulic force on cylinder	(1)	Measurements of pressure distributions on cylinder surface in open-channel flows Observation of Karman vortex behind cylinder
H)Sediment transport	(1)	Measurements and observations of bed load in open-channel flows. Comparison with theories and formulae
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】Hydraulics and Exercises

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【Web Sites】

【Additional Information】

35390

Coastal Engineering

Coastal Engineering

【Code】35390 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Tuesday・4
【Location】Kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English
【Instructor】H. Gotoh,Khayyer Abbas,E. Harada,H. Ikari,

【Course Description】Fundamental items related to coastal engineering (i.e., coastal process, sediment transport, near shore current, shoaling, irregular wave, tsunami, storm surge, tidal wave, wave force)are to be lectured. Especially, sediment transport controlling physical environment significantly around coastal area is to be explained systematically together with river sediment transport.

【Grading】Based on the results of examinations

【Course Goals】Our goal is systematic understanding of fundamental hydraulic phenomena around coastal zone which is indispensable for designing coastal environment.

【Course Topics】

Theme	Class number of times	Description
Introduction to Coastal Engineering	1	Introduction to coastal engineering with focusing on beach deformation
Small Amplitude wave theory	2	Characteristics of small amplitude wave theory and its application are explained.
Wave Statistics / Wave Transformation	2	Developing process of wind wave and expression method of irregular waves are explained. Mechanics of wave transformation is outlined.
Wave Force on Coastal Structures	1	Several experimental formulae of wave force acting on coastal structures are introduced. Problems for stability of rubble mound is mentioned.
Design of Coastal Structures (Exercise)	1	Exercise of design of coastal structures.
Introduction to Computational Design of Coastal Structures	1	State-of-the-art numerical wave flume and its applications are explained.
Sediment Hydraulics	4	Sediment hydraulics (i.e., basic characteristics, calculation of river-bed, bed load and suspended load, non-equilibrium sediment transport) is explained.
Nearshore Current / Coastal Sediment Transport	1	Near-shore current due to wave deformation and resultant coastal sediment transport are outlined.
Tsunami and Storm Surge: Evacuation Planning under Coastal Disasters	1	Characteristics of tsunami and storm surge are explained. Additionally, evacuation process and evacuation planning are introduced.
Achievement confirmation	1	Comprehension check of course contents.

【Textbook】Handout is used in the lectures as needed.

【Textbook(supplemental)】Supplemental textbook is announced in the first lecture.

【Prerequisite(s)】It is desirable to study Hydraulics and Exercises.

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【Web Sites】Non

【Additional Information】How to get in touch with instructors is announced in the first lecture.

35190

Soil Mechanics II and Exercises

Soil Mechanics II and Exercises

【Code】35190 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday･1-2 【Location】kyotsu4
【Credits】3 【Restriction】This class is intended mainly for students of the International Course. 【Lecture Form(s)】Lecture･Exercises
【Language】English 【Instructor】M. Kimura, M.Mimura, R.Uzuoka, Y. Higo, T. Pipatpongsa, G. Flores,
【Course Description】Students are expected to learn consolidation and stress distribution in soils, shear strength of soils, lateral earth pressures, bearing capacity of shallow and deep foundations, slope stability, and soil dynamics. Fundamental analyses and design criteria of various geotechnical engineering problems are drilled through exercises.
【Grading】Final Exam (70%), Midterm exams and classworks (30%)
【Course Goals】The course objective is to provide understanding of key engineering concepts and mechanical behaviors of soil materials including consolidation and soil improvement, load transmission in elastic medium, effect of excessive pore water pressure to shear strength, effective stress paths interpreted from conventional triaxial tests, lateral earth pressure acting on retaining walls, bearing capacity of foundations, stability of slopes and excavations, soil liquefaction, and dynamic characteristics of soils subjected to earthquake.
【Course Topics】

Theme	Class number of times	Description
Consolidaton	2	Understand Terzaghi's theory of consolidation, laboratory consolidation test, field consolidation curve, normally consolidated condition and over consolidated condition, and problems on final and time rate of consolidation.
Stresses in ground	1	Understand stresses in the ground due to loading, soil strength and pressure distribution below foundation.
Shear strength	2	Understand measurement of shear strength and triaxial compression tests, strength parameters, drained and undrained behavior of clay and sand, and stress path for conventional triaxial test.
Earth pressure	2	Understand the lateral earth pressure in active and passive states, Rankine's theory in cohesive and cohesionless soil, Coloumb's wedge theory with condition for critical failure plane, earth pressure on retaining walls of simple configurations.
Midterm exam	0.5	
Bearing capacity	1.5	Understand the definition of bearing capacity, ultimate bearing capacity, net ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure, and derivation of Terzaghi's general bearing capacity equation for continuous footing and basic numerical problems associated with it.
Slope stability	2	Understand the failure mechanisms of both infinite and finite slopes and methods of slope stability analysis.
Soil dynamics and liquefaction	2	Understand the nature of dynamic loads, mchanism of liquefaction and liquefaction parameters, and stress conditions on soil element under earthquake loading.
Practice	1	Problem solving in geotechnical engineering
Class feedback	1	Confirmation of understanding

【Textbook】Soil Mechanics I & II Tutorial Exercises and Soil Mechanics Laboratory Manual
Exercise book and distributed handouts
【Textbook(supplemental)】Braja M. Das, “ Fundamentals of Geotechnical Engineering ”, Cengage Learning
Muni Budhu, “ Soil Mechanics and Foundations ”, John Wiley & Sons, INC.
Isao Ishibashi, Hemanta Hazarika, “ Soil Mechanics Fundamentals ”, CRC Press
Fusao Oka, “ Soil Mechanics Exercises ”, Morikita publishing Co., Ltd.
【Prerequisite(s)】A required prerequisite is knowledge of soil mechanics. Soil mechanics I and Exercises(35080) would be helpful as a prerequisite.
【】
【Web Sites】http://geomechanics.kuciv.kyoto-u.ac.jp/lecture/text/kakomon.html
【Additional Information】Flores (flores.giancarlo.3v@kyoto-u.ac.jp)
Pipatpongsa (pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

35200

Experiments on Soil Mechanics and Exercises

Experiments on Soil Mechanics and Exercises

【Code】35200 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Wednesday・3-4
【Location】kyotsu4・Engineering Science Depts Bldg. The 1st seminar room 【Credits】2 【Restriction】
【Lecture Form(s)】Practice・Exercises 【Language】English
【Instructor】K. Kishida,M. Mimura,T. Inui,S. Kimoto,Y. Higo,H. Gotoh,T. Kitaoka,M. Sawada,Y. Sawamura,A. Takai,K. Ueda,
【Course Description】The purpose of this course is to teach students how to conduct laboratory experiments and in-situ tests in order to obtain engineering properties and mechanical parameters of soils which were studied in the soil mechanics courses.
【Grading】Students are expected to conduct all experiments. Full attendance to laboratories and submission of all reports are compulsory.
【Course Goals】To help students deepen their understanding on concepts of soil mechanics and to develop their skills and experiences in fundamental experiments as well as collecting, analyzing and interpreting experimental data.
【Course Topics】

Theme	Class number of times	Description
Introduction and orientation	1	
Physical properties of soils	1	Soil structure, engineering classification of soils, consistency Limits, grain size distribution
Compaction test	1	Laboratory compaction tests, factors affecting compaction
Hydraulic conductivity test and particle size distribution test	2	Permeability and seepage, Darcy's law, Hydraulic gradient, determination of hydraulic conductivity, flow net analysis, Sieve analysis for determining the particle size distribution curve
Consolidation test	1	Fundamentals of consolidation, laboratory tests, settlement-time relationship
Uniaxial compression test	1	Stress-strain and strength behavior of clays
Direct shear test	1	Mohr-Coulomb failure criterion, laboratory tests for shear strength determination
Sounding methods	0.5	N-values of standard penetration test and elastic wave exploration
Centrifuge model test	0.5	Experiments using the similitude law of centrifuge test
Shaking table test	1	Experiments using the shaking table test on dynamic behaviors of soils and foundations
Computer exercise and numerical analysis	2	Fundamentals of math and physics for geotechnical engineering
Special lecture	1	Special lecture on soil mechanics
Exercise	1	Practical applications of laboratory testing data
Class feedback	1	Confirmation of understanding

