SYLLABUS 2013

[D] Interdisciplinary Engineering Course Program

Kyoto University, Graduate School of Engineering

[D] Interdisciplinary Engineering Course Program

Laboratory of Applied Mechanics

Laboratory of Evolutionarily Sustainable Infrastructure Engineering

Laboratory of Materials Engineering and Chemistry

Laboratory of Engineering for Life Science and Medicine

Laboratory of Interdisciplinary Photonics and Electronics

Laboratory of Human Security Engineering Interdisciplinary Engineering Course Program (3yr Course)

Laboratory of Design Science

Laboratory of Integrated Medical Engineering

Applied Mechanics

Code   10G047   Course Year   Master 1st   Term   1st term   Class day & Period   Wed 4th

Location   Engineering Science Depts Bldg.-216   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Complex Mechanical Systems

Code   10G045   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 4th

Location   C3-Lecture Room 5   Credits   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Mechanical Engineering

Code   10K013   Course Year   Master and Doctor Course   Term   2nd term

Class day & Period   Tue 5th and Thu 4th   Location   C3-Lecture Room 5   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English   Instructor

Course Description   Lectures on recent topics in various fields of mechanical engineering will be given in English. This is mainly for foreing students (MC/DC), but Japanese students are also welcome.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Mechanics	2	Detailed schedule will be annouced later.
Materials	2	
Thermodynamics	2	
Fluid dynamics	2	
Control	2	
Design	2	
Microengineering	2	
Examination/Feedback	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

New Engineering Materials, Adv.　English lecture

Code　10K004　Course Year　Master and Doctor Course　Term　2nd term　Class day & Period　Thu 5th

Location　KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)　Credits　2　Restriction　No Restriction　Lecture Form(s)　Relay Lecture

Language　English　Instructor

Course Description　Outline: New materials are necessary for the advancement of high technologies, but in order to develop these new materials for practical applications, a number of problems must be solved. In this course, the problems encountered in the fields of chemical engineering, electrical / electronic engineering, mechanical engineering and civil engineering are discussed. Discussions are also held on natural resources, and how computers are being used in the development of new materials. Lectures are given in English.

Grading　Credit: The evaluation of a student's work will be given on a pass / fail basis, based on his / her attendance and reports, not on examinations.(1) Attending the class 10 times or more and submitting at least 5 reports with passing marks is required to receive 2 credits.(2) A report assignment will be given by every lecturer and must be submitted within 2 weeks from the end of the lecture.(3) A student's report on any lecture from which he / she is absent will not be accepted.

Course Goals

Course Topics

Theme	Class number of times	Description
Improving Sanitation and Resource Recovery in both Developing and Developed Countries (Yoshihisa SHIMIZU)	1	
Soils Recovered from Disaster Debris (Takeshi KATSUMI)	1	
Separation Analyses in Micro- and Nano-scale (Koji OTSUKA)	1	
Polymer Synthesis beyond the 21st Century: Precision Polymerizations and Novel Polymeric Materials (Mitsuo SAWAMOTO)	1	
Solid State Lighting based on Light Emitting Diodes (Yoichi KAWAKAMI)	1	
Material Properties of Fiber Reinforced Cementitious Composites and Applicability to Structures (Yoshio KANEKO)	1	
Materials in Micro Electro Mechanical Systems (MEMS) (Toshiyuki TSUCHIYA)	1	MEMS
Composite Materials: Smart, Lightweight and Strong Materials (Masaki HOJO)	2	
Inorganic New Materials (Koichi EGUCHI)	1	
Structural biochemistry of proteins (Masahiro SHIRAKAWA)	1	
Semiconductor Materials and Devices (Tsunenobu KIMOTO)	2	
High Temperature Superconductivity and Its Application to Electronics (Itsuhiro KAKEYA)	1	

Textbook

Textbook(supplemental)　Class handouts

Prerequisite(s)

Web Sites

Additional Information

Applied Numerical Methods

Code   10G001   Course Year   Master Course   Term   1st term   Class day & Period   Mon 1st

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Toshiyuki Tsuchiya

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Numerical Error, Approximation	1	
Linear simultaneous equation 1	3	
Least square approximation	1	
Linear simultaneous equation 2	1	
Singular value decomposition	1	
Eigenvalue analysis	2	
Non-linear equation	2	
Normal differential equation and numerical integral	2	
Numerical analysis of partial differential equation	3	
Examination	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Solid Mechanics, Adv.

Code 10G003 Course Year Master Course Term 1st term Class day & Period Thu 1st

Location C3-Lecture Room 1 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese

Instructor S. Biwa, M. Nishikawa

Course Description In Part I, fundamental issues of the finite deformation analysis of solids and structures are introduced, including tensor analysis, kinematics of continua, conservation laws, and various stress/strain measures. In Part II, basic ideas of elastoplastic and viscoplastic theories are lectured to describe nonlinear material properties, and the derivation of inelastic constitutive equations and their application to numerical analyses are also introduced.

Grading Grading is based on the examination, possibly with considerations of reports.

Course Goals The goal is to understand the concepts of finite deformation analysis and inelastic constitutive relations, which constitute the basis of computational mechanics simulations for mechanical/structural design.

Course Topics

Theme	Class number of times	Description
Part I. Fundamentals of finite deformation analysis		
I-1. Tensor analysis	2	Tensor as a linear transformation; Tensor algebra; Transformation of tensor components due to change of basis; Eigenvalues of symmetric tensors; Spectral decomposition; Integral theorem
I-2. Kinematics	2	Reference and current configurations; Deformation gradient; Cauchy-Green deformation tensors; Strain tensors; Velocity and acceleration; Deformation-rate tensor and spin tensor
I-3. Conservation laws	2	Conservation of mass; Laws of motion by Euler and Cauchy; Cauchy stress tensor; Equation of motion; Principle pf virtual work
I-4. Various definitions of stress	1	First and second Piola-Kirchhoff stresses; Alternative expression of equation of motion; Objectivity of vectors and tensors; stress-rate
Part II. Basis of inelastic analyses		
II-1. Constitutive equations of elastoplastic body	3	Models of plasticity for uniaxial tension; Yield functions for isotropic materials; Work hardening; J2 flow theory; Elastoplastic constitutive equations
II-2. Numerical methods for elastoplastic body	2	Incremental virtual work principle; Basis for incremental finite element analyses
II-3. Constitutive equations of elastic-viscoplastic body	2	Models of rate-dependent plasticity; Elastic-viscoplastic constitutive equations based on tangent modulus method
III. Assessment	1	Assessment of understanding and achievements

Textbook Parts I, II: Lecture materials are distributed in classroom or to be downloaded on the website.

Textbook(supplemental) Part I: T. Kyoya, "Continuum Mechanics," Morikita (2008); A. J. M. Spencer, "Continuum Mechanics," Dover (1980).

Part II: Y. Tomita, " Foundation and Application of Elastoplasticity," Morikita (1995); E. Neto et al., " Computational Methods for Plasticity," John Wiley & Sons (2008).

Prerequisite(s) Enrolling students are expected to have knowledge in "Mechanics of Materials," "Continuum Mechanics," or "Mechanics of Solids" courses on the undergraduate level.

Web Sites

Additional Information The order and hours (weights) for each item are subject to possible change.

Thermal Science and Engineering

Code   10G005   Course Year   Master Course   Term   1st term   Class day & Period   Mon 3rd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   H. Yoshida & M. Matsumoto

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
(M) Brownian motion	1	
(M) Transport phenomena and correlation functions	1	
(M) Spectral analysis and fractal analysis	2	
(M) Stochastic process and its applications	3	
(Y) Entropy and free energy: revisit	1	
(Y) Science of atmosphere and ocean	3	
(Y) Hydrogen energy	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)   Elementary thermodynamics, Statistical physics, Heat transfer engineering, Numerical analysis etc.

Web Sites

Additional Information   (2014)
Matsumoto: April 14 ~
Yoshida: June 9 ~

Introduction to Advanced Fluid Dynamics

Code   10G007   Course Year   Master Course   Term   1st term   Class day & Period   Tue 3rd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Condensed Matter Physics

Code   10G009   Course Year   Master Course   Term   1st term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design and Manufacturing Engineering

Code   10G011   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Dynamic Systems Control Theory

Code   10G013   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Ethics and Management of Technology

Code   10G057   Course Year   Master 1st   Term   1st term   Class day & Period   Thu 3rd

Location Butsurikei-Kousya   Credits 2   Restriction No Restriction   Lecture Form(s) Lectures and Exercise

Language   Japanese   Instructor   Sawaragi, Nishiwaki, Tomita, M. Komori, Tsuchiya, Noda, Sato, Iseda

Course Description   Basic knowledge of Engineering Ethics and Management of Technology needed for future project leaders in companies and society is taught. Students have to make group work after-class hours as well as presentations of wrapping-up the discussions. Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. Management of Technology is a set of management disciplines that allows organizations to manage their technological fundamentals to create competitive advantage. This course consists of lectures, exercises, discussions and oral presentations under supervision of professional faculties and extramural lecturers.

Grading   Submission of reports and presentations

Course Goals   To cultivate a spirit of self-sufficiency needed for engineers

Course Topics

Theme	Class number of times	Description
Engineering Ethics	9	1. Introduction to Engineering Ethics (EE) 2.Medical Engineering Ethics 3.EE by Institution of Professional Engineers, Japan and abroad 4.Product Safety and Product Liability 5.Comprehensive Manufacturing and EE (1) 6.Comprehensive Manufacturing and EE (2) 7.Group Discussions 8.History and Philosophy of EE 9.Presentation on exercise of EE
Management of Technology	5	1.Product Portfolio, Strategy for Competition 2.Bussiness Domain and MOT for Marketing 3. Organizational Strategy for Corporates' R & D 4. Management Theory for R & D 5.Presentation on exercise of MOT
Summary	1	

Textbook   No textbook

Textbook(supplemental)   Nothing

Prerequisite(s)   Nothing particular

Web Sites   No Web Site

Additional Information   Nothing particular

Special Topics in Transport Phenomena

Code 10E001 Course Year Master and Doctor Course Term 1st term Class day & Period Thu 4th

Location A2-305 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese

Instructor R.Yamamoto

Course Description Theoretical approaches on momentum, heat, and mass transports will be discussed. For example, problems of non-steady transport such as transient behavior, hydrodynamics of complex fluids such as polymeric liquids will be treated.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Polymeric Liquids	6	
Higher Dimensional Problems (Flow)	3	
Heat Transfar in Fluids	3	
Higher Dimensional Problems (Heat Transfar))	2	
Understanding Check	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Magnetohydrodynamics

Code   10C076   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   English Lecture

Language   English   Instructor   Tomoaki Kunugi, Atsushi Fukuyama

Course Description   This course provides fundamentals of magnetohydrodynamics which describes the dynamics of electrically conducting fluids, such as plasmas and liquid metals. The course covers the fundamental equations in magnetohydrodynamics, dynamics and heat transfer of magnetofluid in a magnetic field, equilibrium and stability of magnetized plasmas, as well as illustrative examples.

Grading   Attendance and two reports

Course Goals   The students can understand fundamentals of magnetohydrodynamics which describes the dynamics of electrically conducting fluids, such as plasmas and liquid metals. Moreover, the students will figure out the applications of magnetohydrodynamics to the various science and engineering fields.

Course Topics

Theme	Class number of times	Description
Liquid Metal MHD	7	1. Introduction and Overview of Magnetohydrodynamics 2. Governing Equations of Electrodynamics and Fluid Dynamics 3. Turbulence and Its Modeling 4. Dynamics at Low Magnetic Reynolds Numbers 5. Glimpse at MHD Turbulence & Natural Convection under B field 6. Boundary Layers of MHD Duct Flows 7. MHD Turbulence at Low and High Magnetic Reynolds Numbers
Plasma MHD	8	1. Introduction to Plasma MHD 2. Basic Equation of Plasma MHD 3. MHD Equilibrium 4. Axisymmetric MHD Equilibrium 5. Ideal MHD Instabilities 6. Resistive MHD Instabilities 7. MHD Waves in Plasmas 8. Student Assessment

Textbook   Handout of the presentation will be provided at the lecture

Textbook(supplemental)   P. A. Davidson, "An Introduction to Magnetohydrodynamics," Cambridge texts in applied mathematics, Cambridge University Press, 2001

Prerequisite(s)   Fundamentals of fluid mechanics and electromagnetism

Web Sites

Additional Information

Continuum Mechanics

Code   10F003   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kunitomo Sugiura, Tomomi Yagi

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

Grading   Assessment will be based on exam, report and attendance.

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

Course Topics

Theme	Class number of times	Description
Introductions	1	
Matrices and tensors	1	
differential and integral calculus of tensors	1	
Kinematics	1	- Material derivative
Deformation and strain	2	- Strain tensors - Compatibility conditions
Stress and equilibrium equation	1	
Conservation law and governing equation	1	
Constitutive equation of idealized material	1	
Elastic-plastic behavior and constitutive equation of construction materials	1	
Boundary value problem	1	
Variational principle	1	
Various kinds of numerical analyses	2	
Confirmation of the attainment level of learning	1	

Textbook

Textbook(supplemental)

Prerequisite(s)   Basic knowledge for structural mechanics, soil mechanics and fluid mechanics are required.

Web Sites

Additional Information

Structural Stability

Code   10F067   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Hiromichi SHIRATO, Kunitomo SUGIURA

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

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

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

Course Topics

Theme	Class number of times	Description
Elastic Stability under Static Loading	7	Stability of Structures and Failures Basis of Structural Stability Elastic Buckling of Columns Elastic Buckling of Beams & Frames Elastic Buckling of Plates Elasto-plastic Buckling Buckling Analysis
Basic theory of dynamic stability and its application	7	The stability around the equilibrium points based on the state equation of motion in which the nonlinearity of external, damping and restring forces are taken into account. Wind-induced vibration of a square prism (Galloping) and 1dof system with nonlinear spring will be introduced as practical examples. Chaotic motion of a pendulum subjected to periodic external force is also explained as an introduction of chaos theory.
Achievement Check	1	Summary and Achievement Check.

Textbook   Not specified.

Textbook(supplemental)   Introduced in class if necessary.

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

Web Sites   none

Additional Information   none

Structural Dynamics

Code   10F227   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 1st
Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese
Instructor   Igarashi, Furukawa

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

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

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

Course Topics

Theme	Class number of times	Description
Introduction	1	Fudamental concepts, harmonic motion
Dynamics of Multi-Degree-Of-Freedom Systems	2	Formulation of Eq. of Motion / Lagrange's method / Normal Modes / Modal Analysis / Modeling of System Damping
Frequency-Domain Analysis of System Response	1	Frequency Response Funcs. / Fourier Transform
Numerical Time Integration	2	Formulation / Stability and Accuracy Analysis of Integration
Random Vibration	6	Overview / Probability Theory / Sequence of i.i.d. Random Variables / Concept of Random Processes / Correlation Funcs. / White Noise / Stochastic Differential Eq. / Lyapunov Eq. / Response to White Noise Excitation / Covariance Matrix Approach / Correlation Funcs. of Random Response / Spectral Representation of Random Processes / Spectral Representation of Structural Response / Application
Structural Response Control	2	Active Control / Semi-Active Control
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)   Mechanical vibration (undergraduate level), Complex calculus (integration of analytic functions, Fourier transform, etc.), Probability theory, Linear algebra

Web Sites

Additional Information

Applied Hybrid System Engineering

Code   10C621   Course Year   Master Course   Term   1st term   Class day & Period   Wed 1st

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Takashi Hikihara, Shinji Doi, Yoshihiko Susuki, Syun'ichi Azuma

Course Description   Many engineering systems show hybrid dynamical structure, which is accompanied with discrete change of vector flow by control and regulate the trajectory to target dynamically. In the course, the fundamental characteristics and theorems are lectured. The framework of hybrid system, automaton model, and singular perturbation theorem are explain. Dynamic quantizer, power system, and network are picked up as examples.

Grading   Exercise and repots are evaluated.

Course Goals   Students are requested to understand the characteristics of hybrid system, approaching method, and control methods.

Course Topics

Theme	Class number of times	Description
Fundamentals of hybrid system	4	As fundamentals, the definition of hybrid system and the method of modeling is explained.
Singular perturbation and asymptotic expansion	3	Singular perturbation theorema and asymptotic expansion are explained. For the global oscillation of singular perturbed system, analytical and geometrical singular perturbation methods are introduced.
Application of hybrid system-1: power system	3	The application to power system is explained. The outline of power system, then safety and examination, the stability analysis, and the modeling towards control are given.
Application of hybrid system-2: dynamic quantizer	2	As an application, dynamic quantizer is adopted. The outline of the dynamic quantizer, the analysis, and the design of the system are given.
Application of hybrid system-3: networking	3	As an application, the communication network is adopted. The internet network is also explained as an example of modeling and control.

Textbook   Each professors prepare the prints of lectures.

Textbook(supplemental)   No textbook.

Prerequisite(s)   Nothing.

Web Sites

Additional Information   This course is held every two years.

Applied Mathematics for Electrical Engineering

Code   10C601   Course Year   Master Course   Term   1st term   Class day & Period   Thu 1st

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   T. Hikihara & S. Doi

Course Description   In the class, fundamental mathematics is lectured for electrical engineering, electronics, system engineering, and material science. In particular, system theory, nonlinear dynamics, and particle dynamics in force field can be discussed with mathematical clear image.

Grading   Students are requested to reply to report assignments. The grading is based on the evaluation of the reports.

Course Goals   Professors expect students to model their system and analyze the models theoretically. Students will be requested to understand their system in principle mechanics and control them based on system theory.

Course Topics

Theme	Class number of times	Description
	1	
	3	
	3	
Introduction 2	1	Relationship between the previous classes and further will be explained. The introduction to nonlinear dynamics will be explained based on oscillation theory.
Hamiltonian mechanics	4	Hamiltonian mechanics on linear symplectic space is lectured.
Manifold and vector field	3	Manifold is discussed in nonlinear system with relation to vector filed analysis.

Textbook

Textbook(supplemental)   S. Wiggins, Introduction to Applied Nonlinear Dynamical Systems and Chaos, Springer-Verlag.

Prerequisite(s)   Linear algebra

Web Sites   https://www.t.kyoto-u.ac.jp/lecturenotes/gse/kueeng/10C601/syllabus

Additional Information   Appropriate references will be shown in classes.