【Textbook】Soil Mechanics I & II Tutorial Exercises and Soil Mechanics Laboratory Manual
Handouts will be distributed
【Textbook(supplemental)】Braja M. Das,“ Soil Mechanics Laboratory Manual ”, Oxford University Press
Dante Fratta et al.,“ Introduction to Soil Mechanics Laboratory Testing ”, CRC Press
土質試験 : 基本と手引き, 地盤工学会
土質試験の方法と解説, 地盤工学会
【Prerequisite(s)】Soil mechanics I and exercises. It is recommended to take soil mechanics II and exercises in parallel.
【】
【Web Sites】
【Additional Information】This class is intended mainly for students of the International Course, and will be delivered in English. You cannot join this class from middle of the semester.
Flores (flores.giancarlo.3v@kyoto-u.ac.jp)
Pipatpongsa (pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

35210

Planning and Management of Social Systems

Planning and Management of Social Systems

【Code】35210 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・2

【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Cruz Ana Maria,Qureshi Ali Gul,Schmcker Jan-Dirk,

【Course Description】This lecture series explains why and how society can be regarded as a system and described with mathematical tools. Predicting changes in a society and influencing society in a desired direction are closely related to infrastructure planning and management. Basic concepts and frameworks of typical models that are indispensable for the analysis of (social) system states and trends are introduced. Moreover the lectures cover theories in social psychology and discuss how cultural differences impact infrastructure planning.

【Grading】Joined judgement of report and end of term exam.

【Course Goals】To provide students with a complex system perspective of society and to clarify the role of infrastructure planning and management. Further, to provide understanding of some mathematical and psychological typical models for system analysis.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Problems of infrastructure planning and management, and its methodology. Abstract of systems analysis and "physics of society".
Markov models	2	Markov process. Transition probability matrix. Steady state.
Time-series predicting model	2	Serial correlation. Auto-Regressive model. AutoRegressive-Moving Average model.
Queuing theory	2	single and multiple queues, examples of various M/D/k queues
Game theory and general social dilemma situations	3	Strategic interdependency. Nash equilibrium. Typical models. Social dilemma situations and infrastructure planning.
Social psychology and planning	2	Attitudes, values and their influence on behavior and planning
Hazard Analysis	2	Examples of major accident analysis; fault trees and event trees.
Comprehension Test	1	final exam

【Textbook】None

【Textbook(supplemental)】Hillier, F.S. and Lieberman, G.J. (2015) Introduction to Operations Research. 10th Edition. McGraw Hill.
Straffin, P.D. (1993). Game Theory and Strategy. The Mathematical Association of America. New Mathematical Library.
Further useful textbooks and materials are introduded during the lectures.

【Prerequisite(s)】

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【Web Sites】

【Additional Information】Offices hours of the teachers are notified during the first class.

35240

Public Economics

Public Economics

【Code】35240 【Course Year】3rd year 【Term】1st semester in 2018 【Class day & Period】Thursday・1
【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English
【Instructor】K. Kobayashi,K. Matsushima,M. Yokomatsu,S. Segi,
【Course Description】The purpose of this lecture is to understand the basic concept of micro economics to evaluate infrastructure projects. For the sake of this purpose, the detailed concept of micro economics is explained including the function of the market, the behaviour of firms and consumers, and the methodology to evaluate the social welfare is explained. The concept of market failure and policies to conquer it are also explained. Finally, cost benefit analysis which is wildy used to evaluate the efficiency of infrastracture is explained with economical aspects of infrastructure.
【Grading】Final Exam: 70-80%, Reports during classes: 20-30%
【Course Goals】To understand the basic concept of micro economics for project evaluation of infrastructure
【Course Topics】

Theme	Class number of times	Description
Introduction	1	The outline of this course, the role of public
Consumers' behaviour	2	Consumers' behaviour model (the preference of household, utility, utility maximisation behaviour, demand function, compensated demabd function, Slutsky equation, aggregated demand fuction, welfare measures and their feature)
Exercise (1)	1	Exercise related to above three lectures
Firms' behaviour	2	Firms' behaviour (technology, production function, profit maximisation behavior, cost minimisation behaviour, cost function and supply function, market structure and firms' behaviour)
Exercise (2)	1	Exercise related to above three lectures
Perfect Comititive Market	1	Perfect competitive market, the difference between general equiribrium and partial equiribrium, Pareto effciency
Imperfect Competition	1	Monopolistic Market, Oligopoly Market
Measurement for Economic Evaluation	1	Consumers' surplus, Producers' surplus, social surplus, equivalent variation, compensating variation
Externality	1	The concept of externalities, its mechanism and variation, policy to internalise externalities
Public Goods	1	The feature of public goods, Samuelson condition
Exercise (3)	1	Exercise related to above three lectures
Cost Benefit Analysis	1	The concept of cost and benefit, social discount rate, evaluation index, cost benefit analysis and financial analysis, quantification of the benefit, the way of pjofect evaluation from the viewpoint of engineers' ethic
	1	

【Textbook】Hal R. Varian: Intermediate Microeconomics : A Modern Approach, seventh Edition, W. W. Norton & Company, 2014
【Textbook(supplemental)】
【Prerequisite(s)】Students are supposed to have earned a credit for "Systems Analysis and Exercises for Planning and Management"
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【Web Sites】
【Additional Information】

35370

Computer Programming and Experiment on Structural Mechanics

Computer Programming and Experiment on Structural Mechanics

【Code】35370 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・4-5
【Location】W2・Reseach Bldg.No.9 The 1st seminar room 【Credits】2 【Restriction】
【Lecture Form(s)】Lecture・Practice・Exercises 【Language】English
【Instructor】Y. Takahashi,T. Yagi , A. Igarashi, S. Sawada,An Lin, J. Saito , A. Furukawa , M. Matsumura , H. Goto ,Chang Kai-Chun , K.Noguchi ,R.Matsumoto,
【Course Description】Practical understanding and application of the theory that have been learned in “Structure mechanics Ⅰ and Exercises ”and “Structure mechanics Ⅱ and Exercises ”.
To learn the measurement technique on strain, deflection and vibration in experiment, and the fundamentals/application on computer programming for matrix methods for structural analysis in computational exercise which are needed for understanding the mechanical properties of member and/or structure.
【Grading】Grade is given based on attendance and reports.
【Course Goals】To understand the fundamentals of measurement of strain, deflection and vibration
To deeply understand theory of structure mechanics by beam experiment
To understand numerical analysis approach of structures by use of matrix methods
To deeply and synthetically understand mechanical behaviors and validation methods of structures by comparing the experimental results with those resulted from matrix methods
【Course Topics】

Theme	Class number of times	Description
Introduction	1	Explanation of the significance and the role of structural experiment and computer analysis Introduction of relationship among structural mechanics, structural experiment and computer analysis, and examples of practical failure structures
Experiment	6	Introducing fundamentals of experiment method and measurement technique for structure model Experiment of cantilever beam under static load and vibration, and its results and discussion Some practical application cases on techniques of experiment and analyses
Analysis	6	Structural analysis for truss, beam and frame by matrix Calculation of stiffness matrix, steps of formation of stiffness equations and the solution Explanation on a few of attention points of practical numerical approaches and analyses Exercises of computer programming
Analysis on experiment	1	To compare the experimental results with those resulted from computer programming To deeply and synthetically understand mechanical behaviors and validation methods of structures
Confirmation of the attainment level of learning	1	Confirm the attainment level of learning

【Textbook】To be distributed in lectures
【Textbook(supplemental)】
【Prerequisite(s)】Computer Programming in Global Engineering, Structure mechanics Ⅰ and Exercises, Structure mechanics Ⅱ and Exercises.
【】
【Web Sites】
【Additional Information】Office hour (contact information and consultation hours) of the individual lecturer will be given in his/her first lecture.

35360

Concrete Engineering

Concrete Engineering

【Code】35360 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・5

【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】An Lin,

【Course Description】The basic analysis theory and the design technique of reinforced concrete (RC) and prestressed concrete (PC) structure are explained.

【Grading】Grading is based on the result of final examination and reports.

【Course Goals】Students are expected to understand the mechanical behaviors of RC and PC structures members such as beams and collumns, based on the fundamentals learned in this course.