Space Radio Engineering

Code   10C612   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 3rd

Location   N1 lecture room in the Faculty of engineering building No. 3, A1-131 in Katsura campus, Uji

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

Instructor   Hiroshi Yamakawa, Hirotsugu Kojima

Course Description   The present lecture provides the guideline how the technology on the electronics and propulsion system is used for the development of spacecraft and space systems. Furthermore, in order to understand the environment in space, we also give a lecture on the space plasma physics.

Grading   attendance and reports

Course Goals   Mastery of the way how we can make use of the knowledges of the physics and technology to the space engineering.

Course Topics

Theme	Class number of times	Description
Space environment	2	The space environment in the view point of spacecraft desing such as thermal condition, plasmas, and charging.
Spacecraft system and its related technology	6	The spacecraft system and its technology related to power system, communication system, EMC, and payload desings.
Spacecraft dynamics	3	Spacecraft orbit design and its attitude control
System engineering of spacecraft	4	Spacecraft propulsion system including the advanced systems which make use of solar power, GPS navigation system, and space debris

Textbook

Textbook(supplemental)

Prerequisite(s)   Plasma physics, Electromagnetics. Radio engineering, Electronics

Web Sites

Additional Information

Fracture Mechanics

Code   10G017   Course Year   Master Course   Term   2nd term   Class day & Period   Fri 1st

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Takayuki Kitamura

Course Description   The basics of the fracture mechanics will be lectured.

Elastic problem, Stress function of a crack, Stress field around a crack tip, Stress intensity factors, Energy release rate,

J-integral, Elastic plastic fracture mechanics, Interfacial fracture mechanics etc.

Fracture toughness, Crackings in fatigue, environmental fatigue and creep-fatigue etc.

Grading   Mini-reports will be evaluated.

Course Goals   The objective of this lecture is to master the basic knowledge of the fracture mechanics, and to be able to discuss about material strength on the basis of the knowledge.

Course Topics

Theme	Class number of times	Description
Introduction	2	Introduction Examples of fracture in real components Deformation and fracture Stress concentration and singular stress field Basics of solid mechanics
Linear fracture mechanics	3	Mechanics of cracked body under linear elasticity Singular stress field near a crack tip, Stress intensity factor, Energy release rate, J-integral, Small scale yielding Interfacial fracture mechnics in dissimilar materials, Stress field near an interface edge, Stress field near an interfacial crack
Nonlinear fracture mechanics	2	Fracture mechanics in non-linear elastic solid HRR singular field, J-integral, creep Stress field near an interface edge
farcture phenomenon and mechanics	3	Application of fracture mechanics to fracture toughness Application of fracture mechanics to fatigue cracking Application of fracture mechanics to environmental cracking Application of fracture mechanics to fatigue cracking at high temperatures
fracture mechanics on growth of small cracks	1	Growth of physicall small crack Growth of microstrucually small crack
Smakk crack and cavity in creep	1	Cavity growth by diffusion creep Difference of stress filed between crack and cavity
Fracture nanomechanics	1	Research works on fracture mechanics in nanometer scale
Fracture in atomic scale	1	Research works on fracture in atomic scale
Summary	1	Discussion and report

Textbook   The teacher provide articles for this lecture.

Textbook(supplemental)

Prerequisite(s)   The traditional material strength and the linear elastic mechanics should be learned before taking this lecture.

Web Sites

Additional Information

Advanced Finite Element Methods

Code   10G041   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and Practice

Language   English   Instructor   Kotera and Nishiwaki

Course Description   This course presents the basic concept and mathematical theory of the Finite Element Method (FEM), and explains how the FEM is applied in engineering problems. We also address important topics such as the physical meaning of geometrical non-linearity, material non-linearity, and non-linearity of boundary conditions, and we explore numerical methods to deal with these nonlinearities. Also, we guide students in class in the use of software to solve several numerical problems, to develop practical skill in applying the FEM to engineering problems.

Grading   Grading is based the quality of two or three reports and the final exam.

Course Goals   The course goals are for students to understand the mathematical theory of the FEM and the numerical methods for analyzing non-linear problems based on the FEM.

Course Topics

Theme	Class number of times	Description
Basic knowledge of the FEM	3	What is the FEM? The history of the FEM, classifications of partial differential equations, linear problems and non-linear problems, mathematical descriptions of structural problems (stress and strain, strong form and weak form, the principle of energy).
Mathematical background of the FEM	2	Variational calculus and the norm space, the convergence of the solutions.
FEM formulations	3	FEM approximations for linear problems, formulations of iso-parametric elements, numerical instability problems such as shear locking, formulations of reduced integration elements, non-conforming elements, the mixed approach, and assumed-stress elements.
Classifications of nonlinearities and their formulations	4	Classifications of nonlinearities and numerical methods to deal with these nonlinearities.
Numerical practice	2	Numerical practice using COMSOL.
Evaluation of student achievements	1	

Textbook

Textbook(supplemental)   Bath, K.-J., Finite Element Procedures, Prentice Hall

Belytschko, T., Liu, W. K., and Moran, B.., Nonlinear Finite Elements for Continua and Structures, Wiley

Prerequisite(s)   Solid Mechanics

Web Sites

Additional Information

Strength of Advanced Materials

Code　10B418　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Thu 2nd

Location　C3-Lecture Room 2　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture　　Language　Japanese

Instructor　M. Hojo and M. Nishikawa

Course Description　The mechanism underlying mechanical and functional properties are lectured for advanced materials used and developed in advanced fields of current engineering. In particular, advanced composite materials, used for aircraft structure etc., are introduced, with a detailed description of the relationship between microscopic constituent materials and macroscopic properties from the perspective of multiscale mechanics; also the anisotropy of their properties, their fatigue and fracture properties are described in the basic discipline for strength of materials. The latest applications are introduced in the field of various transportation systems including airplanes.

Grading　Grading is based on the reports. The assignments will be given around three times.

Course Goals　The course goal is to understand basic concepts of composite materials and the underlying mechanism of their mechanical properties from multiscale viewpoints, while the phsyical understanding of composites is developed based on multiple disciplines.

Course Topics

Theme	Class number of times	Description
Concept of composite materials	2	The concept and definition of composite materials, their constituent materials and manufacturing methods are illustrated. Their application to aircraft structures etc. are also introduced.
Mechanical properties of microscopic constituent materials	2	Resin for matrix and various fiber types are explained including their structure and mechanical properties. The weakest link model and Weibull distribution are described as a basis of the statistic nature of strength.
Basic mechanical properties	4	The specific strength, the specific stiffness, and the rule of mixture for elastic modulus and strength are lectured. In particular, the detailed explanation is made to the anisotropy of elastic modulus, independent elastic constants in the generalized Hookean law, the anisotropic failure criteria, and laminate theory. The relationship between the mechanical properties of microscopic constituent materials and macroscopic properties of composite materials is also illustrated.
Micromechanics	2	The mechanism of transverse fracture is illustrated. The mechanical models are described for short fiber reinforced composites and particle dispersed composites. The micromechanical analyses based on finite element method is also illustrated for the physical understanding of the strength of composite materials.
Fracture mechanics properties	2	Fracture mechanics of anisotropic materials are described. The interlaminar fracture toughness and interlaminar fatigue crack propagation, the critical issues in the application of composite structures, are explained including their underlying mechanism.
Superconducting materials	1	High-temperature superconducting materials are the composite materials consisting of metals and fibrous superconducting materials made of oxides. The mechanism are explained for understanding that their mechanical properties so much control their electric properties.
Process and mechanical properties of composite materials	1	The molding and machining process of composite materials is explained to relate it to their mechanical properties. Fiber preform, the selection of resin, intermediate materials, machining and assembly and inspection methods are overviewed from the academic viewpoints.
Academic achievement test	1	Academic achievements is assessed.

Textbook　Supplementary handouts will be distributed in the class.

Textbook(supplemental)　D.Hull and T.W.Clyne, "An Introduction to Composite Materials," Cambridge University Press.

Prerequisite(s)　Mechanics of Materials, Continuum Mechanics, Fundamentals of Materials, Solid Mechanics, Adv.

Web Sites

Additional Information　The order and the item in the course are possibly subject to change.

Dynamics of Solids and Structures

Code   10G230   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   S. Biwa and T. Hayashi

Course Description   Fundamental principles for dynamic deformations of solids and structures are examined. In particular, basic characteristics of elastic wave motion in solid media are emphasized. Responses of materials and structures to impact loading are also considered.

Grading   Grading is based on the attendance, homework reports and the final examination (possibly replaced by reports).

Course Goals   This course aims to establish the understanding of basic characteristics of dynamic deformations and elastic waves in solid media, as well as to learn about technological applications of ultrasound in a variety of fields extending from micro- to macro-scales. Particular emphasis is put on the mathematical aspects of the physical phenomena involved.

Course Topics

Theme	Class number of times	Description
Fundamentals of elastodynamics	3	Expressions of stress and strain; Conservation laws; Hooke's law; Hamilton's principle, Love's theory for longitudinal waves in a bar.
Basics of wave propagation in solids	3	One-dimensional wave equation; D'Alembert's solution; Harmonic waves; Spectral analysis; Waves in structural members; Dispersion; Phase and group velocities; Plastic waves; Impact strength
Waves in isotropic elastic media	2	Voigt notation of Hooke's law; Navier's equations; Longitudinal and transverse waves; Propagation of plane wave.
Waves in anisotropic elastic media	2	Stiffness matrix; Propagation of plane wave; Christoffel's equation; Propagation and polarization directions.
Reflection and transmission	2	Reflection and transmission of normal incident waves; Snell's law; Mode conversion; Reflection and refraction of oblique incident waves.
Guided elastic waves	2	Bulk waves and guided waves; Rayleigh wave; Love wave; Lamb wave.
Assessment of achievement	1	Assessment of achievement.

Textbook   No textbooks are assigned. The lecture is mainly given in a blackboard style. Print-outs are handed in when needed.

Textbook(supplemental)

Prerequisite(s)   Basic knowledge of mechanics of materials (solid mechanics, continuum mechanics) is expected.

Web Sites

Additional Information   The time units and weights for each item on the above list are subject to possible changes.

Thermophysics for Thermal Engineering

Code　10B622　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Fri 1st

Location　C3-Lecture Room 5　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor　M. Matsumoto

Course Description　Based on elementary thermodynamics and statistical physics, I will describe non-equilibrium thermodynamics and advanced statistical physics, including phase transition, pattern formation, and entropy production.

Grading　Paper assignments

Course Goals　Understanding the principle mechanisms of phase transition, cooperation phenomena, patern formation, and relaxation phenomena, in terms of advanced statistical mechanics and non-equilibrium thermodynamics.

Course Topics

Theme	Class number of times	Description
Elementary statistical physics: review	1	Review of equilibrium statistical mechanics
Phase transition as a cooperative phenomenon	3	Statistical mechanics of interacting particle system - Exact calculation - Monte Carlo simulation - Mean field approximation
Pattern formation of non-equilibrium systems	4	After a time dependent Ginzburg-Landau (TDGL) model is introduced, formation of spatial patterns is discussed from various viewpoints.
Equilibrium thermodynamics: review	1	Review of elementary thermodynamics
Non-equilibrium thermodynamics: Basics	2	System stability and the principle of irreversible process are discussed in terms of thermodynamics.
Non-equilibrium thermodynamics: Applications	3	- Entropy production - Linear response theory - Onsager's reciprocal relation
Examination	1	

Textbook　Lecture note will be prepared.

Textbook(supplemental)

Prerequisite(s)　Elementary level of Thermophysics, Heat transfer phenomena, and Statistical physics

Web Sites

Additional Information

10G039

Transport Phenomena

Code   10G039   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nakabe, Kazuyoshi, Tatsumi, Kazuya

Course Description   The important learning objective of this class is to understand the fundamental mechanisms of momentum, heat, and mass transfer phenomena, the knowledge of which will be markedly required for the thermal energy control technologies to further practice conservations of natural resources and energies for sustainable development. Heat and mass transfer processes consisting of conduction and forced/natural convection will be highlighted in detail, referring to the similarity characteristics of flow velocity, fluid temperature, and species concentration. Some topics on Reynolds stress, turbulent heat flux, and phase change will be introduced, expanding to their numerical models, together with some recent trends of high-tech heat and energy devices.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Surrounding Examples of Transport Phenomena	1	
Governing Equations and Non-Dimensional Parameters	3 4	
Boundary Layer Flows	2 3	
External and Internal Flows	1 2	
Turbulent Phenomena	2 3	
Topics of Flow and Heat Transfer Mechanism	2 3	
Estimation on Study Achievement	1	

Textbook

Textbook(supplemental)   Example: Transport Phenomena (Bird, R.B. et al.)

Prerequisite(s)

Web Sites

Additional Information

Molecular Fluid Dynamics

Code   10G019   Course Year   Master 1st   Term   2nd term   Class day & Period   Tue 1st   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	2	
	5	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Optics and Spectroscopy

Code　10G021　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Wed 1st

Location　C3-Lecture Room 3　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	1	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physics of Neutron Scattering

Code   10B628   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 4th

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   T. Fukunaga, K. Mori

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

High Energy Radiation Effects in Solid

Code   10B631   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Experimental Techniques and Analysis in Engineering Physics

Code   10B634   Course Year   Master and Doctor Course   Term   (intensively; in summer vacation)

Class day & Period   Location   Research Reactor Institute   Credits 2   Restriction   No Restriction

Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Robotics

Code   10B407   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Fumitoshi Matsuno

Course Description   Understanding of intelligent behaviors of living things is very interesting. And realization of their intelligent motion by a robot is also attractive for mechanical engineering. In this lecture, we consider basic understanding of beautiful human skill "manipulation" on the point of view of dynamics and control. First modeling methodologies for a rigid multibody system and a general dynamic model of a manipulator are provided. Next, a typical nonlinear control law is introduced and some problems for applying the controller are shown. Based on nature of the dynamics of the manipulator, a very simple and robust controller can be derived by designing energy of the system. This lecture provides modeling methodologies and controller design strategies of the rigid multibody system and we analyze a beautiful human skill of the manipulation.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Vibration and Noise Control

Code   10G023   Course Year   Master 1st   Term   2nd term   Class day & Period   Mon 1st

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Hiroshi MATSUHISA, Hideo UTSUNO

Course Description   Vibration and noise control of machines and structures are explained. Passive, active and semi-active vibration controls explained.

Grading   Examination

Course Goals   Understand the basic theories of vibration and sound control and be able to apply them to the actual problem.

Course Topics

Theme	Class number of times	Description
Passive vibration control	2	
Semi-active vibration control	2	
Active vibration control	2	
Modal Analysis	1	
Theory of sound	3	
Propagation of sound in outdoor field	2	
Indoor sound	1	
Technology of noise reduction	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanical Functional Device Engineering

Code   10G025   Course Year   Master 1st   Term   2nd term   Class day & Period   Wed 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Theory for Design Systems Engineering

Code   10Q807   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Tetsuo Sawaragi and Hiroaki Nakanishi

Course Description   The lecture focuses on the human design activity; designing artifacts (things, events and systems) based on human intuitions, and designing human-machine systems in which the relations between human and objects are of importance.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

High Precision Engineering

Code   10B828   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese+Englihs   Instructor   Ari Ide-Ektessabi

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	Introduction to High Precision Analysis Using Synchrotron Radiations
High precision Measurement	2	Synchrotron Radiation and X-ray Fluorescence Spectroscopy
High precision Measurement	3	Micro Imaging and Quantitative XRF micro Analysis
High precision Measurement	4	Fine Structure Spectroscopy
High precision Measurement	5	Fine Structure Spectroscopy
High precision Measurement	6	Synchrotron Radiation Measurement
Applications in bio-nano technology	7	Elemental Images of Single Neurons by Using SR-XRF I
Applications in bio-nano technology	8	Elemental Images of Single Neurons by Using SR-XRF II
Applications in bio-nano technology	9	Elemental Imaging of Mouse ES Cells(Application)
Applications in bio-nano technology	10	Application of Synchrotron Radiation in the Investigation of process of neuronal differentiation
Applications in bio-nano technology	11	Chemical State Imaging for Investigations of Neurodegenerative Disorders (Parkinsonism-Dementia Complex)
Applications in bio-nano technology	12	Chemical State Imaging for Investigations of Neurodegenerative Disorders: Chemical State of Iron in Parkinsonism Dementia Complex (PDC)
Applications in bio-nano technology	13	Comparison with other techniques
Applications in bio-nano technology	14	Comparison with other techniques
	15	

Textbook

Textbook(supplemental)   Application of Synchrotron Radiation, Arid Ide-Ektessabi, Sp ringer 2007

Prerequisite(s)

Web Sites   http://ocw.kyoto-u.ac.jp/graduate-school-of-engineering-jp/ultra-high-precision-analysis/schedule

Additional Information

Biomechanics

Code   10V003   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   Credits 2   Restriction   Lecture Form(s)   Language Japanese   Instructor Taiji Adachi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biomolecular Dynamics

Code   10D450   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	2	
	2	
	3	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Environmental Fluid Dynamics

Code   10B440   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	6	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Turbulence Dynamics

Code   10Q402   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 3rd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Hanazaki

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Crystallography of Metals

Code　10G055　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Thu 3rd

Location　C3-Lecture Room 3　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture　　Language　Japanese

Instructor

Course Description　　Metallic crystal structure and deformation behavior are lectured on the basis of metal physics and dislocation theory. Especially, mechanical properties of dislocation and its substructure, which is changed in association with deformation, are introduced, and the effect of grain boundary and free surface on dislocation motion is explained.

Grading　　Reporting assignment

Course Goals　　The objective of this lecture is to deepen a further understanding of crystal growth methods, the dislocation theory and industrial problems.

Course Topics

Theme	Class number of times	Description
Introduction	1	Introduction 　Ideal strength and slip deformation 　Concept of dislocation 　Simulation
Basis of crystallography	1	Typical crystallographic structure 　Allotropic transformation 　Stereographic projection of crystal
High temperature and vacuum techniques	1	Furnace 　Vacuum pump
Crystal breeding	2	Single- and bi-crystal growth 　Crystal growth 　Vapor deposition and thin film
Dislocation theory	3	Plastic deformation of crystal 　Definition and type of dislocation 　Strain field around dislocation 　Dislocation reaction 　Dislocation multiplication
Mechanical properties of single- and bi-crystals	1	Dislocation substructure 　Grain boundary structure 　Reaction between dislocation and grain boundary 　Deformation of micro- and nano- materials
Fatigue	3	Fatigue of single crystal 　Fatigue dislocation substructure 　Fatigue cracking mechanism 　Fatigue of micro- and nano- materials
Observation and analysis techniques	2	Introduction of electron microscope and observation case
Summary	1	Discussion and report

Textbook　　The teacher provide articles for this lecture.

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar: Dynamics of Atomic Systems

Code   10Q610   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 5th

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture + Exercise

Language   Japanese   Instructor   M. Matsumoto, M. Nishikawa, R. Matsumoto, T. Shimada, Y. Inoue

Course Description   Particle simulations are a tool of analyzing microscopic phenomena, and widely used in various fields of science and engineering. After providing the basics of particle simulation methods through lectures and exercises, we show various practical applications in thermofluids, solid materials, and quantum systems.

Grading   Reports, presentation/discussion

Course Goals   - Understanding the basics of particle simulations - Mastering data analysis techniques

Course Topics

Theme	Class number of times	Description
Basics of MD simulations (M.Matsumoto)	5	- Numerical simulation of equations of motion - Model potentials - Data analysis - Equilibrium vs. non-equilibrium
Application: Thermofluidal systems (M. Matsumoto)	2	- Lennard-Jones fluids - Interface, phase change, energy transport, etc.
Application: Polymeric materials (Nishikawa)	2	
Application: Biosystems (Inoue)	2	
Application: Solid systems (R. Matsumoto)	2	- Deformation and destruction - Alternative methods
Application: Quantum systems (Shimada)	2	- First principle MD - Mechanical and electronic properties on nanoscale

Textbook

Textbook(supplemental)

Prerequisite(s)   Elementary Level of
Analytical mechanics, Quantum mechanics, Material science, Statistical physics, Numerical analysis

Web Sites

Additional Information

Neutron Science Seminor 1

Code   10V007   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   Research Reactor Institute   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Neutron Science Seminar II

Code   10V008   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period

Location   Reseach Reactor Institute   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Applied Mechanics A

Code   10W025   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	-	
	-	
	-	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W027

Seminar on Applied Mechanics B

Code   10W027   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	-	
	-	
	-	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Patent Seminar

Code   10G029   Course Year   Master Course   Term   2nd term   Class day & Period   Fri 2nd   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Micro Process and Material Engineering

Code 10G203 Course Year Master Course Term 1st term Class day & Period Mon 4th

Location C3-Lecture Room 2 Credits 2 Restriction No Restriction Lecture Form(s) Lecture

Language Japanese Instructor H. Kotera, O. Tabata, K. Eriguchi, I. Kanno, T. Tsuchiya

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Semiconductor microfabrication	3	
Thin-film process and evaluation	3	
Silicon micromachining	3	
3D lithography	2	
Soft-micromachining	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Microsystem Engineering

Code   10G205   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 3rd

Location   C3-Lecture Room 4a   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   Microsystem covers not only technologies related to individual physical or chemical phenomenon in micro scale, but also complex phenomena which are eveolved from their interaction. In this course, the physics and chemistry in micro and nanoscale will be lectured in contrast to those in macro scale. The various kinds of application devices (ex. physical (pressure, flow, force) sensors, chemical sensors, biosensors, actuators (piezoelectric, electrostatic, and shape memory) and their system are discussed.

Grading   The evaluation will be based on the reports given in each lecture.

Course Goals   Understand the theory of sensing and actuating in microsystem. Acquire basic knowledge to handle various kinds of phenomena in microscale.

Course Topics

Theme	Class number of times	Description
MEMS modeling	2	Multi-physics modeling in microscale. Electro-mechanical coupling analysis.
MEMS simulation	2	System level simulation in MEMS.
Electrostatic microsystem	3	Electrostatic sensors and actuators. Theory and application devices.
Physical sensors	4	Physical sensors as a fundamental application in microsystem. Accelerometer, vibrating gyroscope, pressure sensors.
Micro total analysys system	4	Chemical analysis system and bio-sensing device using microsytem.

Textbook   Provided in the lecture.

Textbook(supplemental)   Provided in the lecture.

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is strongly recommended to take a course 10V201 "Introduction to the Design and Implementation of Micro-Systems", which is a practice for designing microsystem. Those who wants to take this course, please contact one of the instructors as early as possible.

Multi physics Numerical Analysis

Code   10G209   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 1st

Location   Engineering Science Depts Bldg.-101   Credits   2   Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	2	
	2	
	5	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Theory of Condensed Matter

Code   10B619   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Solid State Physics 1

Code   10G211   Course Year   Master 1st   Term   2nd term   Class day & Period   Wed 1st

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Precision Measurement and Machining

Code   10G214   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location C3 seminar room c1   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language

Instructor   A. Matsubara and S. Ibaraki

Course Description   This course gives the principles of precision measurement and machining process for the meso-micro-nano metric fabrication. The optical measurement technologies (e.g. laser interferometer, optical encoders) and cutting technologies (e.g. cutting mechanics, tool, machine) are shown.

Grading   Small exams in the term and the final exam

Course Goals   Understand the basic principles of precision mesurement and machining associated with the applications

Course Topics

Theme	Class number of times	Description
Basics of measurement and machining	1	Concept of accuracy, precision, Relation of measurement, machining, and control
Basics of precision measurement	2	
Optical mesurement	4	
	3	
	1	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to the Design and Implementation of Micro-Systems

Code   10V201   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 4b   Credits   2   Restriction   Take class 10G205 "Microsystem Engineering"

Lecture Form(s)   Lecture and Pactice   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   This is a joint lecture with Hong Kong University of Science and Technology (HKUST). A team consists of two students from each University work together to fullfill the assignment (design a microsystem) through paper survey, analysis,design, and presentation. A student can acquire not only the basic knowledge of a microsystem, but also comprehensive ability of English such as technical knowledge in English, skill for team work, and communication.

Grading   Presentation, Assignments, and Achievement

Course Goals   Acquire the knowledge and skill to design and analyze a microsystem.

Course Topics

Theme	Class number of times	Description
Tutorial on microsystem CAD software	3	Master CAD program for microsystem design and analysis which will be utilized to accomplish an assignment.
Lecture and Task Introduction	2	Learn basic knowledge necessary to design a microsystem/MEMS(Micro Electromechical Systems) utilizing microfabrication technology.
Design and analysis work	3	Analyze and design a microsystem by communicating with a team member of HKUST.
Presentation I	2	The designed device and its analyzed results is presented in detail by team in English.
Evatuation of device	3	Evaluate the fabricated microsystem.
Presentation II	2	The measured results and comparison between the analyzed results of the fabricated microsystem is presented by team in English.

Textbook

Textbook(supplemental)

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is required to take the course 10G205 "Microsystem Engineering", which provide the knowledge about the theory of sensing and actuating in microsystem. Those who wants to take this course have to take training course for CAD in advance. For more detail, please contact one of the instructors as early as possible.

Introduction to Biomedical Engineering

Code   10W603   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Intensive Lecture   Language   Japanese

Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Theory of Molecular Physics

Code   10B617   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Theory of Chemical Physics

Code   10Q408   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Solid State Physics 2

Code   10V205   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4-5	
	4-5	
	4-5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Transport Phenomena in Reactive Flows

Transport Phenomena in Reactive Flows

Code   10G423   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 1st

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   English   Instructor   YOSHIDA Hideo, IWAI Hiroshi

Course Description   This lecture is designed for the students who want to gain their knowledge and understanding on transport phenomena associated mainly with convective flows with chemical reactions. It starts with a brief review of undergraduate level subjects followed by more advanced discussion on heat and mass transfer with reactions. The reactions of interest in the lecture include combustion (oxidation), reforming and electrochemical reactions. As the reactions may proceed on catalysts, the discussion covers the catalytic surface reactions, reactions in porous media as well as gas phase reactions. The students are expected to have learned fundamentals of Fluid dynamics, Thermodynamics and Heat transfer during their undergraduate courses.

Grading   Grade evaluation is based on attendance, short reports and one's term paper submitted at the end of the semester.

Course Goals   Starting from the basic heat and mass transfer, the lecture aims to expand the students' comprehensive understanding on transport phenomena in physicochemical processes including thermochemical and electrochemical reactions.

Course Topics

Theme	Class number of times	Description
Transport phenomena in reactive flows	14	Transport phenomena in convective flows with chemical reactions including combustion (oxidation), reforming and electrochemical reactions.
Achievement Confirmation	1	Achievement Confirmation

Textbook

Textbook(supplemental)

Prerequisite(s)   Fluid dynamics, Thermodynamics, Heat transfer

Web Sites

Additional Information   This course will not be opened in 2015.

Jet Engine Engineering

Code 10G401 Course Year Master and Doctor Course Term 2nd term Class day & Period Wed 1st

Location C3-Lecture Room 2 Credits 2 Restriction No Restriction Lecture Form(s)

Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Optimum System Design Engineering

Code   10G403   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	4	
	2	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Propulsion Engineering, Adv.

Code   10G405   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Gas Dynamics, Adv.

Code 10G406   Course Year   Term 2nd term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Aerospace Systems and Control

Code   10G409   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	4	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fluid Dynamics for Aeronautics and Astronautics

Code　10G411　Course Year　Master and Doctor Course　Term　1st term　Class day & Period　Tue 1st

Location　C3-Lecture Room 2　Credits　2　Restriction　No Restriction　Lecture Form(s)　Lecture

Language　Japanese　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	3	
	3	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Flight Dynamics of Aerospace Vehicle

Code   10C430   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 4th

Location   C3-Lecture Room 3   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kei Senda

Course Description   Flight Dynamics and Control of Aerospace Vehicles including Analytical Mechanics, Attitude Dynamics of Vehicles, Orbital Mechamics, etc.

Grading   Evaluation depends on marks of examination and exercises.

Course Goals   To understand analytical mechanics through flight dynamics of aerospace vehicles: Basic items of Analytical Mechanics, Attitude Dynamics of Vehicles, Orbital Mechanics, etc.

Course Topics

Theme	Class number of times	Description
Analytical Mechanics	6	1. Newton equations, 2. Lagrange equations, 3. Hamilton equations
Orbital Mechanics	4	1. Motions in central force field, 2. Conservation law, 3. Orbit transition
Attitude Dynamics and Control	4	1. Kinematics of rotation, 2. Attitude mechanics, 3. Stability analysis of equilibrium points, 4. Attitude Control
Achievement Confirmation	1	Achievement Confirmation

Textbook

Textbook(supplemental)   L. D. Landau and E. M. Lifshitz: Mechanics, Volume 1 (Course of Theoretical Physics

Herbert Goldstein: Classical Mechanics

Toda and Nakajima: Introductory course of physics #1, #2, #10, etc. (Iwnami Shoten)

Prerequisite(s)   Foundation of mechanics and mathematics, Flight Dynamics of Aerospace Vehicle (Undergraduate)

Web Sites

Additional Information

Seminar on Engineering Science of Ionized Gases

Code   10V401   Course Year   Doctor Course   Term   2nd term   Class day & Period   Mon 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	13	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Molecular Gas Dynamics

Code   10V010   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Gas Dynamics

Code 10V412   Course Year   Term 1st term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10V405

Seminar on Fluid Dynamics for Aeronautics and Astronutics

Code   10V405   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   C3-Lecture Room 5   Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	14	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Aerospace systems

Code   10R410   Course Year   Doctor Course   Term   2nd term   Class day & Period   Mon 4th

Location   C3-Lecture Room 2   Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Systems and Control

Code   10R419   Course Year   Doctor Course   Term   1st term   Class day & Period   Tue 4th

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Optimum System Design Engineering

Code   10V407   Course Year   Doctor Course   Term   2nd term   Class day & Period   Tue 3rd

Location   C3-Lecture Room 2   Credits 2   Restriction No Restriction   Lecture Form(s) Seminar and Exercise

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermal Engineering Seminar

Code   10V409   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 3rd

Location C3-Lecture Room 3   Credits   Restriction   Lecture Form(s)   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Mechanics of Functional Solids and Structures

Code   10V413   Course Year   Doctor Course   Term   2nd term   Class day & Period   Wed 4th

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   Japanese   Instructor   S. Biwa

Course Description   This Seminar is to review advanced topics related to materials and structural systems involved in aeronautics and astronautics, as well as to nurture the presentation and discussion skills. Specific topics include the numerical methods for mechanical behavior of thin-walled structures and composite/functional materials, and advanced experimental techniques for structural health monitoring.

Grading   Grading is based on the literature survey, presentation, discussion and the final report.

Course Goals   The goal is to nurture the skills to survey and discuss advanced topics in the mechanics of functional materials and structures as well as structural health monitoring, and to utilize them in carrying out the research project.

Course Topics

Theme	Class number of times	Description
Subject setting	3	Literature survey is to be carried out for advanced topics in the mechanics of functional materials and structures as well as structural health monitoring.
Presentation and discussion	11	The results of literature survey are presented and discussed with the critical evaluations for them.
Assessment	1	The achievement is assessed by the final report.

Textbook   No textbooks are assigned. Relevant papers are distributed.

Textbook(supplemental)

Prerequisite(s)   Fundamental knowledge of solid mechanics is preferable.

Web Sites

Additional Information   The time units of each stage are subject to change depending on each year's conditions.

Theory of Symbiotic Systems

Code   693518   Course Year   Doctor Course   Term   2nd term   Class day & Period   Mon 4th

Location   Integrated Research Bldg.-213   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture

Language   Japanese   Instructor   , ,

Course Description   Various theories on developing and maintaining harmonious symbiosis among humans, artifacts, and environments are lectured and discussed. Topics include typical forms of harmonious coexistence such as in ecological systems, caring and artistic nature of communication and interactions, philosophical discussions on deep-ecology, and methodologies for designing symbiotic systems.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2	
	1	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Control Theory for Mechanical Systems

Code   693510   Course Year   Master Course   Term   1st term   Class day & Period   Mon 2nd

Location   Engineering Science Depts Bldg.-315   Credits   2   Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693513

Theory of Human-Machine Systems

Code 693513   Course Year Master Course   Term 2nd term   Class day & Period Mon 3rd   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor ,

Course Description

Grading

Course Goals

Course Topics

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

Dynamical Systems,Advanced

Code   693431   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 1st

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

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693410

Mathematical Analysis,Advanced

Code   693410   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 3rd

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

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Topics in Nonlinear Dynamics A

Code 693320   Course Year Master and Doctor Course   Term   Class day & Period   Location   Credits

Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693321

Topics in Nonlinear Dynamics B

Code 693321   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits   Restriction   Lecture Form(s)   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code 693321   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Heat Engine Systems

Code   653316   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	3	
	7	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

653322

Combustion Science and Engineering

Code   653322   Course Year   Master Course   Term   1st term   Class day & Period   Tue 1st   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Meteorology I

Code   10M226   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Meteorology II

Code 10M227 Course Year Master Course Term 1st term Class day & Period Wed 2nd Location

Credits 2 Restriction Lecture Form(s) Lecture Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Advanced Nuclear Engineering

Code   10C072   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nuclear Energy Conversion and Reactor Engineering

Code   10C034   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   KAWARA, KUNUGI, YOKOMINE

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physics of Fusion Plasma

Code   10C038   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C037

Multiphase Flow Engineering and Its Application

Code 10C037   Course Year Master and Doctor Course   Term 2nd term   Class day & Period Wed 2nd   Location

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

Instructor   KUNUGI, Tomoaki, YOKOMINE, Takehiko

Course Description   Reviewing of the fundamental definition and characteristics of multiphase flows, and to learn the governmental equations and some modelings of the constitutive equations and the current status of the multiphase flows. Moreover, to review and learn the fundamental definition and characteristics of particle flows, and to learn the numerical methods to track the particle laden flows and the particle measurement method.

Grading   Present a summary of some papers regarding multiphase flows research by using a power point, and then answer several questions made by lecturers. The quality of your presentation and how deep understand your subject are the grading point.

Course Goals   As for the multiphase flows, to learn its fluid dynamics behaviors, governing equations and numerical methods, and finally to discuss its applications to many engineering fields.

Course Topics

Theme	Class number of times	Description
What's the multiphase flows?	1	To review the definitions and fundamental characteristics of multiphase flows.
Governing equation of gas-liquid two phase flows	2	To learn the governing equation of gas-liquid two phase flows
Modeling of gas-liquid two phase flows	2	To learn modeling of gas-liquid two phase flows and its constitutive equations
Numerical methods	3	To learn the numerical methods to solve the single-phase and two-phase flows
Examples of gas-liquid two phase flow analysis	1	To show some examples of gas-liquid two phase flow analysis
Characteristics of particle flows	1	Review characteristics of particle flows
Fundamental aspect of particle flows	1	Explain variables and parameters subjected to interaction between particle and particle and/or particle or flow. Moreover, momentum and heat exchange between phases, i.e., to explain One-way, Two-way and Four-way coupling numerical methods.
Particle methods	2	Explain numerical method for thermofluid including static particles like a packed bed. Moreover, numerical methods for macroscopic and microscopic particles such as Discrete Element Method.
Measurements of particle characteristics	2	Review several measuring methods of particle characteristics and thermofluid behaviors

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nonlinear Physics in Fusion Plasmas

Code   10R013   Course Year   Doctor Course   Term   1st term   Class day & Period   Tue 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   English   Instructor   Atsushi Fukuyama

Course Description   This course provides a comprehensive introduction to computational modeling and simulation of magnetically confined fusion plasmas. Topics include elements of nonlinear plasma physics, modeling of various phenomena in fusion plasmas, computational methods in plasma physics, and integrated simulation of fusion plasmas

Grading   Report in English

Course Goals

Course Topics

Theme	Class number of times	Description
Nonlinear Phenomena in Plasma Physics	1	Review of nonlinear phenomena in plasmas; modeling of plasmas
Nonlinear Waves in Plasmas	2	Nonlinear ion acoustic waves; Korteweg de Vries equation; Soliton; Nonlinear Schrodinger equation
Wave-Particle Interaction in Plasmas	2	Linear wave particle resonant interaction; Landau damping; Trapping in a single wave: Nonlinear interaction with waves; Stochastic particle motion; Quasi-linear interaction
Wave-Wave Interaction in Plasmas	2	Parametric instability; Three-wave interaction
Numerical Analysis of Differential Equations	4	Basics of numerical simulations; Ordinary differential equation; Partial differential equation; Matrix solver
Numerical Simulation of Fusion Plasmas	3	Numerical simulation of fusion plasmas: equilibrium, transport, heating and current drive, stability, energetic particles, integrated modeling
Assessment of Achievement	1	Assessment of Achievement

Textbook   None

Textbook(supplemental)

Prerequisite(s)   Plasma Physics, Fundamental Magnetohydrodynamics, Fusion Plasma Physics

Web Sites

Additional Information

10F010

Bridge Engineering

Code   10F010   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 3rd   Location   C1-172   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Hiromichi Shirato, Kunitomo Sugiura, Tomoaki Utsunomiya, Tomomi Yagi

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

Grading   Assessment will be based on exam, reports and attendance.