【Course Topics】

Theme	Class number of times	Description
Introduction	1	Introduction of concrete structures (RC&PC)
Fundamental of design	2	Design code and specifications
Materials	1	The mechanical behavior of concrete, reinforcing steel and others are explained
Bonding behavior	2	The mechanism of bonding between concrete and steel
Flexural behavior	2	The mechanical behavior and the capacity of RC section subjected to the flexural moment and/or the uniaxial force are explained
Shear behavior	2	The mechanical behavior and the capacity of RC section subjected to the shear are explained.
Crack and deflection	2	Cracking mechanism and evaluation of deflection of RC member are explained.
Prestressed concrete I	1	Effects of Prestressing Prestressing steel concrete for prestressed construction
Prestressed concrete II	1	Elastic flexural analysis Flexural strength
Confirmation of understanding of lecture	1	A confirmation of understanding of lecture is examined

【Textbook】Arthur H.Nilson, David Darwin and Charles W.Dolan: Design of Concrete Structures, Mc Graw Hill,2010

【Textbook(supplemental)】K. Kobayashi: Concrete Engineering, Morikita Publishing Co., Ltd., 3,240JPY
James K.Wight, James G.MacGregor: Reinforced Concrete Mechanics & Design, Pearson,2010

【Prerequisite(s)】Students of this class had better take ‘Structural Mechanics I and Exercises (30080)’ in 2nd year and ‘Construction Materials (30240)’ in 3rd year.

【】

【Web Sites】

【Additional Information】

35350

Earthquake and Wind Resistance of Structures, and Related Structural Design Principles

Earthquake and Wind Resistance of Structures, and Related Structural Design Principles

【Code】35350 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Friday・3 【Location】N3

【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】H. Shirato,K. Sugiura,Y. Takahashi,H. Gotoh,

【Course Description】To understand fundamentals of design theory for civil infrastructures. To explain various design loads, including dead load, live load, temperature load, seismic load, and wind load, limit states of structures and their evaluation, demand performance. To design structures considering reliability, optimal design, serviceability, aesthetics, and environment.

【Grading】Based on the performance during the course (including homework) and the results of a final examination.

【Course Goals】To understand fundamentals of design for civil infrastructures.
To understand fundamentals of load, limit state of structures, reliability design and optimal design.
To understand fundamentals of characteristics of natural wind, aerodynamics of structures, design wind and wind resistant design.
To understand fundamentals of earthquake mechanism and seismic response of structures, seismic load, and seismic design.

【Course Topics】

Theme	Class number of times	Description
Introduction of design theory of civil infrastructure	2	Design theory of civil infrastructures is introduced. The concept and significance of design, objective of design, characteristics of civil infrastructures, flow of design process, mechanical design, multi-level decision making are discussed. Engineering ethics are also explained.
Introduction of load	3	Design loads for civil infrastructures are introduced. The characteristics and classification of design loads are explained and their quantitative expression is discussed. Especially statistic characteristics of random loads, i.e. seismic load and wind load, are explained.
Prediction of earthquake ground motion and earthquake response of structure	2	Methods for predicting earthquake ground motion are introduced based on the theories of earthquake mechanism and ground vibration. Equation of motion for the single degree of freedom system and its solution is also explained in order to estimate earthquake response of structure. Design methods for infrastructures are interpreted on the basis of theories of elasticity and plasticity.
Characteristics of natural wind and aerodynamics of structures	2	The characteristics of natural wind and strong wind are explained and process of design wind for structures is discussed. And various aerodynamics (vortex-induced vibration, galloping, flutter, buffeting, etc.) acting on structural section with various geometric shape and their generation mechanism are explained.
Limit state of structure and reliability analysis	3	The outline of structural safety analysis is introduced for serviceability, ultimate and fatigue limit of structures. As for uncertainties in various actions to structures and the resistance of structures, the design methods such as allowable stress method, limit states method with partial safety factors will be discussed in conjunction with reliability analysis.
Seismic design, wind resistant design, optimal design, and landscape design	3	Seismic design, wind resistant design, optimal design and landscape design for various structures, including long span bridge.

【Textbook】Hand-outs are distributed when necessary.

【Textbook(supplemental)】

【Prerequisite(s)】Probabilistic and Statistical Analysis and Exercises(35050), Dynamics of Soil and Structures(35120), Structural Mechanics I and Exercises(35110), Structural Mechanics II and Exercises(35140), and Fluid Mechanics.

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【Web Sites】

【Additional Information】Office hour (contact information and consultation hours) of the lecturer will be given in the first lecture.

35320

River Engineering

River Engineering

【Code】35320 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・2 【Location】kyotsu4
【Credits】2 【Restriction】Nothing 【Lecture Form(s)】Lecture 【Language】English 【Instructor】Hosoda,T., Takemon, Y. ,
【Course Description】This subject deals with a wide range of basic knowledge on rivers required to make an integrated river basic management plan based on natural & social sciences and engineering. The contents included in this subject are described as follows: various view-points in relation to river systems, long term environmental changes of rivers and their factors, river flows and river channel processes, structure and function of river and lake ecosystems, recent characteristics of flood disasters, integrated river basin planning including flood control, sustainable reservoir management, nature restoration, and sediment transport management.
【Grading】Mainly regular examination. Quiz in classes, attendance and reports are considered for grading to some extent.
【Course Goals】The objectives of this subject are to understand the basic knowledge to consider river environments from the various points of view such as flood control, natural environment conservation, water utilization based on natural science, social sciences and engineering & technology.
【Course Topics】

Theme	Class number of times	Description
Various viewpoints on rivers and river basins	1	Various viewpoints on rivers and river basins, Vvrious rivers and their landscapes on the Earth, formation processes of river basins, long term environmental changes of rivers and main factors
Precipitation, water cycle and run-off phenomena	1	Basic knowledge on Meteorology, Water Resources, Statistical Hydrology of precipitation and Rain Fall Run-off Analysis
River flow and river channel processes	2	Basics on unsteady open channel flows andflood flow simulation, sediment transport in alluvial streams, formation processes of sand bars, etc.
Application of numerical hydraulics to environmental issues	1	Relation between the behavior of an endangered bird called 'Kamogawa-Chidori' and sand-bar formation, Mechanism on DO depletion near the bottom of the northern part of Lake Biwa due to climate change, Dam reservoir sedimentation due to sediment run-off from a catchment area, etc.
Structure and functions of river and lake eco-system	3	(1) Hierarchical structure and classification of river ecosystems, Relations between river geomorphology and habitat structure, Classification of microhabitats and their maintenance mechanisms, Longitudinal distribution of biological communities (2) Function of river ecosystems, Roles of biodiversity, Sustainable conditions of habitats for biological communities, Mass transfer mechanism in rivers, Nutrient spiraling, Impact assessment of river environments and Physical Habitat Simulation Model (3) Function of lake ecosystems, Classification of natural lakes and ponds by thermal stratification and thermal convection, Relations between lake types and biota (fauna and flora), Characteristics of man-made reservoir ecosystems
Integrated river basin planning	3	(1) River environmental improvement plan, Normal discharge, River restoration projects, Environmental assessment, etc. (2) Classification of river structures and their functions, Impact assessment for construction of dam reservoirs and estuary barrages, etc. (3) Comprehensive management of sediment outflow and sediment budgets in river basins, concepts of recent sediment control dams, asset management of dam reservoirs, management of sediment dynamism for integrated river planning, etc.
Integrated river basin planning	3	(1) River environmental improvement plan, Normal discharge, River restoration projects, Environmental assessment, etc. (2) Classification of river structures and their functions, Impact assessment for construction of dam reservoirs and estuary barrages, etc. (3) Comprehensive management of sediment outflow and sediment budgets in river basins, concepts of recent sediment control dams, asset management of dam reservoirs, management of sediment dynamism for integrated river planning, etc.
Confirmation of understanding	1	Students can check their understanding giving questions to Hosoda and Takemon.

【Textbook】Printed materials on the contents will be distributed in each lecture.
【Textbook(supplemental)】
【Prerequisite(s)】Elementary knowledge of Hydraulics, Hydrology and Ecology
【】
【Web Sites】http://www.geocities.jp/kyoto$_{ur}$ivereng/
【Additional Information】Students can contact with instructors by sending e-mail to hosoda.takashi.4w@kyoto-u.ac.jp & takemon.yasuhiro.5e@kyoto-u.ac.jp.