Course Goals

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

Course Topics

Theme	Class number of times	Description

Introduction	1	- Fundamental knowledge on steel structures
		  - Types of steel structures
		  - Future trend of steel structures

Material behavior, Initial imperfections and Damages	1	- Construction of steel structures
		  - Residual stresses and initial deformations
		  - Damages

Stress-strain relationship, Joints	1	- Yield surfaces
		  - Bauschinger effect
		  - Hardening effect
		  - Welded joint
		  - Bolted joint

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

Structural stability and design for buckling	1	- Structural instability and accident
		  - Theory of Stability
		  - Compressive members, etc.

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

Wind resistant design of structures	3	- Natural winds due to Typhoon, Tornado and so on
		  - Evaluation and estimation of strong winds
		  - Wind resistant design methods
		  - Various kinds of design codes

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

Wind-induced disaster	1	- Accidents on structures due to strong winds - Disaster prevention
Topics	1	Introduction of current topics on bridge engineering by a visiting lecturer
Confirmation of the attainment level of learning	1	Confirm the attainment level of learning

Textbook

Textbook(supplemental)

Prerequisite(s)   Basic knowledge for construction materials, structural mechanics and fluid mechanics are required.

Web Sites

Additional Information

Structural Design

Code   10F009   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd   Location   C1-173

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Tomoaki Utsunomiya, Yoshikazu Takahashi, Yoshiaki Kubota

Course Description   This course provides the knowledge of the structural planning and design for civil infrastructures. Fundamentals of the reliability of structures based on the probability and statistics are given. Emphasis is placed on the reliability index and the calibration of partial safety factors in the LRFD design format. Furthermore, the structural morphology, aesthetics and case studies of structural design that satisfies " utilitas, firmitas and venustas" are given. Then we discuss what the holistic structural design should be.

Grading   Assessed by term-end examination, reports and quizes

Course Goals   To understand the structural planning and design for civil infrastructures.

To understand the reliability-based design of structures.

To deepen the understanding of aesthetics of structures.

Course Topics

Theme	Class number of times	Description
Structural Planning	2	Structural Planning of civil infrastructures is introduced. The concept, significance of planning, characteristics of civil infrastructures are discussed. Practical planning process of a bridge is explained.
Modern Excellent Designs	1	The excellent examples of modern structural design are introduced from the viewpoint of the structural system and the urban design. Then the importance of integrated design of urban infrastructure as a place of human activities and how the design should be are lectured.
Structure and Form	2	The bridge types, for example, girder, truss, and arch etc. that have been regarded individually, are lectured as an integrated holistic concept from the viewpoint of the acting forces to understand the structural continuity, symmetry and the systems. Furthermore, the methods of the operation of structural form are given.
Structural Design and Performance-based Design	3	Design theory of civil infrastructures is introduced. The allowable stress design method and the limit state design method are explained. The basic of earthquake resistant design is discussed based on the dynamic response of structures. Performance-based design is also introduced.
Random Variables and Functions of Random Variables	1	Fundamentals of random variables, functions of random variables, probability of failure and reliability index in their simplest forms are lectured.
Structural Safety Analysis	3	Limit states, probability of failure, FOSM reliability index, Hasofer-Lind reliability index, Monte Carlo method are lectured.
Design Codes	2	Code format as Load and Resistance Factors Design (LRFD) method, calibration of partial safety factors based on the reliability method are given.
Assessment of the Level of Attainment	1	Assess the level of attainment.

Textbook   Reliability of Structures, A. S. Nowak & K. R. Collins, McGraw-Hill, 2000 (for T. Utsunomiya)

Textbook(supplemental)   U.Baus, M.Schleich, "Footbridges", Birkhauser, 2008   Japanese ver.: "Footbridges"(translated by Kubota, et al.),   , 2011

          ,   ,   , 2010

Other books will be given in the lectures as necessary.

Prerequisite(s)   Fundamental knowledge on Probability and Statistics, and Structural Mechanics

Web Sites

Additional Information   Structural planning and design will be given by Y. Takahashi, Excellent designs and structure & forms by Y. Kubota, and Structural reliability analysis by T. Utsunomiya.

Infrastructural Structure Engineering

Code   10W001   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   English   Instructor   Related Faculty members

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

Grading   Coursework will be graded based on the reports.

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

Course Topics

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

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

Textbook(supplemental)   Supplemental text books will be introduced by instructors.

Prerequisite(s)   Structural Mechanics, Wind Resistant Design, Construction Materials, Dynamics of Structures, etc.

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics A

Code   10W005   Course Year   Doctor 1st   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics B

Code   10W007   Course Year   Doctor 1st   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics C

Code   10W009   Course Year   Doctor 2nd   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics D

Code   10W011   Course Year   Doctor 2nd   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics E

Code   10W013   Course Year   Doctor 3rd   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Exercise in Applied Mechanics F

Code   10W015   Course Year   Doctor 3rd   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship M

M

Code   10W019   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship DS

DS

Code   10W021   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship DL

DL

Code   10W023   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   6   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar of Complex Mechanical Engineering,A

Code   10V025   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 1st

Location   C3-Lecture Room 2   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.
Registration is required by the deadline. Contact at
cme-seminar@me.kyoto-u.ac.jp

Seminar of Complex Mechanical Engineering,B

Code   10V027   Course Year   Doctor Course   Term   2nd term   Class day & Period   Thu 1st

Location   C3-Lecture Room 2   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.
Registration is required by the deadline. Contact at
cme-seminar@me.kyoto-u.ac.jp

Seminar of Complex Mechanical Engineering,C

Code   10V029   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 1st

Location   C3-Lecture Room 2   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.
Registration is required by the deadline. Contact at
cme-seminar@me.kyoto-u.ac.jp

Seminar of Complex Mechanical Engineering,D

Code   10V031   Course Year   Doctor Course   Term   2nd term   Class day & Period   Thu 1st

Location   C3-Lecture Room 2   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki, Ikeda

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.
Registration is required by the deadline. Contact at
cme-seminar@me.kyoto-u.ac.jp

Seminar of Complex Mechanical Engineering,E

Code   10V033   Course Year   Doctor Course   Term   2nd term   Class day & Period   Thu 1st

Location   C3-Lecture Room 2   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.
Registration is required by the deadline. Contact at
cme-seminar@me.kyoto-u.ac.jp

Seminar of Complex Mechanical Engineering,F

Code   10V035   Course Year   Doctor Course   Term   2nd term   Class day & Period   Thu 1st

Location   Engineering Science Depts Bldg.-215   Credits   1   Restriction   Lecture Form(s)   Seminar

Language   English   Instructor   Matsuno, Ide, Matsumoto, Takata, Suzuki, Ikeda

Course Description   This seminar provides doctor-course students an opportunity of face-to-face group discussions to exchange ideas and information with those from other research fields. It is also emphasized in this seminar to give the attendees a chance to boost up the presentation skills necessary to broaden their own expertise across multi-disciplinary research fields. The primal aim is to offer these significant experiences of leadership as a young scientist with broad perspective in the global community.

Grading   Based on Group Activity Reports and Personal Report

Course Goals

Course Topics

Theme	Class number of times	Description
Self introduction	1-2	
Organizing groups	1	
Group activity	10-12	Each group chooses an activity theme, and pursue the goal through discussion in the group. Weekly reports on the activity are required.
Final presentation	1-2	Each group gives presentation of its final resutls.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   All activities should be done in English.

Structural Testing Technology

Code   10W017   Course Year   Master and Doctor Course   Term   Class day & Period   Summer vacation period

Location   Structural testing laboratory   Credits   2   Restriction   No Restriction   Lecture Form(s)   Exercise   Language   Japanese

Instructor   Hiromichi SHIRATO, Kunitomo SUGIURA

Course Description   The structural design method is going to shift to the performance based design. Since applications of new construction methods and new technology can be accelerated by the use of performance based design, it is necessary to evaluate the performance of structures by the material and structural tests. In this class, the various test methods under static and dynamic loading will be discussed including shaking table test, wind tunnel test and nondestructive evaluation. Instrumentation to measure strain, force, acceleration, temperature and other physical state variables is also discussed through the course work.

Grading   Grade is given based on attendance and reports.

Course Goals   To carry out the structural performance evaluation by material test and structural test based on fundamental understanding of measurement of strain, deflection and vibration in conjunction with the development of design methodology, computing technology, electronics and instrumentations.

Course Topics

Theme	Class number of times	Description
Introduction	1	Physical modeling in structural engineering -Modeling process -Modeling case studies
Dimensional analysis	1	Dimensional analysis for structural models -Similitude requirements(general) -Elastic model -Inelastic model
Instrumentation	2	Data acquisition -Strain -Displacement -Stress and Force -Acceleration -Temperature -Crack detection -Smart structures
Loading system	2	-Loading apparatus -Hydraulic system -Computer control -Loading techniques
Material test	3	-Universal testing machine -Fatigue testing machine -Stress vs. strain relation
Structural testing	3	-Static loading test -Hybrid loading test -Considerations in testing
Shaking table test	1	-Structural models for seismic loading -Similitude requirements -Considerations in shaking table test
Wind tunnel test	1	-Structural models for wind loading -Similitude requirements -Considerations in wind tunnel test
Nondestructive evaluation	1	-Strain measurement -Ultrasonic test -Magnetic particle test -Infrared test

Textbook

Textbook(supplemental)   introduced if necessary

Prerequisite(s)   Knowledge on construction materials, structural mechanics, structural dynamics, instrumentation engineering are required.

Web Sites

Additional Information

Advanced Experiment and Exercise in Applied Mechanics I, II

Code   10V037   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10V037   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

10V039

Advanced Experiment and Exercise in Applied Mechanics I, II

Code   10V039   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Infrastructure Creation Engineering

Code　10F081　　Course Year　Master and Doctor Course　　Term　1st term　　Class day & Period　Thu 4th　　Location　C1-192

Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture　　Language　Japanese　　Instructor　related teaching staff

Course Description　A system of scientific principles and technologies is required which enable to create safe, reliable and vigourous human society with enough world-wide competitiveness. The class of Infrastructure Creation Engineering will lecture ongoing, retrospective and perspective on global environment, fundamental science/engineering, social science, social ecomonics and major scientific pronciples and technologies on natural environment including ecological system, which are needed to develop infrastructures.

Grading　Grading will be based on reports (70%) and evaluation in each class (30%).

Course Goals　It is aimed to make understand a system of scientific principles and technologies shich is required to create human society with sustainable development and to indicate their concept clearly. Major contents to create infrastructure as well as fundamental knowledge on its retrospective and perspective will be able to be learned.

Course Topics

Theme	Class number of times	Description
Role of geotechnics in sustainable infrastructure creation	2	
Role of hydro mechanics and water engineering in infrastructure creation and its evaluation	2	
Planning for infrastructure creation	2	
Subjects in material and structural engineering in rebuilding of infrastructure	2	
Role of earth resouses engineering for sustainable development in harmonious with environment	2	
Role of environmental engineering in infrastructure creation	2	
Thermal fliuid dynamics for fundamental understanding of global environmental subjects	2	
Confirmation of educational achievement	1	

Textbook　None

Textbook(supplemental)　To be introduced at any time

Prerequisite(s)　It is desired to acquire basic knowledge on civil, environmental, eath resources and mechanical engineering.

Web Sites　None

Additional Information　To present in every class will be checked.

Developmental and Sustainable Infrastructure Engineering Seminar A

A

Code   10W201   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Developmental and Sustainable Infrastructure Engineering Seminar B
B

Code   10W203   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Infrastructural Structure Engineering

Code   10W001   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   English   Instructor   Related Faculty members

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

Grading   Coursework will be graded based on the reports.

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

Course Topics

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

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

Textbook(supplemental)   Supplemental text books will be introduced by instructors.

Prerequisite(s)   Structural Mechanics, Wind Resistant Design, Construction Materials, Dynamics of Structures, etc.

Web Sites

Additional Information

10F065

Hydraulic Engineering for Infrastructure Development and Management

Code   10F065   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 3rd
Location   C1-117   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English
Instructor   Hosoda Takashi, Toda Keiichi, Gotoh Hitoshi, Tachikawa Yasuto, Kisihida Kiyoshi, Harada Eiji,
Sanjou Michio and Khayyer Abbas

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

Grading   Grading is based on students activities in lectures and reports.

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

Course Topics

Theme	Class number of times	Description
Introduction	1	The purpose and constitution of the lecture, the method of the scholastic evaluation are explained.
Hydraulics in open-channel flows	3	Several problems and exciting topics related to hydraulics in open-channel flows are discussed with advanced practical examples.
River basin management	3	Introduction of flood disasters during a few decades in the world, flood control planning in Japan, Economic evaluation and analysis of people's awareness to river improvement projects with dam construction.
Beach erosion	3	Several problems and their solution methodology against sediment transport process in coastal zone are explained. Advanced approaches for sediment control are overviewed.
Rainfall-runoff prediction and hydrologic design	3	Water resources issues related to rainfall-runoff prediction and hydrologic design are discussed with advanced practical examples.
Numerical simulation for Hydraulic engineering	1	Recent numerical simulation development and related state-of-the-art technologies are overviewed.
Achievement Confirmation	1	Comprehension check of course contents.The exercises to the given subjects are performed.

Textbook   Non

Textbook(supplemental)   Non

Prerequisite(s)   hydraulics, fluid mechanics, river engineering, coastal engineering, hydrology, etc.

Web Sites   Non

Additional Information   Non

Infrastrucuture Planning

Code   10W207   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 5th

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	4	
	5	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Resources Development Systems

Code 10A402   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period Fri 1st
Location C1-172   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese
Instructor   T. Matsuoka, S. Murata

Course Description   Development of mineral resources and energy resources is essential to the sustainable development of our society and economy. In this class, the exploration and development process of such the natural resources are reviewed including the environmental conservation and harmony. In addition, petrophysics dealing with the basic physical properties of rocks and its application to the resources exploration, fundamentals and applications of reservoir engineering used to evaluate the production behavior and reserves of oil and natural gas are lectured.

Grading   Evaluation is made by the average score of the report problems presented by each teacher.

Course Goals   The goal of this class is to master the fundamentals of petrophysics and reservoir engineering needed for the exploration and development of oil and natural gas resources.

Course Topics

Theme	Class number of times	Description
From exploration to development of natural resources	1	The exploration and development process of mineral resources and energy resources, which are essential to the sustainable development of our society and economy, is reviewed including the environmental conservation and harmony.
Petrophysics used in natural resources development	6	To know the elastic properties of sedimentary rocks is essential when we consider the exploration and development of oil and natural gas resources. For the sedimentary rocks, physical variables, a rule of thumb and the pore fluid that affect the elastic wave velocity are mainly lectured. For igneous rocks, in addition, the rule of thumb on the physical properties of the rocks affected by fractures are lectures, because fractures in the rocks defines their physical properties.
Fundamentals of reservoir engineering	5	The properties of reservoir fluids and the material balance method to evaluate the reserve of oil and natural gas are explained.
Fluid flow in the reservoir	2	Basic equations of fluid flow in the reservoir and the analytical solution for the flow of oil and natural gas around a well are explained, and the concept and the method of well test analysis are also explained.
Enhanced oil and natural gas recovery	1	The methods of enhanced oil and natural gas recovery (EOGR) are overviewed. The essentials of each EOGR method are explained.

Textbook   Handouts are delivered.

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

G.Mavko, T. Mukerji and J. Dvorkin, The rock physics handbook :tools for seismic analysis in porous media, Cambridge University Press, ISBN 0-52l-62068-6

Prerequisite(s)   It is desirable to have knowledge of calculus at the undergraduate level

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

Additional Information   Not specified

Environmental Risk Analysis

Code   10F439   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

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

Optimum System Design Engineering

Code   10G403   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	4	
	2	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Developmental and Sustainable Infrastructure Internship A

ORT   A

Code   10W209   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 5th

Location   C1-173   Credits   2   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Developmental and Sustainable Infrastructure Internship B
ORT   B

Code   10W211   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   C1-117   Credits   4   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Developmental and Sustainable Infrastructure Engineering Seminar I

Code 10W213 Course Year Doctor Course Term 1st+2nd term Class day & Period Location

Credits 4 Restriction Lecture Form(s) Seminar Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Developmental and Sustainable Infrastructure Engineering Seminar II
II

Code   10W215   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F003

Continuum Mechanics

Code   10F003   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kunitomo Sugiura, Tomomi Yagi

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

Grading   Assessment will be based on exam, report and attendance.

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

Course Topics

Theme	Class number of times	Description
Introductions	1	
Matrices and tensors	1	
differential and integral calculus of tensors	1	
Kinematics	1	- Material derivative
Deformation and strain	2	- Strain tensors - Compatibility conditions
Stress and equilibrium equation	1	
Conservation law and governing equation	1	
Constitutive equation of idealized material	1	
Elastic-plastic behavior and constitutive equation of construction materials	1	
Boundary value problem	1	
Variational principle	1	
Various kinds of numerical analyses	2	
Confirmation of the attainment level of learning	1	

Textbook

Textbook(supplemental)

Prerequisite(s)   Basic knowledge for structural mechanics, soil mechanics and fluid mechanics are required.

Web Sites

Additional Information

Structural Stability

Code 10F067 Course Year Master and Doctor Course Term 2nd term Class day & Period Mon 2nd

Location C1-171 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language English

Instructor Hiromichi SHIRATO, Kunitomo SUGIURA

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

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

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

Course Topics

Theme	Class number of times	Description
Elastic Stability under Static Loading	7	Stability of Structures and Failures Basis of Structural Stability Elastic Buckling of Columns Elastic Buckling of Beams & Frames Elastic Buckling of Plates Elasto-plastic Buckling Buckling Analysis
Basic theory of dynamic stability and its application	7	The stability around the equilibrium points based on the state equation of motion in which the nonlinearity of external, damping and restring forces are taken into account. Wind-induced vibration of a square prism (Galloping) and 1dof system with nonlinear spring will be introduced as practical examples. Chaotic motion of a pendulum subjected to periodic external force is also explained as an introduction of chaos theory.
Achievement Check	1	Summary and Achievement Check.

Textbook Not specified.

Textbook(supplemental) Introduced in class if necessary.

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

Web Sites none

Additional Information none

10F068

Material and Structural System & Management

Code   10F068   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   English   Instructor   Toyoaki Miyagawa, Hirotaka Kawano, Atsushi Hattori, Takashi Yamamoto

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

Grading   Reports ,presentations and other activities are inclusively considered.

Course Goals   To understand the maintenance for a single structure and the asset management for structure's group.

Course Topics

Theme	Class number of times	Description
1. Outline of maintenance for concrete structures	1	
2. Deterioration mechanisms of concrete structures and deterioration prediction	4	
3. Repair materials and methods for concrete structures	1	
4. Maintenance and asset management	2	
5. Maintenance for structures' group	2	
6. Management for structures' group	2	
7. Presentations and discussions	3	

Textbook   Not specified. Some materials may be provided.

Textbook(supplemental)   Not specified.

Prerequisite(s)   Basic knowledge on Construction Materials and Concrete Engineering.

Web Sites

Additional Information   Positive presence in the lecture is expected by joining discussions for example.

Computational Fluid Dynamics

Code   10F011   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Hiromichi Shirato, Satoru Ushijima

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

Grading   The grading will be based on homework assignments.

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

Course Topics

Theme	Class number of times	Description
Introduction	1	Introduction of recent examples of CFD
computational method for incompressible fluids	7	The course introduces the MAC algorithm, which is generally used for incompressible Newtonian fluids on the basis of finite difference and finite volume methods (FDM and FVM). The outline of numerical methods is also discussed for parabolic, hyperbolic or elliptic partial differential equations, in terms of the numerical stability and accuracy. Homework will be assigned each week.
unsteady viscous flow around bluff body by surface vorticity method	7	The surface vorticity method is introduced as one of the effective method which can solve an unsteady separating flow from an edge and its reattachment to a body. The mesh- and pressure-free concept in this method is introduced, which can be applied various flow phenomena including unsteady separation. SOme special treatment such as how to introduce the viscosity (core spreading, random walk) and how to evaluate surface pressure distribution will be explained. Design of airfoil geometry is also introduced as one of application of the method.

Textbook   No textbook assigned to the course

Textbook(supplemental)   Recommended books and papers will be introduced in the course.

Prerequisite(s)   Basic knowledge of fluid dynamics, continuum mechanics and computational technique

Web Sites

Additional Information

Structural Dynamics

Code   10F227   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 1st
Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese
Instructor   Igarashi, Furukawa

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

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

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

Course Topics

Theme	Class number of times	Description
Introduction	1	Fudamental concepts, harmonic motion
Dynamics of Multi-Degree-Of-Freedom Systems	2	Formulation of Eq. of Motion / Lagrange's method / Normal Modes / Modal Analysis / Modeling of System Damping
Frequency-Domain Analysis of System Response	1	Frequency Response Funcs. / Fourier Transform
Numerical Time Integration	2	Formulation / Stability and Accuracy Analysis of Integration
Random Vibration	6	Overview / Probability Theory / Sequence of i.i.d. Random Variables / Concept of Random Processes / Correlation Funcs. / White Noise / Stochastic Differential Eq. / Lyapunov Eq. / Response to White Noise Excitation / Covariance Matrix Approach / Correlation Funcs. of Random Response / Spectral Representation of Random Processes / Spectral Representation of Structural Response / Application
Structural Response Control	2	Active Control / Semi-Active Control
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)   Mechanical vibration (undergraduate level), Complex calculus (integration of analytic functions, Fourier transform, etc.), Probability theory, Linear algebra

Web Sites

Additional Information

Earthquake Engineering/Lifeline Engineering

Code 10F261 Course Year Master and Doctor Course Term 1st term Class day & Period Tue 4th

Location C1-191 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language English

Instructor Kiyono, Koike (T), Igarashi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seismic Engineering Exercise

Code   10F263   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 4th   Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and Exercise   Language   Japanese   Instructor   Sawada, Takahashi

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

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

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

Course Topics

Theme	Class number of times	Description
Frequency domain analysis	1	Basics of Fourier transformation is introduced.
Modeling of structure - soil system and time domain analysis	1	Equation of motion of SR model is introduced and the integration method of the equation in time domain is explained.
Exercise of linear seismic response analysis	2	Small groups of students are exercised in elastic modeling of structures and linear response analysis in time domain and frequency domain.
Prediction of ground motion by empirical Green's function method	3	Empirical Green's function method is introduced to predict large earthquakes based on observed small earthquakes.
Seismic analysis method of soil	2	Seismic analysis method of layered half-space based on equivalent linearization method is introduced.
Nonlinear seismic analysis method of structures	2	Nonlinear modeling of structures and the integration and iterative methods of the nonlinear equation of motion in time domain are introduced.
Exercise of nonlinear seismic response analysis	3	Small groups of students are exercised in the prediction of ground motion generated by a specified seismic fault and the nonlinear response analysis of structures and foundation.
	1	

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

Textbook(supplemental)

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

Web Sites

Additional Information

Hydraulics & Turbulence Mechanics

Code   10F075   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd

Location   C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Toda, Sanjou, Okamoto

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Basin Environmental Disaster Mitigation

Code   10F466   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 3rd

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

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	3	
	3	
	3	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

River basin management of flood and sediment

Code   10F077   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 1st

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   (DPRI) Nakagawa, H., (DPRI) Sumi, T., (DPRI) Takebayashi, H. and (DPRI) Kawaike, K.

Course Description   In a river basin, various kinds of disasters such as debris flow, land slide, flood inundation, storm surge, and etc. sometimes happen from the origin to the mouth. This lecture presents occurrence examples, mechanisms, theory and methods of prediction and prevention/mitigation methods against those disasters. Also this lecture mentions comprehensive management in a sediment routing system focusing on sediment management strategy in dam reservoirs.

Grading   Grading is based on 2 reports out of 4 topics and attendance.

Course Goals   The goals of the class are to understand phenomena within a river basin and to have wide knowledge of problems of flood and sediment disasters and countermeasures against them.

Course Topics

Theme	Class number of times	Description
About Sabo Works	4	About Sabo works, sediment disasters, countermeasures against sediment disasters, Sabo projects.
About Reservoir Sediment Management	3	Reservoir sediment management focusing on reservoir sustainability and comprehensive management in a sediment routing system is overviewed including worldwide perspective and Japanese advanced case studies.
About basin-wide sediment routing	4	About the one dimensional bed deformation analysis and the sediment runoff model are introduced. Furthermore, some examples of the application of those models are introduced.
About basin-wide flood management	4	Flood disasters and countermeasures against them are overviewed along the history of flood management in Japan.

Textbook   No designation. Printed materials regarding the contents of this class are distributed in class.

Textbook(supplemental)   Instructed in class

Prerequisite(s)   Fundamental knowledge of Hydraulics and river engineering

Web Sites

Additional Information   This class is held biennially and is not held in 2014. Attendance is taken every time.

10F019

River Engineering and River Basin Management

Code 10F019 Course Year Master and Doctor Course Term 1st term Class day & Period Wed 1st

Location C1-173 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese

Instructor Hosoda, Kishida

Course Description It is important to consider about rivers comprehensively in view of the various aspects based on natural science and engineering. The fundamental knowledge to consider rivers and make the plans of river basins is explained with the following contents: various view points to consider rivers, long term environmental changes of rivers and its main factors, river flows and river channel processes, ecological system of rivers and lakes, flood disasters, integrated river basin planning(flood defense, environmental improvement planning, sediment transport system), functions of dam reservoir and managementto learn the fundamental knowledge and grounding to consider rivers from the various points of view such as natural science, engineering and social science.

Grading Reports, Attendance

Course Goals The fundamental knowledge which can consider a river with various senses from a viewpoint of natural science, an engineering viewpoint and a social-scientific viewpoint, is mastered.

Course Topics

Theme	Class number of times	Description
Various view points on rivers and river basins	1	Various viewpoints and river basins, Various rivers on the earth, Formation processes of river basins, long term environmental changes of rivers and its main factors
Ecological system in rivers	2	Fundamental knowledge on river eco-system
Application of computational methods to environmental problems	2	Numerical analysis of the environmental change in Lake Biwa, Flood flows and river channel processes
Recent flood disasters & Integrated river basin planning	2	Characteristics of recent flood disasters, River law, Fundamental river management plan, River improvement plan, Procedures of flood defense planning, Flood invasion analysis and hazard map
Groundwater and its related field	2	Simulation technology of groundwater, Geo environmental issues, Reservoir Engineering, Contaminant Transport Processes
Sustainable development of dam	2	Needs of dam development and history of dam construction. Maintenace of Dam reservoir
Economic evaluation of environmental improvement projects	1	Evaluation of people's consciousness for river improvement works by means of CVM, Conjoint Analysis, etc.
Dam structure and maintenance	2	Dam structure, foundation, grouting. Desighn of Arch Dam and Graviety Dam.
Achievement Confirmation	1	Comprehension check of course contents (Report)

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

Textbook(supplemental)

Prerequisite(s) Fundamental knowledge of Hydraulics, Hydrology and Ecology

Web Sites

Additional Information Students can contact with professors by visiting their rooms and sending e-mail.

Prof. Hosoda: hosoda.takashi.4w@kyoto-u.ac.jp

Assoc. Prof. Kishida: kishida.kiyoshi.3r@kyoto-u.ac.jp

Sediment Hydraulics

Code   10A040   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hitoshi Gotoh and Eiji Harada

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

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

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

Course Topics

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

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

Textbook(supplemental)   Non

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

Web Sites   Non

Additional Information   Non

Coastal Wave Dynamics

Code   10F462   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 1st

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Hitoshi Gotoh   Eiji Harada and Khayyer Abbas

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

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

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

Course Topics

Theme	Class number of times	Description
Introduction	1	The purpose and constitution of the lecture the method of the scholastic evaluation are explained.
Conservation laws of fluid	4	Fundamentals of fluid mechanics, liner / non-liner wave theories and numerical mathematics are explained.
Modeling of surf zone dynamics	6	Several methodologies against free-surface wave including breaking waves (i.e. VOF, MPS, SPH) are illustrated. Especially advanced approaches of MPS and SPH are explained in detail.
Introduction of turbulence models	1	Reynolds averaging models and large eddy simulation are outlined.
Modeling of rock mound dynamics	2	Method for tracking of armor blocks under high waves using Distinct Element Method is described.
Achievement Confirmation	1	Comprehension check of course contents.

Textbook   Non

Textbook(supplemental)   Non

Prerequisite(s)   Non. It is desiarable to have knowledge about hydraulics, fluid mechanics.

Web Sites

Additional Information   If there are any questions, please send e-mail to the staff. This course will not be offering in 2014.

Hydrology

Code 10A216 Course Year Master and Doctor Course Term 2nd term Class day & Period Tue 2nd

Location C1-117 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language English

Instructor Yasuto TACHIKAWA

Course Description Physical mechanisms of the hydrologic cycle are described from the engineering viewpoint. The rainfall-runoff modeling and its prediction method are emphasized. Physical hydrological processes explored are surface flow, saturated-unsaturated subsurface flow, groundwater flow, streamflow routing, and evapotranspiration. Physical mechanism of each hydrological process and its numerical modeling method are explained. The basic equations and numerical simulation methods are provided. Then, distributed hydrological modeling which incorporate various hydrological processes and a lumping method of distributed hydrological model are explained.

Grading Examination and report

Course Goals The goals of the class are to understand the physical mechanism of hydrological processes, their basic equations, and numerical simulation methods.

Course Topics

Theme	Class number of times	Description
Introduction	1	The hydrologic cycle and the hydrological processes are explained.
Surfaceflow	2	The physical process of the surface flow and its numerical modeling method are described. The basic equations of the surface flow and the numerical simulation methods are explained.
Saturated-unsaturated subsurface flow	2	The physical process of the saturated-unsaturated subsurface flow and its numerical modeling method are described. The basic equations of the saturated-unsaturated subsurface flow and the numerical simulation methods are explained.
Groundwater flow	2	The physical process of the groundwater flow and its numerical modeling method are described. The basic equations of the groundwater flow and the numerical simulation methods are explained.
Streamflow routing	2	The physical process of the streamflow routing and its numerical modeling method are described. The basic equations of the streamflow routing and the numerical simulation methods are explained.
Evapotranspiration	2	The physical process of the evapotranspiration and its numerical modeling method are described. The basic equations of the evapotranspiration and the numerical simulation methods are explained.
Channel network and watershed modeling	1	Numerical representations of channel networks and catchments are explained.
Distributed hydrological model	1	A physically-based distributed hydrological model is described, which is constructed with numerical representations of channel networks and catchments.
Lumping of flow, parameter and watershed model	1	Lumping methods of a distributed hydrological model are described, which include lumping of flow, parameter and watershed model.
verification of study achievement	1	Verification of study achievement

Textbook Handouts are distributed at each class.

Textbook(supplemental)

Prerequisite(s) Basic knowledge of hydraulics and hydrology

Web Sites http://hywr.kuciv.kyoto-u.ac.jp/lecture/lecture.html

Additional Information This course is open every other year. In 2013, not open.

10F464

Hydrologic Design and Management

Code   10F464   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd
Location   C1-191   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese
Instructor   Yasuto TACHIKAWA

Course Description   Methods for hydrologic design and real-time rainfall-runoff predictions are described. The frequency analysis of hydrologic extreme values and the time series analysis of hydrologic variables are described, and then the methods to set the external force for the hydrologic design are explained. Next, a physically based hydrologic model which includes the process of human activities for the hydrologic cycle is described. In addition, the predictive uncertainty for the hydrologic simulation is introduced. A flood control planning and water resources management with the use of innovative hydrologic simulation tools is described. Then, the climate change and the relation to the hydrologic design are discussed. A real-time rainfall runoff prediction method with the use of Kalman filter theory is described.

Grading   Examination and report

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

Course Topics

Theme	Class number of times	Description
Introduction	1	A flood control planning and water resources planning are introduced.
Frequency analysis and hydrologic design	3	The frequency analysis of hydrologic extreme values is described. The methods to set the external force for the hydrologic design are explained.
Time series analysis and hydrologic design	3	The time series analysis of hydrologic variables is described. The methods to develop time series models, time serried data generation methods, spatiotemporal variation of hydrologic variables and a random field model, disaggregation methods are explained.
Hydrologic modeling and predictive uncertainty	1	Hydrologic models which include the process of human activities for the hydrologic cycle is described. Then, hydrologic predictive uncertainty is explained, which is inevitable coming from model structure uncertainty, parameter identification uncertainty and model input uncertainty. Especially, the relation between spatiotemporal scales of hydrologic modeling and model parameter values is described.
Hydrologic modeling system	1	A hydrologic modeling system which helps to develop complicated hydrologic simulation models and its importance for a flood control planning is also described.
Climate change and hydrologic design	1	Data analysis of the latest GCM simulation is presented and the possible changes of hydrologic extremes and hydrologic design are discussed.
Real-time rainfall runoff prediction	4	A real-time rainfall runoff prediction method with the use of Kalman filter theory is described.
Verification of study achievement	1	Verification of study achievement is conducted.

Textbook

Textbook(supplemental)

Prerequisite(s)   Basic knowledge of hydrology, probability and statistics are required.

Web Sites   http://hywr.kuciv.kyoto-u.ac.jp/lecture/lecture.html

Additional Information

Water Resources Systems

Code   10A222   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 1st

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hori, T.(DPTI) and Tanaka, K.(DPRI)

Course Description   Systems approach to natural and social phenomena associated to water resources is introduced in terms of planning and design of sustainable water resources systems.

Grading   Grading is done based on examination and commitment to classes.

Course Goals   Deep understanding of fundamentals for systems modeling of water-related natural and social processes and ability to perform data collection, analyses and design of sustainable water management systems.

Course Topics

Theme	Class number of times	Description
Optimum design of water resources systems	3	
desicion support for water resources management	3	
Recent topics on water management	1	
Water management practices in the world	3	
Land surface model and its application to water management	4	
achievement check	1	

Textbook   Not specified.

Textbook(supplemental)   Supplemental documents will be introduced in classes.

Prerequisite(s)   Fundamentals of hydrology and water resouyrces engineering.

Web Sites

Additional Information   Open every two years. Available in 2013.

10F269

Coastal and Urban Water Disasters Engineering

Code   10F269   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C1-192   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Hydro-Meteorologically Based Disaster Prevention

Code   10F267   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F441

Water Quality Engineering

Code   10F441   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd

Location   C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hiroaki TANAKA, Fumitake NISHIMURA, Naoyuki YAMASHITA, Makoto YASOJIMA, Ryoji NAITO

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Open Channel Hydraulics

Code   10F245   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 1st

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   HOSODA, Takashi

Course Description   Fundamental theory of Open Channel Hydraulics used in River Engineering and Urban Fluid Engineering Fields are lectured, showing various applications in Hydraulic Engineering Field. The contents include the following items: Application of singular point theory to water surface profile analysis, Derivation of 2-D depth averaged model, 1-D analysis of unsteady open channel flows, Plane 2-D analysis of steady high velocity flows, Plance 2-D analysis of unsteady flows, Higher order theory, etc.

Grading   Regular examination

Course Goals   to understand the grounds of Open Channel Hydraulics and to learn how to apply Open Channel Hydraulics to practical problems in hydraulic engineering field.