35310

Water Resources Engineering

Water Resources Engineering

【Code】35310 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Wednesday・1
【Location】kyotsu4 【Credits】2 【Restriction】In principle, students at third grade and above can take this course.
【Lecture Form(s)】Lecture 【Language】English 【Instructor】Y.Tachikawa,T.Hori,Kim Sunmin,
【Course Description】Methodology for water resources development, management and conservation is introduced from the engineering viewpoint. Main topics are distribution of water resource on the earth, grasp and prediction of water demand, planning and design of water resources systems, estimation and prediction of river flow, policy and water rights, and operation of reservoirs.
【Grading】Grading is done based on the mark on regular examination. Minimum passing grade is sixty percent.
【Course Goals】The goal is to understand the basic theory and methodology for water demand prediction, water resources systems design, river flow estimation, water resources policy and reservoir operation.
【Course Topics】

Theme	Class number of times	Description
Water resources systems planning	1	Concept and measures of water resources develeopment. Efficiency and limit of water resources development.
Operation of water resources systems	2	Development of water resources.
Evaluation of river flows	1	Design of water resources systems.
Operation and management of water resources systems	2	Planning and management, off-line and real time operation, optimization of reservoir control.
Attainment check	1	Evaluation of attainment level.
Water resources evaluation (1): Hydrologic predictions	1	Hydrologic predictions play an important role for water resources evaluation. The basic role of hydrologic predictions for a river planning and river management are explained.
Water resources evaluation (2): Hydrologic frequency analysis	4	The basis of the hydrologic frequency analysis is explained. Hydrologic variables used for the river planning and water resources planning are introduces as probabilistic variables; the concept of non-exceedance and exceedance probability and T-year probabilistic hydrologic variables are explained. Then, the procedure of hydrologic frequency analysis, distribution functions used for the frequency analysis, and estimation methods of parameters of a distribution function is described.
Water resources evaluation (3): Real-time hydrologic forecasting	2	Methods for real-time rainfall forecasting and river discharge forecasting are focused.
Achievement confirmation	1	Achievement assement is intended to measure students' knowledge, skill and aptitude on the subject.

【Textbook】
【Textbook(supplemental)】
【Prerequisite(s)】It is desirable that students have already learned fundamental hydrology and systems analysis for planning and management.
【】
【Web Sites】
【Additional Information】

35280

Geoenvironmental Engineering

Geoenvironmental Engineering

【Code】35280 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・1

【Location】kyotsu4【Credits】2【Restriction】This class is intended mainly for students of the International Course

【Lecture Form(s)】Lecture 【Language】English

【Instructor】T. Katsumi,M. Kimura,R. Uzuoka,Flores Giancarlo,Pipatpongsa Thirapong,

【Course Description】This course provides the knowledge on geoenvironmental engineering related to environmental geotechnics, remedial technologies, disaster mitigation and ground improvement/reinforcement.

【Grading】Final exam (60%) and class works (40%)

【Course Goals】The goal of this course is to understand how geotechnical engineering contributes to disaster prevention and environmental issues.

【Course Topics】

Theme	Class number of times	Description
Environmental geotechnics	6	Remediation of contaminated soils and groundwaters, waste containment, and reuse of waste materials in geotechnical applications, are introduced
Ground improvement	2	Principles of ground improvement are introduced
Geo-disaster	2	Measures against geo-disasters are introduced
Remedial technics	4	Remedial technics are introduced
Class feedback	1	Confirmation of understanding

【Textbook】Handouts will be distributed.

【Textbook(supplemental)】Lakshmi N. Reddy, Hilary I. Inyang, “ Geoenvironmental Engineering: Principles and Applications ”, Marcel Dekker, Inc.
Robert W. Sarsby, “ Envirionmental Geotechnics ”, ICE publishing

【Prerequisite(s)】Soil mechanics I and Exercises (35080)

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【Web Sites】

【Additional Information】G. Flores (flores.giancarlo.3v@kyoto-u.ac.jp)
T. Pipatpongsa (pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

35290

Rock Engineering

Rock Engineering

【Code】35290 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・2
【Location】kyotsu2【Credits】2【Restriction】This class is intended mainly for students of the International Course.
【Lecture Form(s)】Lecture 【Language】English 【Instructor】K. Kishida,Pipatpongsa Thirapong,
【Course Description】Unlike soil, rock is strong and hard materials consisting of solid aggregates of various minerals. Still, rock mass is different from concrete because it is not merely a mixture of materials binding together but it has undergone geological proces and formed structural discontinuities. Therefore, strength of rock mass is controlled by planes of weakness and extents of fractures. Moreover, water can have impact on rocks, not by breaking rock into pieces, but rather breaking rock into blocks through permeable discontinuities. Design and construction technology of rock structures (such as tunnel, rock slope, dam), geology, mechanical properties of rock and rock fracture, laboratory tests and field measurements of rock and rock mass are introduced in this lecture.
【Grading】Mid-term exam (35%), Final exam (40%), report and classworks (25%)
【Course Goals】This lecture aims to provide basic understanding of engineering properties of rock and rock masses for applications in both civil engineering works and mining operations. Design exercise of rock structure is also introduced.
【Course Topics】

Theme	Class number of times	Description
Introduction	1	Introduction to rock engineering, geological structure and discontinuities, and discontinuity characterization
Strength characteristics	4	Deformability and compressive strength, fractures and tensile strength, and experiments and failure criteria of rock
Hydraulics in rocks	2	Hydro-mechanical behaviors in rock, and groundwater flow in fractures rock
In-situ investigation	3	Subsurface stresses and field tests, and geological survey and rock classification
Engineering applications	3	Engineering applications to slope and tunneling
Practice	1	Practice of previously studied subjects
Class feedback	1	Confirmation of understanding

【Textbook】
【Textbook(supplemental)】“ Introduction to Rock Mechanics ”, R.E. Goodman, John Wiley & Sons
“ Engineering Rock Mechanics ”, J.A. Hudson and J.P. Harrison, Pergamon
“ Fundamentals of Rock Mechanics ”, J.C. Jaeger, N.G.W. Cook and R.W. Zimmerman, Blackwell Publishing
“ Rock Mechanics ”, Society of Materials Science, Japan (in Japanese)
【Prerequisite(s)】
【】
【Web Sites】
【Additional Information】Prof. Kiyoshi KISHIDA
Office: Department of Urban Management, C1-3-265
E-mail: kishida.kiyoshi.3r@kyoto-u.ac.jp
Assoc.Prof. Thirapong PIPATPONGSA
Office: Department of Urban Management, C1-2-236
E-mail: pipatpongsa.thirapong.4s@kyoto-u.ac.jp)

35260

Urban and Regional Planning

Urban and Regional Planning

【Code】35260 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・3

【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Qureshi Ali Gul,

【Course Description】Outlines of the processes of urban planning, planning of urban facilities, land use policies and transportation policy. In addition, the basic theory and models of land use, transportation, environment protection and urban economics will be discussed.

【Grading】Class participation, quiz and end of term examination.

【Course Goals】To understand the structure of urban problems and to learn the basics of urban planning.

【Course Topics】

Theme	Class number of times	Description
Introduction to Urban and Regional Planning	1	Concept and problems of urban and regional areas, need and social background of planning. Particularly factors affecting the future of cities such as the internationalization, aging and environmental issues will be described.
Histroy of Urban Planning in Japan	1	Historical background of urban planning in pre-war Japan.
Land-use Planning and District Planning	3	Basic concepts of urban planning, domain of urban planning, urbanization, regulations and basic zoning measures. Policies of urban development such as zoning, revamping of the central business district, other district planning methods as well as conservation of natural and historical environment of the city.
Environmental Issues and Urban Systems	2	Environmental issues, contemporary challenges and planning requirements of regional and urban environment from the environmental economics point of view.
Current Urban Development	1	Current trends of the urban and regional planning such as eco-towns and smart growth.
Basic Theory of Urban Transport Policy	1	Transport policy framework considering factors such as mobility, environment, landscape, attractiveness and vitality of the city. Classification of transport policy (regulatory policy, economic policy, infrastructure development policy).
Urban Transport Policy	3	Urban transport policies will be explained from the perspective of urban development. In particular, the transport policies required to achieve a sustainable city with respect to environment and energy use. Deregulation, basic theory of deregulation, limitations and the effects of deregulation.
Urban Transportation Planning	2	Basic concepts and models of the four-step transportation model will be discussed.
	1	

【Textbook】Materials will be provided in the class from time to time.

【Textbook(supplemental)】Useful textbooks and material will be introduded during the lectures.

【Prerequisite(s)】None

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【Web Sites】

【Additional Information】Office hours will be allocated for students to consult the instructor and ask questions as needed.