Course Topics

Theme	Class number of times	Description
Guidance	1	The outline of this class is introduced by overviewing the whole framework of Open Channel Hydraulics with various computational results.
Derivation of 2-D depth averaged model	1	Derivation procesures of plane 2-D depth averaged model are expalined in detail
Application of singular point theory to water surface profile analysis	1	
1-D analysis of unsteady open channel flows	3	Fundamental characteristics of 1-D unsteady open channel flows, Method of Characteristics, Dam break flow, Computational methods
Fundamentals of numerical simulation	1	Considering the convective equation as an example, fundamental knowledge of numerical simulation is explained by means of finite difference method, finite element method, etc. Applications these method to unsteady open channel flows are also shown with some practical applications.
Plane 2-D analysis of steady high velocity flows	1	Characteristics of steady plane 2-D flow are explained based on the method of characteristics.
Plance 2-D analysis of unsteady flows	3	Propagation of characteristic furface, shear layer instability, application of a generalized curvilinear coordinate to river flow computation, application of a moving coordinate system, etc.
Higher order theory	3	Boussinesq equation with the effect of vertical acceleration, full/partially full pressurized flow onserved in sewer network, trafic flow analysis by means of dynamic wave model
Examination of understanding	1	The understanding of the contents is examined through the paper examination.

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

Textbook(supplemental)

Prerequisite(s)   Elementary knowledge of fluid dyanamics and hydraulics

Web Sites

Additional Information   Students can contact with Hosoda by sending e-mail to hosoda.takashi.4w@kyoto-u.ac.jp This class is open in 2012.

Applied Hydrology

Code   10F100   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Tomoharu Hori, Tetsuya Sumi, Yoshitaka Kido, Yasuhiro Takemon, Kenji Tanaka

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

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

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

Course Topics

Theme	Class number of times	Description
Water Resources Systems	2	Interaction between water resources and socio-economic systems, Distributed flood risk assessment and countermeasures design from human security viewpoint
Reservoir Systems and Sustainability	2	Reservoir system and its environmental impacts, Sustainable management of reservoir system
Land Surface Processes	3	Modelling of land surface processes, Application of land surface model
Water Quality Management	3	Diffuse pollution control, Water quality management of enclosed lake and groundwater
Hydro-eco Systems	3	Ecohydrological management of habitats in river ecosystems, Ecohydrological management of biodiversity in wetland ecosystems
Presentation and Discussion	2	Presentation and Discussion on related topics
Examination		

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

Textbook(supplemental)   None

Prerequisite(s)   Elementary knowledge of hydrology and water resources engineering.

Web Sites

Additional Information

Case Studies Harmonizing Disaster Management and Environment Conservation

Code   10F103   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture   Language   English

Instructor   K. TAKARA(DPRI), H. NAKAGAWA(DPRI), E. NAKAKITA(DPRI), H. MASE(DPRI), N. MORI(DPRI), Y. YAMASHIKI(DPRI)

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

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

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

Course Topics

Theme	Class number of times	Description
Introduction	1	Introduction
Disaster due to heavy rainfall -- utilization of weather radar and global climate change	3	Disaster due to heavy rainfall -- utilization of weather radar and global climate change
Flood disaster prevention and the environment	2	Flood disaster prevention and the environment
River environment and disaster management	2	River environment and disaster management
The environment of closed water areas / Atmosphere-ocean climate interaction	2	The environment of closed water areas / Atmosphere-ocean climate interaction
Coastal disasters due to tsunamis and storm surges	2	Coastal disasters due to tsunamis and storm surges
Projection of climate and coastal environmental change	2	Projection of climate and coastal environmental change

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

Textbook(supplemental)   Some literature would be introduced by professors.

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

Web Sites

Additional Information   Contact Prof. Takara at <takara.kaoru.7v@kyoto-u.ac.jp> if you have any query.

10F106

Integrated Disasters and Resources Management in Watersheds

Code   10F106   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 1st

Location   Katsura Campus, Ujigawa Open Laboratory, Shirahama Oceanographic Observatory and Hodaka Sedimentation Observatory

Credits   2   Restriction   　　　Lecture Form(s)   Lecture and Exercise   Language   English

Instructor   Masaharu FUJITA(DPRI), Tetsuya HIRAISHI(DPRI), Nozomu YONEYAMA(DPRI), Kenji KAWAIKE(DPRI), Hiroshi TAKEBAYASHI(DPRI), Daizo TSUTSUMI(DPRI)

Course Description   Mechanism and countermeasures of sediment disasters, flood disasters, urban flood disasters and coastal disasters are explained. An integrated watershed management of these disasters and water/sediment resources is also introduced. This lecture will be open at Katsura Campus, Ujigawa Open Laboratory, Shirahama Oceanographic Observatory and Hodaka Sedimentation Observatory. Students attending this lecture must take one of the intensive experiment/field study courses offered in Ujigawa Open Laboratory and these observatories.

Grading   Presentation, Discussion and Report

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

Course Topics

Theme	Class number of times	Description
Urban flood disaster managemnet	2	We review urban floods from the viewpoint of river basins, flood causes, and features, together with the results of recent studies. Based on these studies, we propose comprehensive measures against urban floods, including underground inundations. In addition, we discuss on prediction methods of the tsunami disaster in urban area.
Flood disaster management	2	Prevention / mitigation measures against flood disasters and flood prediction methods are explained as well as examples of recent flood disasters in Japan.
Sediment disaster management	2	Showing the problems on sediment disasters and sediment resources, I explain an integrated sedimnet management system both for sediment disasters and sediment resources.
Coastal disaster management	2	Coastal erosion and tsunami hazard become remarkable in these days in Japanese coast. In a lecture, we discuss on characteristics of such coastal disasters.
Exercise on flood disaster at Ujigawa Open Laboratory (Selective)		Experiment and analysis on debris flows, riverbed variation and flooding at Ujigawa Open Laboratory, Fushimi-ku, Kyoto city.
Exercise on sediment related disaster at Hodaka Sedimentation Observatory (Selective)		The Hodaka Sedimentation Observatory is located at Okuhida region, Gifu Prefecture. In the field exercise, observation methods of rainfall-runoff and sediment movement processes will be explained. Field investigations into several types of erosion control facilities, sediment producing sites, debris flow sites and sediment related disaster sites will be carried out.
Exercise on coastal disaster at Shirahama Oceanographic Observatory (Selective)		The Sirahama Maritime Observatory is located in Wakayama Prefecture. In the lecture, observatory, waves, currents and tide levels monitoring system is demonstrated.

Textbook   None

Textbook(supplemental)   None

Prerequisite(s)   Hydraulics, River Engineering, Coastal Engineering, Sediment Transport Hydraulics

Web Sites

Additional Information

Geomechanics

Code   10F025   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Fusao Oka, , Sayuri Kimoto

Course Description   Mechanical behavior of soils and problems of its deformation and failure, based on the multiphase mixture theory and the mechanics of granular materials, will be covered in this lecture.

Grading   Final examination and several papers

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

Course Topics

Theme	Class number of times	Description
Deformation of geomaterils	1	Mechanical property of geomaterials, Critical state soil mechanics, Failure criteria, Effective stress, Suction
	2	
elasto-plastic constitutive model	3	Constitutive model for geomaterials, Elasto-plastic model, Cam clay model
Theory of viscosity and viscoplasticity	3	Viscoelasticity, viscoplasticity, Elasto-viscoplastic mode, Adachi-Oka model, Microstructure of soils, Temperature dependent behavior, Applications of constitutive models
Consolidation analysis	3	Biot's consolidation theory and its application, Consolidation of embankment
Liquefaction of soils	2	Liquefaction of sandy soil, Damage and failure due to liquefaction, Remedial measures for liquefaction
Confirmation of achievement	1	

Textbook   Soil mechanics, Fusao Oka, Asakura Publishing (in Japaneses)
An elasto-viscoplastic constitutive model, Fusao Oka, Morikita Publishing (in Japanese)

Textbook(supplemental)

Prerequisite(s)   Soil mechanics, Fundamentals of continuum mechanics

Web Sites

Additional Information

10K016

Computational Geotechnics

Code   10K016   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location C1-172   Credits 2   Restriction No Restriction   Lecture Form(s)   Language English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2	
	5	
	4	
	2	
	1	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Geo-Risk Management

Code   10F238   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Ohtsu,Shiotani

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

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

Course Goals

Course Topics

Theme	Class number of times	Description
Guidance	1	Guidance Introduction of Geo-Asset Management
Basic	5	Basics of Risk Analysis (3), Basics of Monitoring (2)
Probability theory	4	Evaluation of Slope Risk
Miscellaneous of Risk	2	Application of Risk Based Inspection Risk Management of International Construction Project
Case Studies in Southeast Asian Countries	2	Landslide Disaspter in Southeast Asian Countries (2)
Discussions	1	
Final Exam	1	

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

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

Prerequisite(s)

Web Sites

Additional Information   Addtional information is available by visiting the following professors. Appointment shall be made in advance by e-mail.
ohtsu.hiroyasu.6n@kyoto-u.ac.jp
shiotani.tomoki.2v@kyoto-u.ac.jp

Fundamental Geofront Engineering

Code   10F405   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 3rd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   M.Mimura,S.Nishiyama,T.Koyama,K.Ando

Course Description   This lecture aims to learn a practical knowledge associated with mechanical and hydraulic problems in rock masses to realize environment-friendly development of underground space through exercise in modelling and analytical study of rock mass.

Grading   Problem sets will be given almost every week and due one week later in class. You can work together but must turn in your own solutions.

Course Goals   This course is designed to give students knowledge and understanding to recognise and apply the fundamental techniques used in engineering rock mechanics for the analysis of underground engineered structures.

Course Topics

Theme	Class number of times	Description
Introduction to rock mechanics and rock engineering	1	Introduction to common geophysical investigation methods and field investigation methodology.
Rock mass behaviour around excavations	1	How to apply popular failure criteria to determine the strength of both intact rock and discontinuities. How to assess the geometry of discontinuous rock masses using customary measures and techniques
	1	
	1	
Rock strength and rock mass classification	2	Rock construction techniques for rock foundation works and also for construction of rock caverns and tunnels. Proposals for support of strength and running of construction works in rocks based on conceptual engineering geological models, assessment of the Q-value and of the mechanical characteristics of the rock mass.
Underground excavations in discontinuous and stratified rock	1	Basic rock geology emphasizing characteristics of rocks, in particular structural features and the importance of discontinuities in rock construction works.
	1	
	1	
Computer methods in rock mechanics and rock engineering:	2	Introduction to computer programmes for underground space design, rock mechanics, and environmental control.
Hydrogeology and groundwater flow in geotechnical	1	The influence of the groundwater conditions on the characteristics of the rock mass, in particular concerning strength and stability but also rock construction technique and environmental consequences.
Risk assessment and risk management	2	Risk assessment processes in rock engineering and management principles with respect to the environment.
	1	

Textbook   Handout will be distributed.

Textbook(supplemental)   References are indicated in the handout.

Prerequisite(s)   Undergraduate courses in geology, geotechnical engineering,and soil mechanics.

Web Sites

Additional Information

Public Finance

Code   10F203   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 3rd

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   Kobayashi, Matsushima

Course Description   The concept of public finance will be taught based upon the framework of Macro economics.

Grading   Final Exam: 60-70%
Mid-term Exam and Attendance: 30-40%

Course Goals   Understand the concept of public finance

Course Topics

Theme	Class number of times	Description
Introduction	1	
GNP and Social Accounting	2	
Input Output Table and General Equilibrium Model	3	
AD-AS Model	2	
IS-LM Model	1	
Monetary Policies	1	
International Economics	2	
Economic Growth Model	2	
Summary	1	Summarize classes and check whether students could achieved its goal.

Textbook

Textbook(supplemental)   Dornbusch et al., Macroeconomics 10th edition, Mcgrow-hill, 2008

Prerequisite(s)   Basic Microeconomics

Web Sites   will be notified in the first class.

Additional Information   Website of this course will be notified in the first class.

Urban Environmental Policy

Code   10F207   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Dai Nakagawa and Ryoji Matsunaka

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

Grading   evaluation by commitment, tests, reports and examination

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

Course Topics

Theme	Class number of times	Description
Outline	1	
Structure of urban problems	3	Expansion of urban areas, Increase of Environmental impact, Making compact cities
Basic theory of transportation and environment	2	Downtown activation, Road space re-allocation, Pedestrianisation
Road traffic and Public transportation	2	Characteristics of traffic modes, Light Rail Transit, Bus Rapid Transit, Mobility Management
Fundamental theory for measurements of environmental values	3	Utility, Equivalent Surplus, Compensating Surplus
Methodology to measure environmental values	3	Travel Cost Method, Hedonic Approach, Contingent Valuation Method, Conjoint Analysis
Summary	1	

Textbook   No textbook

Textbook(supplemental)

Prerequisite(s)   basic knowledge of public economics is required

Web Sites

Additional Information

City Logistics

Code   10F213   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd   Location   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   English   Instructor   Eiichi Taniguchi, Ali G. Qureshi

Course Description   The methodologies of city logistics for establishing efficient and environmentally friendly logistics systems in urban areas will be described. Focusing on the truck traffic within road network, the process, models and the evaluation for building urban freight policy will be given. As well logistics systems using recent development of ICT, the effects of e-commerce on freight transport and supply chain management will be discussed.

Grading   Term examination 80%, Report 10% and Quiz 10%

Course Goals   The course goals are fully understanding the methodologies for establishing efficient, environmentally friendly and safe logistics systems in urban areas as well as obtaining the basic knowledge on modelling and evaluating city logistics initiatives.

Course Topics

Theme	Class number of times	Description
Introduction	1	Introduction to issues on urban freight transport is given and the importance of these issues is discussed in conjunction with urban planning.
What is city logistics?		City logistics are presented to totally solve problems on the efficiency of urban freight transport as well as social problems including tranffic congestion, traffic environment, traffic safety and energy. The concepts of city logistics and characteristics and implementation methods are given.
Status quo and issues in freight transport---urban freight transport policy		The status quo and issues on freight transport is presented and urban freight transport policies are discussed for establishing efficient, environmentally friendly logistics systems in urban areas.
ITS and logistics		Logistics systems using ITS (Intelligent Transport Systems) are presented and how to implement city logistics initiatives using ITS is discussed.
Vehicle routing and scheduling	3	Models for optimising the visiting order and allocation of trucks in delivering goods to customers in urban areas are given and solution methodologies and practical applications are discussed. The probabilistic vehicle routing and scheduling problems with the uncertainty of travel times as well as the dynamic vehicle routing and scheduling problems with the real time travel times are also described.
Location of logistics terminals	2	The optimal location models of logistics terminals and the solution methodologies and their application to practical problems are presented. The location routing planning including vehicle routing and scheduling problems are discussed.
Cooperative freight transport systems	1	Cooperative freight transport systems which jointly operate logistics terminals, trucks and information systems are presented. The merits and demerits of cooperative freight transport systems as well as the methods for promoting them are discussed.
Application of ICT and ITS		It is shown that ICT (Information and Communication Technology) and ITS (Intelligent Transport Systems) allow us to collect data, transmit and analyse them relating to city logistics. The importance of ICT and ITS is emphasized.
Supply chain management, third party logistics and intermodal freight transport		Supply chain management, third party logistics and intermodal freight transport is presented and the innovative management systems which are used in modern logistics are discussed.
New freight transport systems		The chategorization, characteristics and significance of new freight transport systems including underground freight transport systems are presented. The possibility of realizing new freight transport systems is discussed based on cost benefit analyses.
transport demand management and e-commerce		The transport demand management, which is important in city logistics is described and the difference is highlighted with the transport demand management for passenger traffic. Effects of e-commerce on urban freight transport are discussed based on recent behaviour change of consumers.
deregulation and evaluating city logistics		The deregulation on freight transport is described and performance indicators for evaluating city logistics initiatives are discussed.

Textbook   1) Taniguchi, E. and T. Nemoto, City logistics---Efficient and environmentally friendly freight transport planning in urban areas, Morikita Publishing, 2001 (In Japanese).

2) Taniguchi, E., R.G. Thompson, T. Yamada and R. van Duin, City Logistics --- Network modelling and Intelligent Transport Systems. Pergamon, Oxford, 2001.

3) Taniguchi, E. and R.G. Thompson (Eds.) Innovations in freight transport, WIT Press, Southampton, 2002.

4) Taniguchi, E. (Eds.) Contemporary new city logistics, Morikita Publishing, 2005 (In Japanese).

Textbook(supplemental)   1) Urban logistics planning, In: Urban transport II, Traffic Engineering Series, Japan Society of Traffic Engineers, 2002 (In Japanese).

2) Brewer, A. M., K.J. Button and D.A. Hensher (Eds.) Handbook of logistics and supply chain management, Pergamon, Oxford, 2001.

3) R.G. Kasilingam, Logistics and transportation, Kluwer Academic Publishers, Dordrecht, 1998.

4) OECD, Delivering the Goods---21st Century Challenges to Urban goods Transport, OECD, 2003.

5) Taniguchi, E. and R.G. Thompson (Eds.) Logistics systems for sustainable cities, Elsevier, 2004.

6) Taniguchi, E. and R.G. Thompson (Eds.) Recent advances in city logistics, Elsevier, 2006.

7) Kuse, H., K. Takada and Y. Takahashi, Logistics management in urban areas, Keiso Shobo, 2006.

8) Taniguchi, E. and R.G. Thompson (Eds.) Innovations in city logistics, Nova Science Publisher, 2008.

Prerequisite(s)   Linear programming, optimisation, queueing theory

Web Sites

Additional Information

10F215

Intelligent Transportation Systems

Code   10F215   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd
Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese
Instructor   N. Uno and T. Yamada

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

Grading   Final report: 50-60%, Mid-term report: 30-40% and Attendance: 10%

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

Course Topics

Theme	Class number of times	Description
Basics for Transportation Network Analysis	1	
Estimation of OD Traffic Volume using Observed Link Traffic Counts	1	
Analytical Approaches Based on Transportation Network Equilibrium	3	
Outlines of ITS	1	
Traffic Management for Enhancing Efficiency	2	
Innovative Approaches for Data Collection Using ICT	1	
Application of ITS for Enhancing Traffic safety	1	
Travel Demand Management and Congestion Charging	2	
Application of Traffic Simulation	2	
Examination	1	

Textbook
Textbook(supplemental)
Prerequisite(s)
Web Sites
Additional Information

Quantitative Methods for Behavioral Analysis

Code   10F219   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 5th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Satoshi Fujii

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F223

Risk Management Theory

Code 10F223 Course Year Master and Doctor Course Term 2nd term Class day & Period Wed 3rd

Location C1-173 Credits 2 Restriction Lecture Form(s) Lecture and exercise Language English

Instructor Muneta Yokomatsu

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

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

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

Course Topics

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

Textbook

Textbook(supplemental) 1.Ross, S.M.: An Elementary Introduction To Mathematical Finance, Cambridge University Press, 1999

2.Sullivan W.G.: Engineering Economy, Pearson, 2012

Prerequisite(s) Fundamental understanding of probability

Web Sites

Additional Information

Remote Sensing and Geographic Information Systems

Code 10A805   Course Year Master and Doctor Course   Term 1st term   Class day & Period Tue 2nd   Location C1-117   Credits 2   Restriction No Restriction
Lecture Form(s) Lecture & Exercise   Language Japanese   Instructor Masayuki Tamura, Junichi Susaki

Course Description   Geoinformatics is the science and technologies dealing with spatially distributed data acquired with remote sensing, digital photogrammetry, global positioning system, etc, to address the problems in natural phenomena or human activities. This lecture particularly focuses on satellite remote sensing and explains the theory and the technologies for analyzing environmental changes or disaster effects. A free software "MultiSpec" is used in exercises to learn the basic techniques of image processing.