35270

Transportation Management Engineering

Transportation Management Engineering

【Code】35270 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Monday・4

【Location】kyotsu4 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Schmcker Jan-Dirk,

【Course Description】To provide the student with sufficient knowledge to explain the significance of the various methodologies used for transportation planning, operation and traffic engineering. To enable the student to apply each method appropriately.

【Grading】Joined judgement of report and end term exam.

【Course Goals】To provide the student with sufficient knowledge to explain the significance of the various methodologies used for transportation planning, operation and traffic engineering. To enable the student to apply each method appropriately.

【Course Topics】

Theme	Class number of times	Description
Introduction	2	The role of transport in the city and the role of motorisation. Definition of Transportation planning and traffic engineering. Status of transport in cities and current global transport planning problems.
Observing and analysing travel behaviour	2	Purpose of travel surveys, in particular person trip surveys. How to analyse travel behaviour with these and how to use these data.
Road network survey and analysis	2	Explaining methods for road traffic flow and travel demand estimation.
Traffic Flow Theory	3	Mechanisms of congestion, characteristics of traffic flow and traffic flow models, traffic capacity of road.
Traffic operations	3	Grade intersection, Traffic capacity at intersections, traffic signal control methods
Traffic management methods	3	Introduction to the various traffic management techniques currently being implemented, their benefits and challenges.

【Textbook】None

【Textbook(supplemental)】Iida, Kitamura: Traffic Engineering. 2008.
Roess R.P, Prassas E. S, McShane W.R (2004) Traffic Engineering, 4th Ed, Prentice Hall.
Further useful material will be introduced during the class.

【Prerequisite(s)】

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【Web Sites】None

【Additional Information】It is recommended to take this course jointly with "Urban and Regional Planning" taught by Assoc. Prof. Ali Qureshi on Mondays, 3rd period, as some exercises will be conducted jointly.

35300

Design for Infrastructure Ⅱ

Design for Infrastructure Ⅱ

【Code】35300 【Course Year】3rd year 【Term】2nd semester in 2018 【Class day & Period】Tuesday・4

【Location】N3 【Credits】2 【Restriction】 【Lecture Form(s)】Lecture 【Language】English

【Instructor】Related Faculty members,

【Course Description】Civil Engineering widely contributes to our society. This course explains Civil Engineering from the viewpoint of how technology and knowledge is applied and integrated for a safe, comfortable and sustainable society. This class consists of lectures not only from academic staffs but also visiting lecturers and it is expected to comprehensive teach what is Civil Engineering including the expected roles and ethics for civil engineers.

【Grading】The grade is evaluated based on the record of attendance and reports assigned by lecturers.

【Course Goals】To understand how technology and knowledge cultivated in Civil Engineering contributes to the promotion of social infrastructure, prevention or diminishment of disaster, and creation of environment. Furthermore, by overviewing the current research trend, it is expected to comprehend the challenges and future directions of Civil Engineering.

【Course Topics】

Theme	Class number of times	Description
Expected role for Civil Engineers	2	Firstly, the outline of this course is explained. Then, reflecting the current examples, the role and the field related to civil engineers are explained. Finally, the ethics for Civil Engineers are explained.
Application of Civil Engineering to the society	7	It is explained how technology and knowledge cultivated in Civil Engineering contributes to the promotion of social infrastructure, prevention or diminishment of disasters, and creation of environment. Concretely, the relationship between the academic studies and the application to practice, and the real image of Civil Engineering are explained from the viewpoint of major fields where many Civil Engineers work.
Understanding the currentresearches in Civil Engineering	5	Firstly, the research trend in Civil Engineering, which aims to realise safe, comfortable and sustainable society, is explained. Then, each student selects specific research field based on his/her interests and investigates their research topics and future directions
Achievement assessment	1	The achievement of the lecture is assessed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

International Internship

International Internship

【Code】35340 【Course Year】3rd year 【Term】2nd semester in 2018

【Class day & Period】During the summer break for about few weeks. 【Location】Noticed by the bulletin bord

【Credits】2

【Restriction】Priority is given to the international course student when the applicants for employing institute of internship program are a large number

【Lecture Form(s)】Practice 【Language】English 【Instructor】Related Faculty members,

【Course Description】This program aims to train basic concept and application of global engineering ’ s methodology (“ structural engineering ” , “ hydraulics ” , “ geomechanics ” , “ infrastructure planning and management ” , etc) on real society.

This internship will not only provide practical opportunity to train at formal institution or enterprise in Japan but also train at foreign university or international institution or NGO.

【Grading】Final presentation: 40-50%, Reports (Daily work report, summary report) : 50-60%

【Course Goals】To understand relationship between basic concept and application of global engineering ’ s methodology in real society, and to induce high motivation of technical capacity improvement through practical experience of business.

【Course Topics】

Theme	Class number of times	Description
Implementation of Internship	Corresponding to two weeks - one month internship in August or September	Practice internship. After implementation of internship, students should submit daily work report to instructer.
Individual report meeting	1 (October)	Instructer will arrange indivisual report meeting. Individual meeting will be hold by selected interviewer (facaluty teacher). Students should report to interviewer in this meeting.
Final report meeting	1 (November)	Instructer will arrange final report meeting. Each students should present output of internship in this meeting. Student should report to interviewer in this meeting.

【Textbook】None

【Textbook(supplemental)】None

【Prerequisite(s)】Students should attend to orientation meeting for 3rd year student in April.

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【Web Sites】

【Additional Information】Priority is given to the international course student when the applicants for employing institute of internship program are a large number.

31770

Design Exercise for Global Engineering A

地球工学デザイン A

【Code】31770 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Tuesday・3-4 【Location】Katsura C1-172 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises 【Language】Japanese

【Instructor】M. Kawasaki, Y. Takahashi, T. Yagi, K. Yamaguchi, (Part-time lecturer), R. Iwase, (ditto) N. Nagahama, (ditto) H. Yagi,

【Course Description】In this course, the name of which represents the“Civil Engineering Design,”the process and methodology to integrate an engineering aspect and an aesthetic aspect of design of civil engineering facilities will be provided through a design exercise of a footbridge. In this course, structural engineering, material science, and landscape design will be considered to be unified. Before that, planning issues such as a flow plan, pedestrian traffic, width of the walkway etc. will be introduced. Through the design exercise, students acquire a viewpoint of integration contained in designing civil engineering facilities, and find a domain of design that can be done and should be done by civil engineers. Moreover, we will have special lectures by 3 practitioners who are active in the front line.

【Grading】Total points will be scored in attitude of attendance (40%) and results of design practice and reports (60%).

【Course Goals】To understand the process and methodology to integrate an engineering aspect and an aesthetic aspect of design of civil engineering facilities through a design exercise of a footbridge. To come in touch with the front line of civil engineering design. Students are expected to get design-mindsets as civil engineers in the end.

【Course Topics】

Theme	Class number of times	Description
Outline of Civil engineering design	1	Guidance Outline of Civil engineering design: design and architecture, idea and image of design, shape and scale, method of design.
Civil engineering design exercise	8	Through a design exercise, students execute a design process: the field survey, arrangement of conditions, planning, creating ideas, structural analysis, detailed study, drawing, model making, and presentation. Then, a mature design is proposed with the consideration of integration of basic knowledge of civil engineering.
Front line of civil engineering design	5	Lectures and design practices by 3 professionals who are working on the front line of civil engineering design. In addition, we will have a talk session with the lecturers about various topics.
Achievement confirmation		Achievement of learning is confirmed.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】It is desirable to have taken the class of "Urban and Landscape Design". It is expected to have mastered basic knowledge of "Structural Mechanics" and "Construction Materials".

【】

【Web Sites】

【Additional Information】Office hours are not especially set. Ask any questions by mailing or visiting professors (Kawasaki, rm.202; Kubota, rm.201, C1-1 at Katsura Campus). The theme of design practice could be changed partially.

32700

Social Engineering for Disaster Reduction

社会防災工学

【Code】32700 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Monday・2

【Location】Katsura C1-226 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture

【Language】Japanese 【Instructor】K.Kobayashi,H.Tatano,M.Hatayama,K.Yamori,M.Onishi,

【Course Description】This course provides various concepts, scientific methodologies, engineering technologies and plannings related to social policies for reducing the damage due to natural disasters.

【Grading】Judged by the evaluation of essays and final exam and incorporating the attendance.

【Course Goals】To understand damages and social impacts caused by various types of natural disaster. To comprehensively understand various concepts, scientific methodologies, engineering technologies and plannings related to social policies for reducing the damage due to natural disasters.

【Course Topics】

Theme	Class number of times	Description
Introduction	4	Explaining characteristics of natural disaster and its variety, mechanisms of damage caused by natural disaster. Explaining a comprehensive framework for disaster risk reduction.
Planning for disaster risk reduction	3	Explaining the process of impacts caused by disasters such as earthquake and flood. Explaining disaster risk reduction plan including engineering technologies and social policies.
disaster and information	4	Explaining the role of information in emergency response after disaster and policies. Explaining policies which connects information and course of actions.
evaluation of disaster risk	3	Explaining methodologies to evaluate potential natural hazards for rational disaster risk reduction measures.
Test of understanding	1	Test of understanding

【Textbook】Hand-out materials will be distributed.

【Textbook(supplemental)】

【Prerequisite(s)】

【】Homework such as writing essays will be given as needed-basis.

【Web Sites】

【Additional Information】Office hour is not specified, but students may ask lectures questions by email.

30860

Construction Materials, Laboratory

材料実験

【Code】30860 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Monday・3-4
【Location】Katsura C1-107 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Experiment 【Language】Japanese
【Instructor】A.Hattori,T.Yamamoto,S.Takaya,R.Matsumoto,
【Course Description】Experiments on the materials for concrete and concrete member are carried out in the main. Properties of concrete materials and member are discussed by using those experimental results.
Be sure and attend the laboratory with your experimental text book. The schedule and details of the experiment are announced at the initial lecture. Students of this laboratory class have to attend an initial lecture because they are to be divided into some groups.
【Grading】A report with the experimental results and discussion is assigned in each time. The grading is based on the total point of reports and attendance.
【Course Goals】Students of this class practically learn to understand the properties of concrete material and member introduced in 'Construction Materials' and 'Concrete Engineering', and its measurement technique.
【Course Topics】

Theme	Class number of times	Description
Introduction	1	The objective and contents of this laboratory are introduced. The fundamentals of the measuring and testing method are also introduced.
Cement	1	The density, the fineness and the setting time of cement, and the flow of mortar are tested.
Aggregate	1	The density, the water absorption ratio, the grading, unit mass and surface water ratio of fine and coarse aggregate are tested.
Mix proportion design of concrete and fresh concrete	1	Mix proportion of concrete is designed using the results of ‘cement’ and ‘aggregate’. The condition of fresh concrete made by using the designed mix proportion is examined. The test specimens for ‘hardened concrete’ are also cast.
Hardened concrete	2	Some destructive and non-destructive tests are performed in the test specimens cast in ‘fresh concrete’.
Reinforcing steel bar	1	The yield strength, the tensile strength and the elongation are obtained in the reinforcing steel bar for concrete.
Design of reinforced concrete (RC) and prestressed concrete (PC) beam	3	The reinforced concrete (RC) and prestressed concrete (PC) beam are designed.
Casting of RC and PC beam	1	The designed RC and PC beam specimens are cast.
Prestressing	1	The prestress is introduced in PC beam by post tensioning system.
Loading test of RC and PC beam	2	Loading test for RC and PC beam specimens is carried out. The flexural behavior of RC and PC beam is investigated, comparing the experimental loading capacity with the designed one.
Achievement confirmation	1	Achievement of learning is confirmed.

【Textbook】The Society of Materials Science, Japan: Construction Materials Laboratory, 2,200JPY
【Textbook(supplemental)】
【Prerequisite(s)】Members of this class had better take ‘Construction Materials (30240)’ and ‘Concrete Engineering (30250)’ in 3rd year.
【】‘Construction Materials (30240)’ and ‘Concrete Engineering (30250)’ should be reviewed.
【Web Sites】
【Additional Information】

30890

Introduction to Architectural Engineering

建築工学概論（建築）

【Code】30890 【Course Year】4th year 【Term】2nd semester in 2018 【Class day & Period】Monday・1

【Location】Reseach Bldg.No.9,N7 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture･Exercises

【Language】Japanese 【Instructor】Related Teachers,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31780

Design Exercise for Global Engineering B

地球工学デザイン B

【Code】31780 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Friday・3-4
【Location】kyotsu2・Katsura C1-117 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture・Exercises
【Language】Japanese
【Instructor】
K.Koike,H.Takuda,M.Mabuchi,H.Kusuda,T.Goto,M.Hakamada,T.Hama,H.Fujimoto,S.Murata,K.Kashiwaya,E.Kusaka,J.Takekawa,Y.
【Course Description】Two courses (a, b) are opened in parallel. In the course "a", the aim is understanding theories of numerical simulation, and carrying out the simulation analysis. Lectures on simulation theory and analysis are conducted with exercises. In the course"b", lectures and exercises on basic knowledge related to resources and energy are conducted.
【Grading】In the course "a", the half of scores is based on student's presentation with discussion, the rest is from student's reports. In the course "b", the score based on student's attendance and reports.
【Course Goals】Course "a": getting skill solving problems using simulation, and presentation technique. Course "b" : getting basic knowledge on resources and energy.
【Course Topics】

Theme	Class number of times	Description
a-1. Simulation Theory and Introduction of Each Theme	3	Explanations of theories of numerical simulations analysis, and each theme for students.
a-2. Simulation exercise	6	Students carry out numerical simulation analysis based on each theme.
a-3. Interim report	1	Each student explains their own theme, and reports the method and the progress.
a-4. Simulation exercise	4	Continue simulation analysis for each theme.
a-5. Presentation of final results	1	Summary of the analysis results, and the presentation.
b-1. Deformation and Strength of Metallic Material	4 ～ 6	Learning deformation behavior and strength characteristics of metallic materials from the dislocation theory, and also basic knowledge on the relationship between macroscopic behavior and factors in deformation. Exercise on fundamental problems related to them.
b-2. Observation and Analysis of Minerals	4 ～ 6	Observations and Analysis of production and dissolution of methane hydrate using microscope. Observation rock minerals, rock texture, microcracks. Knowledge of rock minerals.
b-3. Numerical analysis of thermal fluid	3 ～ 5	Explanation of finite difference method for estimation of numerical solution of thermal fluid. Programming exercise.
Confirmation of achievement	1	Confirmation of students knowledge.

【Textbook】It will be shown in the lectures. Printed materials will be also provided.
【Textbook(supplemental)】It will be shown in the lectures.
【Prerequisite(s)】
【】
【Web Sites】
【Additional Information】Details are explained at the guidance.

31590

Earth Resources and Ocean Energy

地殻海洋資源論

【Code】31590 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Thursday・2

【Location】W3 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】M.Mabuchi,H.Kusuda,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	2	
	2	
	1	
	3	
	1	
	2	
	1	
	1	
	1	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

32600

Reservoir Engineering

貯留層工学

【Code】32600 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Friday・2 【Location】Katsura C1-107 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese 【Instructor】T.Sakaki,S.Murata,

【Course Description】Fluid flow in an oil and gas reservoir and geothermal reservoir is explained. Then, the reservoir properties relating to the flow such as porosity, permeability, relative permeability, capirally pressure and so on are explained. Reservoir fluids properties and their phase behavior are also explained. Furthermore, drilling and completion for a oil/gas well, log interpretation method and well test analysis are explained.

【Grading】The grade will be evaluated by the score of three report works and final examination. Their weight for the grading is 50% each.

【Course Goals】The course goals are as follows: 1) to understand the basics of fluid flow in reservoir based on Darcy's law, 2) to master the properties of reservoir rock and fluids and their evaluation methods, 3) to obtain basic knowledge about oil/gas well drilling and completion methods, 4) to understand the log interpretaion method and well test analysis.

【Course Topics】

Theme	Class number of times	Description
Introduction to reservoir engineering	0.5	The role and necessity of reservoir engineering are explained. The definition of reserve and its evaluation method are also explained.
Reservoir rock properties 1	3	Darcy's law represents single phase flow in porous media are explained. The reservoir rock properties such as porosity, permeability and so on affecting the flow are also explained. For unsaturated porous media with water and air, water retention property and its evaluation methods are described.
Reservoir rock properties 2	2	Application of Darcy's law is to be extended to multi-pahse flow in oil-water filled porous media and reservoir rock properties such as relative permeability, capillary pressure, wettability and so on are explained.
Reservoir fluid properties	3	The properties of reservoir fluid, oil gas and water, and their phase behavior are explained.
Drilling oil/gas well	2	Methods of oil/gas well drilling and completion are explained.
Log interpretation	1.5	The methods of log interpretation to some important kinds of well logging are explained.
Well test analysis	2	The method of well testing and its analysis methods are explained for pressure buid-up and drawdown test.
Summary of this course	1	The solutions of report works and examination are explained, and the contents of this course are summarize.