Grading   Grading is based on the achievements in home works given in every lesson.

Course Goals   To understand the basic theory and to acquire the basic techniques of satellite remote sensing for observation and analysis of environmental changes and disaster effects.

Course Topics

Theme	Class number of times	Description
Introduction	1	1. Introduction to remote sensing 2. Applications in environmental and disaster prevention fields
Classification of electromagnetic waves and satellite sensors	1	1. Classification of electromagnetic waves 2. Basic terms on electromagnetic radiation 3. Theory of electromagnetic radiation from objects 4. Classification of satellite sensors by observation wavelengths
Interaction of electromagnetic waves with earth surfaces	1	1. Reflection and scattering of electromagnetic waves by earth surfaces 1.1 Bidirectional reflectance distribution function 1.2 Bidirectional reflectance factor 2. Spectral reflectance properties of earth surfaces and objects
Atmospheric effects on satellite observations	1	1. Absorption and scattering of electromagnetic waves by atmospheric particles 2. Atmospheric radiative transfer of electromagnetic waves 3. Atmospheric effects on satellite observations 4. Correction of atmospheric effects
Optical sensors	1	1. Principles of visible and reflective infrared sensors 2. Examples of visible and reflective infrared sensors 3. Applications of reflective infrared sensors
Thermal infrared sensors	1	1. Principles of thermal infrared sensors 2. Measurements of surface temperature by satellite sensors 3. Examples of thermal infrared sensors 4. Applications of thermal infrared sensors
Image processing 1 (Image correction)	1	1. Image processing procedure 2. Image enhancement 3. Image correction 4. Correction of geometrical distortion
Image processing 2 (Image classification)	1	1. What is image classification? 2. Theory of image classification 3. Classification rules 4. Image classification procedure
Microwave sensors	1	1. Microwave 2. Microwave sensors 3. Real Aperture Radar (RAR) 4. Synthetic Aperture Radar (SAR) 5. Interferometric SAR 6. Differential Interferometric SAR
	1	
	1	
	1	
	1	
	1	
	1	

Textbook

Textbook(supplemental) • W. G. Rees   Physical Principles of Remote Sensing 2nd ed., Cambridge University Press

• J. A. Richards   Remote Sensing Digital Image Analysis: An Introduction, Springer-Verlag

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• Fundamentals of Remote Sensing: A Tutorial by the Canada Center for Remote Sensing   http://ccrs.nrcan.gc.ca/resource/tutor/fundam/index_e.php

Prerequisite(s)   Basic knowledge in computer information processing

Web Sites

Additional Information

Civic and Landscape Design

Code 10A808   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 3rd

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and practice

Language   Japanese   Instructor   Masashi Kawasaki, Yoshiaki Kubota, Keita Yamaguchi, Shojiro Hara

Course Description

Grading   Reports (Kawasaki: 30%, Yamaguchi: 10%), Participation in discussions (Kubota: 10%), and design practice (Hara: 50%)

Course Goals

Course Topics

Theme	Class number of times	Description
Guidance. Landscape and image	1	
Design of streets	1	
Design of parks	1	
Design of waterfronts	1	
Design of stations	1	
Various aspects of landscape research	1	
Design of Urban landscape	2	
Design Management	2	
Design practice	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Computational Mechanics and Simulation

Code   10K008   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and Exercises

Language   English   Instructor   Gotoh, Murata, Furukawa, Liang

Course Description   The process to obtain numerical solutions for various problems in compuational mechanics. Descretization and some solvinng technique for initial/boundary value problems is to be introdeced by the FEM, FDM, VM and PM with programming exercises. Statistical mechanics, molecular dynamics, Monte Carlo method and Multiple scale model will be shortly introduced in order to understand the basic theory of molecular dynamics simulation. Their application to engineering problems are to be also given by showing some up-to-date examples. Theory of the distinct element method (DEM) will be lectured, and its application in the engineering field will also be explained.Current technology of the particle method by is to be explained on the violent flow phenomena with free surface. The prticular subjects in PM such as mometum conservation and convection of pressure disturbance by numerical instability, etc. will be inntroduced. This course will be given in English.

Grading   Achievement is evaluated by submitted reports to each topic.

Course Goals

Course Topics

Theme	Class number of times	Description
Homogenization technique and FEM	4	Homogenization method with FEM will be lectured in this item. It is used for obtaining the equivalent homogenized material constants of an anisotropic composit material to be analyzed. The method to obtain homogenized elastic coefficient tensor will be especially focused on.
Molecular dynamics simulation	4	Statistical mechanics, molecular dynamics, Monte Carlo method and Multiple scale model will be shortly introduced in order to understand the basic theory of molecular dynamics simulation. Their application to engineering problems are to be also given by showing some up-to-date examples.
Distinct element method and its application	4	Theory of the distinct element method (DEM) will be lectured in this item. The DEM is the numerical analysis method for discontinuum. The application of the DEM in the engineering field will also be explained.
Free surface flow analysis by particle method	3	Current technology of the particle method by is to be explained on the violent flow phenomena with free surface. The prticular subjects in PM such as mometum conservation and convection of pressure disturbance by numerical instability, etc. will be inntroduced.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F069

Modelling of Geology

Code   10F069   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C1-173   Credits   2

Restriction   should have unit(s) of an introductory lecture on earth science (i.e. Introduction to Earth Science) and/or earth resources engineering

Lecture Form(s)   Leture, excercises, field excursions   Language   Japanese or English (change every year)

Instructor   Yasuhiro YAMADA

Course Description   This lecture is on modelling of a geology phenomenon which becomes indispensable when carrying out underground-resources development. First of all, the lecture tells that geologic phenomena are complicated as a fundamental posture and mathematical analysis is possible only a part of them. Then, a various analysis techniques and the analysis example are explained with the basic theory for simplifying the natural phenomena to construct geologic models. Then, field excursions are carried out to see relation between topography and local geology. During the excursions, students learn the conditions and assumptions which are needed to model complicated phenomena in which two or more factors involve. The phenomenon in which modelling is possible is limited to a few part.

Grading   Based on the reports on the lectures and field excursions.

Course Goals   Students understand the scope of this lecture, the complexity of natural phenomena and our limited knowledge on them, and can explain the contents to others.

Course Topics

Theme	Class number of times	Description
Introduction	1	Theme, lecture / excursion schedule, evaluation etc
modelling theory	2	basic theory on geologic modelling
methods and examples	6	methods of geologic modelling and examples are explained with exercises.
excursion 1	4	excursion to NE Kyoto basin to see the relation between topography and geology, in term of an active fault
excursion 2	2	excursion to SW Kyoto basin to see the relation between topography and geology, in term of a relatively inactive fault

Textbook   no textbook. appropriate articles will be provided.

Textbook(supplemental)   appropriate books will be informed, this may include ones on geologic modelling.

Prerequisite(s)   basic knowledge on earth science, including skills to read geologic and geography maps, required.

Web Sites

Additional Information   this lecture includes field excursions. the dates will be determined during the first class, thus all applicants have to attend this class.

Applied Elasticity for Rock Mechanics

Code   10F071   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 3rd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   S. Murata

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

Grading   Evaluation is made by the score of two report problems or homework and semester final exam.

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

Course Topics

Theme	Class number of times	Description
Airy's stress function and complex stress function	2	Airy's stress function used to solve a two-dimensional elastic problem is first explained, and then the complex stress functions that are the representation of Airy's stress function by the complex variables are explained.
Two-dimensional elastic analysis using the complex stress function	8	Analytical solutions of the two-dimensional elastic problems in fracture mechanics and rock engineering are derived by using the complex stress functions. The mechanical behavior of rock material is also explained based on the derived solution.
Application of two-dimensional elastic analysis	2	The theory of rock support, ground characteristic curve, theoretical equations used for the evaluation of rock stress, which are derived from the solution of two-dimensional elastic problem, are explained.
Three-dimensional theory of elasticity	2	Stress functions to solve the three-dimensional elastic problem are explained, and some examples of the three-dimensional elasticity solution derived by using the stress functions are explained.
Achievement check	1	Check the achievement of course goals.

Textbook   Handouts are delivered.

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

Prerequisite(s)   It is desirable to have knowledge of calculus, vector analysis and complex analysis.

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

Additional Information   Not specified

Fundamental Theories in Geophysical Exploration

Code   10F073   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 3rd

Location   C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hitosih Mikada, Tada-nori Goto

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

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

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

Course Topics

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

Textbook

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

Prerequisite(s)   Students should understand exploration geophysics of undergraduate level.

Web Sites   Could be specified by the lecturers if any.

Additional Information

Time Series Analysis

Code   10F039   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 4th

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10A405

Environmental Geosphere Engineering

Code   10A405   Course Year   Master Course   Term   1st term   Class day & Period   Wed 2nd   Location   C1-171

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Katsuaki KOIKE

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction of structure and content of this course	1	
Physics of Earth system	1	
Chemistry of Earth system	1	
Fundamentals of Geoinformatics (1): Spatical modeling techniques	2	
Fundamentals of Geoinformatics (2): Scaling of geological structure	1	
Fundamentals of Geoinformatics (3): Remote sensing	3	
Fundamentals of Geoinformatics (4): Earth survey and geochemical exploration	1	
Geosphere environments (1): Weathering process and geohazards	1.5	
Geosphere environments (2): CCS and HLW	1.5	
Mineral and energy resources	2	

Textbook   Handouts will be distributed at each class.

Textbook(supplemental)   References will be introduced in the handouts.

Prerequisite(s)   Fundamental knowledges on geology, physics, and chemistry are required.

Web Sites

Additional Information

Energy System Management

Code   10F086   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd   Location   C1-171

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English   Instructor   Katsuaki Koike

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

Grading   Integrated evaluation by attendance to the classes and report grades

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

Course Topics

Theme	Class number of times	Description
Introduction of this course and resources	1	Definition of renewable and non-renewable resources. Interaction among Earth environment, human society, and natural resources. Existence pattern of natural resources in the crust.
1. Internal structure of Earth and geodynamics	1	Inner structure of the Earth, geodynamics, geologic composition, temperature structure, rock physics, and chemical composition of crust.
2. Present and future of energy resources	1.5	Classification of energy sources, recent trend on social demand of energy, physical characteristics of each energy resources, and sustainability.
3. Present and future of mineral resources	1.5	Classification of minerals used for resources, recent trend on social demand of mineral resources, industrial uses of each mineral, and sustainability.
4. Economic geology (1)	1	Classification of ore deposits, distribution of each type of ore deposit, generation mechanism of deposit.
4. Economic geology (2)	1	General structure and distribution of fuel deposits (coal, petroleum, and natural gas), generation mechanism of deposits, and geological process of formation.
5. Resource exploration (1): Terrestrial area	1	Physical and chemical exploration technologies for natural resources in terrestrial area. Representative methods are remote sensing, electric sounding, electromagnetic survey, and seismic prospecting.
6. Resource exploration (2): Sea area	1	Introduction of marine natural resources such as methane hydrate, cobalt-rich crust, and manganese nodule, and exploration technologies for the deposits in sea area.
7. Assessment of ore reserves and deposit characterization	1	Fundamentals of geostatistics, variography for spatial correlation structure, spatial modeling by kriging, geostatistical simulation, integration of hard and soft data, and feasibility study.
. Resource development	1	Development and management technologies of energy resources related to coal, petroleum, and natural gas.
9. Engineering geology	2	Fundamentals of deep geological repository for high-level nuclear waste, CCS (carbon dioxide capture and storage), and underground storage of petroleum and gas.
10. Sustainability	2	Characteristics of natural energy related to geothermal, solar, wind, and tide, aand ssessment of natural energy resources. Co-existence of natural resource development with environment, low-carbon society, and problems for human sustainability.

Textbook   Printed materials on the class contents are distributed before each class.

Textbook(supplemental)   References on each topic will be instructed in classes.

Prerequisite(s)   Elementary knowledge of engineering, mathematics, physics, and geology.

Web Sites

Additional Information   This course is opened every two years, and opened in 2013.

Water Sanitary Engineering

Code   10F234   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location C1-192   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	5	
	5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Ecomaterial and Environment-friendly Structures

Code   10F415   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 1st

Location   C1-117   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hirotaka Kawano, Atsushi HATTORI

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

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

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

Course Topics

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

Textbook   No set text

Textbook(supplemental)   Instructed in class

Prerequisite(s)   Basic knowledge of construction materials, concrete engineering

Web Sites

Additional Information   Questions and discusions are welcome

10F454

Systems Approach on Sound Material Cycles Society

Code   10F454   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 3rd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Shinichi Sakai, Yasuhiro Hirai

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Geohydro Environment Engineering. Adv.

Code   10A622   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 1st

Location   C1-173   Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese

Instructor

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

10F446

Atmospheric and Global Environmental Engineering, Adv.

Code   10F446   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Yuzuru MATSUOKA, Gakuji KURATA

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	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Environmental Health

Code   10A626   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 3rd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese

Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	1	
	1	
	2	
	10	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Urban Metabolism Engineering

Code   10A632   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 3rd

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2	
	5	
	4	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Environmental Microbiology, Adv.

Code   10A643   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 1st

Location   C1-172   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hiroshi TSUNO, Hiroaki TANAKA, Fumitake NISHIMURA, Naoyuki YAMASHITA

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F456

New Environmental Engineering I, Advanced

I

Code   10F456   Course Year   2013   Term   1st term   Class day & Period   Mon 5th

Location   Reserch Bldg.No.5-Lecture Room(2nd floor)/C1-171   Credits   2   Restriction   No Restriction

Lecture Form(s)   Relay Lecture   Language   English

Instructor   Y. Shimizu (Prof), H. Tanaka (Prof), and S. Fujii (Prof)

Course Description   This course provides various kinds of engineering issues related to the water environment in English, which cover fundamental knowledge, the latest technologies and regional application examples. These lectures, English presentations by students, and discussions enhance English capability and internationality of students.
The course is conducted in simultaneous distance-learning from Kyoto University, or from remote lecture stations in University of Malaya, and Tsinghua University of China. For the distance-learning, a hybrid system is used, which consists of prerecorded lecture VIDEO, VCS (Video conference system) and SS (slide sharing system).

Grading   Evaluated by class attendance, Q&A and presentation.

Course Goals   Each student is requested to give a short presentation in English in the end of the course. The students will understand the present circumstance of environments in the world, and the students may improve their English skill and international senses through these lectures, presentations, and discussions.

Course Topics

Theme	Class number of times	Description
Wastewater Treatment in Japan	1.4	Guidance & self introduction of students & lecturer on " Wastewater Treatment Plants Case Study in Japan (Fujii)
Ecological Sanitation	1.4	From Ecotoilets to Ecotowns Shimizu)
Wastewater Reuse	1.4	Wastewater Reuse & Disinfection (Tanaka)
Membrane Treatment	1.3	Treatment Technologies (Practical & Advanced Technology I): Membrane Technology (MT) (Prof. Huang, Tsinghua University)
POPs	1.4	Global POPs (Persistent Organic Pollutants) Pollution, and Countermeasures (Fujii)
Wastewater Treatment in Malaysia	1.3	Wastewater Treatment Plants Case Study in Malaysia - Design Consideration - (Prof. Ghazaly, University of Malaya)
Anaerobic Treatment	1.3	Anaerobic Biological Treatment Technologies (Prof. Shaliza, University of Malaya)
Wastewater Treatment in China	1.3	Wastewater Treatment Plant: Case Study in China, Biological Nutrient Removal (Prof. Wen, Tsinghua University)
Water Pollution in Malaysia	1.4	History of Water Pollution in Malaysia (Prof. Ghufran, University of Malaya)
Student Presentation	1.4	Student Presentations /Discussions I (all)
Student Presentation	1.4	Student Presentations /Discussions II (all)

Textbook   Class handouts

Textbook(supplemental)   Introduced in the classes

Prerequisite(s)   General understanding of water environmental issues

Web Sites

Additional Information   Either of this course or " New Environmental Engineering II, advanced" can be dealt as " Asian Environmental Engineering". PowerPoint slides are main teaching materials in the lectures, and their hard copies are distributed to the students. In addition, a list of technical terms and difficult English words is given to the students with their explanation and Japanese translation.

New Environmental Engineering II, Advanced

II

Code   10F458   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 5th

Location   Reserch Bldg.No.5-Lecture Room(2nd floor)/C1-171   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   English   Instructor   Prof. Matsuoka, Prof. Shimidzu, Associate Prof. Takaoka, Associate Prof. Kurata, Prof. Fujii

Course Description   This course provides various kinds of engineering issues related to atmospheric environment and solid wastes management in English, which cover fundamental knowledge, the latest technologies and regional application examples. These lectures, English presentations by students, and discussions enhance English capability and internationality of students. The course is conducted in simultaneous distance-learning from Kyoto University, or from remote lecture stations in University of Malaya, and Tsinghua University. For the distance-learning, a hybrid system is used, which consists of prerecorded lecture VIDEO, VCS (Video conference system) and SS (slide sharing system). The students are requested to give a short presentation in English in the end of the lecture course. This course may improve students' English skill and international senses through these lectures, presentations, and discussions.

Grading   Evaluate by class attendance, Q&A and presentation.