【Textbook】Not specified. Materials for the course will be derivered.

【Textbook(supplemental)】L. P. Dake: Fundamentals of Reservoir Engineering, 19th impression, Elsevier 2002,

【Prerequisite(s)】The knowledge of differential calculus, integral calculus, physical chemistry and exploration geophysics are necessary for this course.

【】It is recommended to solve the homework problems with reviewing the course materials.

【Web Sites】Not specified.

【Additional Information】Office hour will be set from 13:00 to 15:00 on the same day of this class.

31870

Resource information analysis

資源情報解析学

【Code】31870 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Monday・4

【Location】Katsura C1-117 【Credits】2 【Restriction】No Restriction

【Lecture Form(s)】Lecture・Practice・Exercises 【Language】Japanese

【Instructor】K.Koike,H.Mikada,T.Hayashi,K.Kashiwaya,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
Geo-informatics	5	
Time-series data analysis	2	
Spatio-temporal data analysis	3	
Integrated analysis of mechanical data	4	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

31790

Design Exercise for Global Engineering C

地球工学デザイン C

【Code】31790 【Course Year】4th year 【Term】1st semester in 2018 【Class day & Period】Wednesday･3-4

【Location】W1 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Exercises 【Language】Japanese

【Instructor】S.Itoh,M.Takaoka,K.Oshita,K.Kosaka,T.Fujimori,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	1	
	1	
	2	
	5	
	1	
	2	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

21080

Introduction to Engineering

工学序論

【Code】21080 【Course Year】1st year 【Term】 【Class day & Period】 【Location】 【Credits】1

【Restriction】No Restriction 【Lecture Form(s)】 【Language】 【Instructor】,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1~2	
	6	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

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【Web Sites】

【Additional Information】

21050

Engineering Ethics

工学倫理

【Code】21050 【Course Year】4th year 【Term】2018 first semester 【Class day & Period】Thu 3rd 【Location】Research Bldg. No.8, 3F, NS Hall 【Credits】2 【Restriction】No Restriction 【Lecture Form(s)】Lecture 【Language】Japanese

【Instructor】Dean of the Faculty of Engineering
Graduate School of Engineering, Professor, Makoto OHSAKI
Graduate School of Energy Science, Professor, Hirohiko TAKUDA
Graduate School of Engineering, Junior Associate Professor, Ryosuke MATSUMOTO

【Course Description】Modern ethics based on engineering aspect are becoming essential to present engineers and scientists. Instructors from various faculties give lectures about ethics in their research fields.

【Grading】Class participation and reports.

【Course Goals】The goal of this class is to understand engineering ethics, and to develop the ability to judge by yourself when you encounter ethical issues.

【Course Topics】

Theme	Class number of times	Description
Significance to learn engineering ethics(4/12)	1	This class gives students explanation about what engineering ethics is and the reason why it is necessary to learn it introducing some troubles in the field of transportation engineering and planning. (N. Uno: Global Engineering)
Ethics in information society on the view point of information technology(4/19)	1	Information devices such as PCs and smartphones and various web services such as SNS are very convenient, but there are also risks of being dangerous depending on usage. In this lecture, we describe the knowledge and the code of conduct to live safely in the information society. (A. Yamamoto: Informatics and Mathematical Science)
(4/26)	1	(M. Mizutani: Graduate School of Letters)
Ethical theories for engineering ethics (5/10)	1	This lecture will focus on basic ethical theories such as utilitarianism, deontology and virtue ethics which will be useful for thinking about particular ethical problems in engineering ethics. (S. Kodama: Graduate School of Letters)
Ethics in Architectural Engineering(5/17)	1	Discussions will be held to increase the ability as engineers to responsibly confront moral issues in the field of building engineering using actual technological activities as examples, such as putting water into fresh concrete, falsification of earthquake-resistance data, shoddy workmanship and architect qualification fraud. (M. Nishiyama: Architecture)
Engineering ethics in operation and maintenance of structures(5/24)	1	Although operation and maintenance of structures such as a plant and an aircraft require enormous labor and cost, unsuitable operation and maintenance may lead to serious accidents that cause unmeasurable damage. This class discusses engineering ethics that engineers are required under the situation. (T. Hayashi: Engineering Science)
Research and engineering ethics(5/31)	1	It is said that He that will do no ill, must do nothing that belongs thereto. The sense of ethics necessary to whom conducts research and engineering work in society is discussed in terms of the importance of equitability and fair evaluation to anyone involved in each area of research or engineering. (H. Mikada: Global Engineering)
Patents and Ethics (Part 1)(6/7)	1	This course will teach the students about 1) patent systems which protect inventions and research results and 2) ethical issues in patents. The first class, in preparation for the next subject of patent ethics, introduces Japan ’ s patent system with comparisons to the patent systems in the world ’ s major countries and international framework. (M. Nakagawa: Electrical and Electronics Engineering)
Patents and Ethics (Part 2) (6/14)	1	Students, equipped with the basic knowledge of patent systems by the previous lecture, will get familiar with actual case studies on ethical and legal issues in patents. (M. Nakagawa: Electrical and Electronics Engineering)
Ethics Required for Advanced Science(6/21)	1	Engineers and researchers are at the forefront of preventing harm caused by advanced chemistry. Think about social roles and ethics required by engineers and researchers through relationships between chemical substances and environmental problems, efforts to avoid hazards of nanomaterials. (K. Miura: Industrial Chemistry)
Ethics in nuclear engineering(6/28)	1	Nuclear technology can brew up an expansive and long-running catastrophe as well as it brings significant value of stable electricity in normal times. Some examples of ethics in nuclear engineering are introduced and important issues are talked. (I. Takagi: Engineering Science)
Ethics in biomedical engineering(7/5)	1	Recent dramatic progress in biology-related techniques, such as reproductive medicine, genome editing, and clone-animal techniques, is causing revolutions in the fields of medicines and food productions. Associated with it, problems of their safety and ethics are arising, which should be addressed by our societies. In this class, the recent progress in biology-related techniques, and problems we have and will have in near future are described. (M. Shirakawa: Industrial Chemistry)
Ethics of biotechnology and stem cell research(7/12)	1	With the rapid development of genome editing technology and stem cell engineering, editing of the human genome that goes beyond generations has become possible, at least technically. In this lecture, I will introduce these latest technologies and think about ethical problems accompanying technological development. (G. Eiraku: Industrial Chemistry)
Art-view Concept for Engineering(7/19)	1	Concept of "quality of life" is required for human related engineering. Some practical examples in medical-care and welfare fields will be introduced, and problem of the QOL-evaluation will be discussed from both function-optimizing view point and art view point. (N. Tomita: Engineering Science)
Ethics for Civil Engineers (7/26)	1	Civil Engineers play a key role on development of social infrastructures to protect people's lives from natural disasters and to support social and economic activities. This lecture introduces the engineering ethics on development of social infrastructures with specific examples. (T. Yagi: Global Engineering)

【Textbook】Lecture materials will be distributed.

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】The class order is subject to change.

22210

Engineering and Economy(in English)

工学と経済（英語）

【Code】22210 【Course Year】2nd year and above 【Term】2018 first semester 【Class day & Period】Tuesdays 5th-6th

【Location】工学部総合校舎１１１講義室 【Credits】2 【Restriction】【Lecture Form(s)】【Language】English 【Instructor】Juha Lintuluoto

【Course Description】The purpose of this course is to teach economy from an engineer viewpoint. The course especially contains such economic topics which engineer can use to solve practical engineering economy problems. The course is consisted of lectures and additional exercises, of which the student should complete five (5) written short reports and five (5) 60 minutes laboratory session attendances. The laboratory sessions are held weekly after the lecture, and consist of interactive group work tasks. Laboratory sessions are held weekly from 18 to 19 o’clock.// The course is aimed for both Japanese and Foreign nationals.// The course starts on April 10th.

【Grading】Test, reports, laboratory performance.

【Course Goals】This course will provide tasks for engineering students to be able to understand relationships between engineering and engineering economy. Students will learn solving economic problems related to engineering project at various levels. The course also prepares the students to write engineering related economic topics in English as well as verbally express themselves of these subjects.

【Course Topics】

Theme	Class number of times	Description
Student orientation, Introduction to engineering economy	1	Course introduction; Principles of engineering economy
Cost concept	1	Cost terminology; Competition; Total revenue function; Breakeven point
Design economics	1	Cost-driven design; Making vs. purchasing; Trade-offs
Cost estimation techniques I	1	Integrated approach and WBS; Index, unit, and factor techniques
Cost estimation techniques II	1	Parametric estimating; Power-sizing technique; Learning curve; Cost estimation, bottom-up, top-down, target costing
The time value of money I	1	Simple interest; Compound interest; Equivalence concept;Cash-flow digrams
The time value of money II	1	Present and future equivalent values of single cash flows
The time value of money III	1	Uniform series cash flows; Deferred annuities; Uniform gradient cash flows; Nominal and effective interest rates
Evaluation of a single project I	1	Determining minimum attractive rate of return (MARR); The present worth method; Bond value; Capitalized-worth method
Evaluation of a single project II	1	The future worth method; The annual worth method; The internal rate of return method; The external rate of return method
Comparison and selection among alternatives I	1	Basic concepts; The study (analysis) period; Useful lives are equal to the study period
Comparison and selection among alternatives II	1	Useful lives are unequal to the study period; Repeatability; Cotermination; The imputed market value technique
Income taxes and depreciation	1	Concepts and terminology; Depreciation; Straight-line method; Declining-balance method; Income taxes; Marginal tax; Gain or loss on the disposal of an asset; After-tax economic analysis
Final test	1	The test is based on the above topics

【Textbook】Sullivan, Wicks, Koelling; Engineering Economy, 15th Ed. 2012 , Chapters 1-7.

【Textbook(supplemental)】

【Prerequisite(s)】Note:

-Interactive lessons (discussion), Small group working method

-This course is held in English.

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【Web Sites】None

【Additional Information】If you have any questions or need further information, feel free to contact at 090aglobal@mail2.adm.kyoto-u.ac.jp.

24010

Global Leadership Seminar I

ＧＬセミナーＩ（企業調査研究）

【Code】24010 【Course Year】 【Term】 【Class day & Period】 【Location】 【Credits】1 【Restriction】

【Lecture Form(s)】 【Language】Japanese 【Instructor】,

【Course Description】

【Grading】

【Course Goals】

【Course Topics】

Theme	Class number of times	Description
	1	
	2~3	
	2~3	
	12	
	3~4	
	1	
	1	

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】

【】

【Web Sites】

【Additional Information】

25010

Global Leadership Seminar II

ＧＬセミナーⅡ（課題解決演習）

【Code】25010 【Course Year】2nd year or higher 【Term】FY2018, 2nd semester, intensive
【Class day & Period】Intensive course 【Location】Announced elsewhere 【Credits】1
【Restriction】Restricion in number to around 20 selected students 【Lecture Form(s)】Lecture and excercise
【Language】
【Instructor】Faculty of Engineering, J. Assoc. Prof., Yoshinori Tanaka
Faculty of Engineering, J. Assoc. Prof., Ryuichi Ashida
Faculty of Engineering, J. Assoc. Prof., Aiko Takatori
Faculty of Engineering, J. Assoc. Prof., Tadao Mizuno
Faculty of Engineering, J. Assoc. Prof., Ryosuke Matsumoto
Related professors
【Course Description】This course is a small-group workshop program where students are supposed to extract or set up challenges by themselves aiming at creating new social values. In concrete, abilities of planning and problem-solving are trained through group works in residential training and skills of presentation and communication are enhanced through oral presentations regarding contents of the proposal at each step of the process from a preliminary draft to its completion.
【Grading】It is required to join the residential training. A report meeting is held and comprehensive evaluation concerning abilities in group discussion to extract or set up challenges and to propose solutions for achieving a goal is made through presentation of the proposal as well as a submitted report.
【Course Goals】Ability of planning, from extraction or setting up challenges to proposal of solutions aiming at creating new social values, is trained through group works.
【Course Topics】

Theme	Class number of times	Description
Orientation	1	A brief overview and a schedule of the course are explained and working groups are organized.
Lectures	2	Lectures by experts are given.
Group works	3	Setting up challenges, extraction of problems, collecting information, and group works are done.
Residential training	7	Through intensive group works based on discussion, a proposal for solving problems is planned, a draft report is made, and a few presentations are made.
Preliminary review meeting	1	A preliminary review meeting is held and discussions are made.
Report meeting	1	Final presentations are made and reports are submitted.

【Textbook】Will be indicated as necessary.
【Textbook(supplemental)】Will be indicated as necessary.
【Prerequisite(s)】
【】
【Web Sites】
【Additional Information】Course open period: October to January
How to register the course will be instructed.
*It depends on divisions which students belong to whether the earned credits are admitted as credits required for graduation. Please refer to the syllabus of your division.

24020

International Internship of Faculty of Engineering I

工学部国際インターンシップ１

【Code】24020 【Course Year】Junior and Senior students 【Term】Through the academic year

【Class day & Period】Intensive course 【Location】Defined in each internship program. 【Credits】1

【Restriction】Defined in each internship program 【Lecture Form(s)】Exercise 【Language】English, et al.

【Instructor】Chairperson of Foreign Students and International Academic Exchange Subcommittee, Faculty members in charge of educational affairs of the undergraduate school the registrant belongs to.

【Course Description】Acquisition of international skills with the training of foreign language through the internship programs hosted by the University, the Faculty of Engineering, or the undergraduate school the applicant belongs to.

【Grading】Marit rating is done based on the presentation or reports after each internship program. Each Ｄepartment responsible to identify if the credit earned by this subject to be included as mandatory ones or not. If the credit is not included in the undergraduate school in which the participant belongs to, the credit is granted by the Global Leadership Education Center as a optional credit. The number of credits, either 1 or 2, will be determined depending on the contents and the duration of the program that the participant has participated in.

【Course Goals】The acquisition of international skills with the training of foreign language through the to internship programs hosted by the University is the major expectation to the students.

【Course Topics】

Theme	Class number of times	Description
Overseas Internship	1	The contents to be acquired should be described in the brochure of each internship program.
Final Presentation	1	A presentation by the student is required followed by discussion among participants.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】Described in the application booklet for each internship program. The registrant is requested to have enough language skills for the participation.

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【Web Sites】

【Additional Information】It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.

International Internship of Faculty of Engineering 2

工学部国際インターンシップ２

【Code】25020 【Course Year】Junior and Senior students 【Term】Through the academic year

【Class day & Period】Intensive Course 【Location】Defined in each internship program. 【Credits】2

【Restriction】Defined in each internship program. 【Lecture Form(s)】Exercise 【Language】English, et al.

【Instructor】Chair of Foreign Students and International Academic Exchange Subcommittee, Faculty members of the Undergraduate School the registrant belongs to.

【Course Description】Acqusition of international skills with wth the training of foreign language through the participation to the international internship programs held by the Faculty of Engineering or its subsidiary bodies.

【Grading】Marit rating is done based on the presentation or reports after each internship program. Each Ｄepartment responsible to identify if the credit earned by this subject to be included as mandatory ones or not. If the credit is not included in the undergraduate school in which the participant belongs to, the credit is granted by the Global Leadership Education Center as a optional credit. The number of credits, either 1 or 2, will be determined depending on the contents and the duration of the program that the participant has participated in.

【Course Goals】The acquisition of international and foreign language skills through the participation to international programs is expected. Detailed objectives of the participation should be identified by each program.

【Course Topics】

Theme	Class number of times	Description
Overseas Internship	1	The contents to be acquired should be described in the brochure of each internship program.
Final Presentation	1	A presentation by the student is required followed by discussion among participants.

【Textbook】

【Textbook(supplemental)】

【Prerequisite(s)】Described in the application booklet for each internship program. The registrant is requested to have enough language skills for the participation.

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【Web Sites】

【Additional Information】It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.

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工学部シラバス 2018 年度版

・ Common Subjects of Faculty of Engineering
・[A] Global Engineering
・[B] Architecture
・[C] Engineering Science
・[D] Electrical and Electronic Engineering
・[E] Informatics and Mathematical Science
・[F] Industrial Chemistry
・**オンライン版**　http://www.t.kyoto-u.ac.jp/syllabus-s/

本文中の下線はリンクを示しています．リンク先はオンライン版を参照してください．

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