Course Goals

Course Topics

Theme	Class number of times	Description
Global warming and Low carbon society	1.4	Global warming and Low carbon society (Matsuoka)
Atmospheric diffusion and modeling	1.4	Atmospheric diffusion and modeling (Prof. S Wang, Tsinghua University)
Air Pollution, Its Historical Perspective from Asian Countries (I),China	1.4	Air Pollution, Its Historical Perspective from Asian Countries (I),China (Prof. Hao, Tsinghua University)
Air Pollution, Its Historical Perspective from Asian Countries (II), Malaysia	1.4	Air Pollution, Its Historical Perspective from Asian Countries (II), Malaysia (Prof. Nik, University of Malaya)
Air Pollution, Its Historical Perspective from Asian Countries (III), Japan	1.4	Air Pollution, Its Historical Perspective from Asian Countries (III), Japan (Kurata)
Student Presentations /Discussions I	1.4	Student Presentations /Discussions I (all)
Introduction to Municipal Solid Waste (MSW) Management in Malaysia	1.4	Introduction to Municipal Solid Waste (MSW) Management in Malaysia (Prof. Agamuthu, University of Malaya)
Solid Waste Management, Case Study in China	1.4	Solid Waste Management, Case Study in China (Prof. Wang, Tsinghua University)
Solid Waste Management, Case Study in Japan	1.4	Solid Waste Management, Case Study in Japan (Takaoka
Solid Waste Management, Case Study in Malaysia	1.4	Solid Waste Management, Case Study in Malaysia (Prof. Agamuthu, University of Malaya)
Student Presentations /Discussions II	1	Student Presentations /Discussions II (all)

Textbook   Class handouts

Textbook(supplemental)   Introduce in the lecture classes

Prerequisite(s)

Web Sites

Additional Information   Either of this course or "New Environmental Engineering I, advanced" can be dealt as "Asian Environmental Enigneering". PowerPoint slides are main teaching materials in the lectures, and their hard copies are distributed to the students. In addition, a list of technical terms and difficult English words is given to the students with their explanation and Japanese translation.

Nuclear Environmental Engineering, Adv.

Code   10F461   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 2nd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese   Instructor   , , Yoko Fujikawa

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

Environmental-friendly Technology for Sound Material Cycle

Code   10W424   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 3rd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   , , , , ,

Course Description   Global warming, ecosystem crisis, and depletion of natural resources are of great concern today. To solve these problems, we have to build the sustainable society where low carbon dioxide emission, low environmental burdens, and the reduction of wastes by recycling are realized. It is possible to utilize municipal wastes, wastewaters, and unused biomass as resources instead of the natural resources used at present. Recycling-oriented technologies that enable sustainable utilization of those wastes and the concept to develop those technologies are introduced.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	7	
	4	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Environmental Organic Micropollutants Analysis Lab.

Code   10F468   Course Year   Master and Doctor Course   Term   Intensive course (25th-27th Sep.)

Class day & Period   9:00 am- 6:00 pm

Location   Seminer Room, Research Center for Environmental Quality Management   Credits   2

Restriction   around 10 students   Lecture Form(s)   Intensive Lecture   Language   Japanese

Instructor   Shimizu, Yoshihisa, Matsuda, Tomonari

Course Description   This 3 days intensive course, limited to around 10 people, will be held in Research Center for Environmental Quality Management in Otsu City. This course includes both lecture and experiments about analytical strategies of environmental micropollutants.

Grading   Reports and attendance

Course Goals   Understand about principle and practical techniques of chromatography. Understand about principle of several bioassays.

Course Topics

Theme	Class number of times	Description
HPLC -How to separate it-	3	Learn about principle and practice of HPLC separation. How do you choose columns, solvents and detectors? How to improve peak separation?
Fractionation and Purification by using HPLC	3	Learn about practical techniques of fractionation and purification using HPLC.
LC/MS/MS	5	Learn about principle and practice of LC/MS/MS analysis. Understand about 3 different scan modes, full scan, daughter scan and MRM. How to make an analytical method in a refined way for substances of your interest.
Bioassays	4	Lecture about several bioassays which are used for evaluation of environmental toxicity, and discuss about how to identify toxic compounds in environment by using HPLC in combination with bioassays.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   This intensive course is useful especially for students who usually use or intend to use HPLC and LC/MS/MS for their research.

Advanced Enivronmental Engineering Lab.

Code   10F470   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period

Location   C1-173   Credits   2   Restriction   Lecture Form(s)   Seminar and Exercise   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10F472

Seminer on Practical Issues in Urban and Environmental Enginering

Code   10F472   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Fri 4th

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Transport Phenomena

Code   10G039   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nakabe, Kazuyoshi, Tatsumi, Kazuya

Course Description   The important learning objective of this class is to understand the fundamental mechanisms of momentum, heat, and mass transfer phenomena, the knowledge of which will be markedly required for the thermal energy control technologies to further practice conservations of natural resources and energies for sustainable development. Heat and mass transfer processes consisting of conduction and forced/natural convection will be highlighted in detail, referring to the similarity characteristics of flow velocity, fluid temperature, and species concentration. Some topics on Reynolds stress, turbulent heat flux, and phase change will be introduced, expanding to their numerical models, together with some recent trends of high-tech heat and energy devices.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Surrounding Examples of Transport Phenomena	1	
Governing Equations and Non-Dimensional Parameters	3 4	
Boundary Layer Flows	2 3	
External and Internal Flows	1 2	
Turbulent Phenomena	2 3	
Topics of Flow and Heat Transfer Mechanism	2 3	
Estimation on Study Achievement	1	

Textbook

Textbook(supplemental)   Example: Transport Phenomena (Bird, R.B. et al.)

Prerequisite(s)

Web Sites

Additional Information

10G009

Quantum Condensed Matter Physics

Code   10G009   Course Year   Master Course   Term   1st term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Sustainability/ Survivability Science

Code　10F112　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Mon 2nd

Location　C1-192　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture　　Language　English

Instructor　K. Takara (DPRI), H. Ishikawa (DPRI), B. He (DPRI), T. Hosoda (Engineering) and S. Yoden (Science)

Course Description　There are many threats for human beings on the earth: medicine/infectious diseases, food, population, energy, water, environment and natural hazards and disasters. This class gives how to cope with these for human beings and societies. If we realized sustainable society, there are still catastrophes that we have to face. This class considers how to survive such catastrophic situations. Especially focused on are frequent and amplified extreme weather due to climatic change (or global warming) and subsequent severe disasters, water and environmental problems. Concepts and technologies for these problems are introduced, discussing the future perspectives of our society, science and technology based on various aspects and examples of climate, culture and ways of life in the world.

Grading　Students will be evaluated by the number of attendance and a final written examination.

Course Goals　Any graduate students in various disciplines can join this class. Mixture of different graduate students from different disciplines gives good discussions in the classroom in which global issues will be introduced and discussed by the teachers and students together. This is a graduate school level lecture class including presentations by students.

Course Topics

Theme	Class number of times	Description
	1	The framework of sustainability/survivability science is given to understand its significance.
Examples	2	Introducing how to cope with various examples of threats that human beings are facing: medicine/infectious diseases, food, population, energy, water, environment and natural hazards and disasters.
Global warming and mitigation	3	A theory of global warming, technical countermeasures of mitigation and political situation in the world are given.
Extreme weather and its prediction	2	Recent water-related disasters and water problems due to extreme weather are introduced.
Adaptation	3	Examples and ideas of adaptation in the world are considered to cope with water-related disasters that are occurring more frequent and getting bigger.
Discussions	3	Giving students an opportunity to express their own ideas, teachers and students discuss his/her ideas.
Summary	1	Conclude this series of lectures.

Textbook　No textbook specified. Handouts will be distributed if necessary.

Textbook(supplemental)　Relevant literature would be introduced.

Prerequisite(s)　The class is given in English with some Japanese language supplement for technical/special words. No background knowledge is necessary. Reading, writing and discussing in English is requirement.

Web Sites　This lecture is related to a Global COE Program " Sustainability/survivability science for a resilient society adaptable to extreme weather conditions" (GCOE-ARS) for a period of 2009 to 2013. See also http://ars.gcoe.kyoto-u.ac.jp/ for further information.

Additional Information　This class, which is given as graduate school-level lectures, can be taken by any graduate students from different disciplines including natural science, social science and humanity. Mixture of graduate students from different disciplines encourages exciting and interesting discussions by them to discuss global environmental issues with several professors and PDs.

Exercise in Practical Scientific English

Code   10i045   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Seminar   Language   English

Instructor   Kim Sunmin, Kenji Wada. etc

Course Description   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Grading   Attendance 60%, midterm reports 20%, final report 20%. The final report must be submitted by the deadline date.

Course Goals   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Course Topics

Theme	Class number of times	Description
Introduction	2	Course Guidance, etc.
Exercise-1	1	Definition of technical writing 3C in technical writing Weaknesses of Japanese writers Good examples and bad examples
Exercise-2	1	Punctuation Presentation skills 1 -organization
Exercise-3	1	Organizing your thoughts for the title and abstract Presentation skills 2 ?Visual aspects
Exercise-4	1	Presenting the background of your research Presentation skills 3 ?Oral Aspects
Exercise-5	1	Describing how you did your research Presentation skills 4 ?Physical Aspects
Exercise-6	1	Presenting what you observed Presentation Practice
Exercise-7	1	Placing your findings in the field Presentation Practice
Exercise-8	1	Expressing thanks and listing references Presentation practice
Exercise-9	1	Writing your proposal Presentation practice
Exercise-10	1	Presentation practice Reviews & Feedbacks Evaluation
Presentation	2	Current situation of studying abraod, etc.
Wrap-up lecture	1	Achievement Assessment

Textbook   No textbook is required.

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.glc.t.kyoto-u.ac.jp/ja/study/grad/10d040 (needs passwords).

Additional Information

Introduction to Advanced Material Science and Technology　English lecture

Code　10K001　Course Year　Master and Doctor Course　Term　1st term

Class day & Period　Friday,4th-5th

Location　KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)　Credits　2

Restriction　No Restriction　Lecture Form(s)　Relay Lecture　Language　English　Instructor

Course Description　The various technologies used in the field of material science serve as bases for so-called "high technologies", and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

Grading　In order to obtain two credits, students must attend at least ten lectures, and at least five of the submitted reports must be evaluated as " passed" by each lecturer. Each report should be submitted to the lecturer within two weeks after his/her lecture. NOTE: Reports are NOT acceptable from those who do not attend the lecture.

Course Goals

Course Topics

Theme	Class number of times	Description
	2	Advanced Beam Processes and Characterization Technique for Nanotechnology//J. Matsuo
		Microreactor TechnologyforProductionofHighFunctional Chemical Materials//K. Mae
		Nano-optical Spectroscopy/Microscopy:Applications in Material Science//H. Aoki
	2	Rheology Control by Associating Polymers//T. Koga
		Hyperthermophiles and their thermostable biomolecules//H. Atomi
	1	ISO Standards in Analytical Chemistry//J. Kawai
	1	Advanced Polymer Foam Technology//M. Ohshima
	1	Photonic Materials//K. Hirao
	1	Nanostructure Control in Structural MetallicMaterials//N. Tsuji
	1	Electrodeposition and Electroless Deposition for Materials Processing//N. Tsuji
		Confirmation of study achievement

Textbook　None

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information　Check the notice on the bulletin board.

10K004

New Engineering Materials, Adv.   English lecture

Code   10K004   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 5th

Location   KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   English   Instructor

Course Description   Outline: New materials are necessary for the advancement of high technologies, but in order to develop these new materials for practical applications, a number of problems must be solved. In this course, the problems encountered in the fields of chemical engineering, electrical / electronic engineering, mechanical engineering and civil engineering are discussed. Discussions are also held on natural resources, and how computers are being used in the development of new materials. Lectures are given in English.

Grading   Credit: The evaluation of a student's work will be given on a pass / fail basis, based on his / her attendance and reports, not on examinations.(1) Attending the class 10 times or more and submitting at least 5 reports with passing marks is required to receive 2 credits.(2) A report assignment will be given by every lecturer and must be submitted within 2 weeks from the end of the lecture.(3) A student's report on any lecture from which he / she is absent will not be accepted.

Course Goals

Course Topics

Theme	Class number of times	Description
Improving Sanitation and Resource Recovery in both Developing and Developed Countries (Yoshihisa SHIMIZU)	1	
Soils Recovered from Disaster Debris (Takeshi KATSUMI)	1	
Separation Analyses in Micro- and Nano-scale (Koji OTSUKA)	1	
Polymer Synthesis beyond the 21st Century: Precision Polymerizations and Novel Polymeric Materials (Mitsuo SAWAMOTO)	1	
Solid State Lighting based on Light Emitting Diodes (Yoichi KAWAKAMI)	1	
Material Properties of Fiber Reinforced Cementitious Composites and Applicability to Structures (Yoshio KANEKO)	1	
Materials in Micro Electro Mechanical Systems (MEMS) (Toshiyuki TSUCHIYA)	1	MEMS
Composite Materials: Smart, Lightweight and Strong Materials (Masaki HOJO)	2	
Inorganic New Materials (Koichi EGUCHI)	1	
Structural biochemistry of proteins (Masahiro SHIRAKAWA)	1	
Semiconductor Materials and Devices (Tsunenobu KIMOTO)	2	
High Temperature Superconductivity and Its Application to Electronics (Itsuhiro KAKEYA)	1	

Textbook

Textbook(supplemental)   Class handouts

Prerequisite(s)

Web Sites

Additional Information

Frontiers in Modern Science & Technology

Code   10D051   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   Katsura Hall   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Science and Technology for Making Substances

Code   10W401   Course Year   Master and Doctor Course   Term   Class day & Period

Location A2-308   Credits 2   Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Dimensional Control and Micro-Nano Systems

Code   10W403   Course Year   1st year - 5th year   Term   Class day & Period   Location   A2-302

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W405

Molecular Function and Composite-Assembly Function

Code   10W405   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 1st

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese

Instructor

H.Imahori,S.Kimura,T.Kakiuchi,Y.Tsuji,A.Toshimitsu,K.Tanaka,H.Kaji,T.Sato,K.Akagi,S.Ito,K.Matsuda

Course Description   Principles and their examples of revealing molecular function will be described based on molecular design. We also focus on guidelines of molecular design and their representative examples to achieve function of molecular composites and assemblies.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Molecular function and composite-assembly function relating to light	3	This lecture describes photosynthesis and artificial photosynthesis as examples of molecular function and composite-assembly function relating to light. Organic photonics and electronics including molecular photovoltaics are also highlighted as potential practical applications (Imahori).
Chemistry of organic radical and organic magnetic materials	3	This lecture describes physics and chemistry on organic radicals, organic magnetic materials, and functional organic magnetic materials (Matsuda).
Electronic property and function of nanocarbon	3	This lecture describes electronic property and function of nanocarbons such as graphene, nanographene, graphene nanoribbon, and carbon nanotube (Kazuyoshi Tanaka).
Molecular function and composite-assembly function relating to biological molecules	3	This lecture describes molecular function and composite-assembly function relating to biological molecules (Kimura).
Luminescence properties and self-assembly function of -conjugated polymers	3	This lecture describes luminescence properties and self-assembly function of -conjugated polymers by focusing on synthesis, polymerization, self-assembly, liquid crystallinity, alignment, helical structure, linear polarization and circular polarization (Akagi).

Textbook   None

Textbook(supplemental)

Prerequisite(s)   Knowledge of an undergraduate level of chemistry is required.

Web Sites   None

Additional Information   This course has been opened every two years since 2009. Prof. Imahori has been a head of this course since 2009. In 2013 this course will begin from April.

Physical Chemistry and Analytical Techniques of Complex Systems

Code   10W407   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 5th

Location   A2-304   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese

Instructor

K.Tanaka,T.Takigawa,T.Sakka,T.Tanaka.H.Watanabe.T.Yoshizaki,T.Koga,T.Kanaya,R.Yamamoto,M.Miyahara

Course Description   This course focuses on fundamentals of physical chemistry for a quantitative understanding of structure, reaction, and properties of matters in complex systems. Analytical techniques including theoretical, numerical, and experimental approaches for clarification of the phenomena in complex systems are also introduced.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Frontiers in the Field of Chemical Biology and Biological Chemistry

Code   10W409   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 5th

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese

Instructor   S.Nishimoto,M.Shirakawa,Y.Tabata,H.Iwata,I.Hamachi,Y.Mori,M.Umeda,H.Atomi

Course Description   In the cutting-edge of reseach fields, chemistry and biologi are being closely related each other. In this class,progress in such interdisciplinary areas and topics including natural products, biophysics, bioimaging , baimaterials, strucural biology, chemical biology,molecular physiology and others, are briefly explained and discussed.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nano Materials Science

Code   10W410   Course Year   Master and Doctor Course   Term   Class day & Period

Location   Integrated Research Bldg.-102   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	12	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics and Synthesis of Micro Machines II

Code 10W412   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s) Lecture   Language English   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Recent advances in fuel cell sciences

Code   10W414   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   A2-303   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese   Instructor   K.Eguchi,T.Abe,M.Kawase,T.Matsui,T.Shishido

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advances in Rechargeable Batteries

Code   10W416   Course Year   Master and Doctor Course   Term   Class day & Period

Location   A2-303   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Integrated Chemical Synthesis

Code   10W418   Course Year   Master and Doctor Course   Term   Class day & Period   intesive course

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Jun-ichi Yoshida

Course Description   Usually, organic synthesis has been performed by stepwise formation of the individual bonds in the target molecule. However, it would be much more efficient if one could form several bonds in one sequence without isolating the intermediates. Therefore, conventional step-by-step synthesis is being supplemented with integrated synthesis which combines multiple components in a singleoperation in one pot or in a flow system. This course, which focus on space integration of reactions using flow microreactors. provides an outline of the concept of reaction integration in flow microreactors and some recent examples.

Grading   examination

Course Goals   To understand characteristic feaxtures of flow microreactor reactions and to get ability to design integrated synthesis using flow microreactors.

Course Topics

Theme	Class number of times	Description
introduction	1	brief introduction ot flow microreactor synthesis
residence time and mixing	2	principle of reaction control by taking advantage of flow microreactors such as precise residence time control and fast mixing
control of reactions	4	some examples of control of reactions such as reactions invovling short-live reactive intermediates and competitive consecutive reactions
organic reactions	4	various examples of organic reactions such as stochiometric reactions, catalytic reactions, photochemical reactions, and electrochemical reactions
polymerization	2	principles and examples of polymerization reactions using flow microreactors
industrial applications	2	some examples of industrial applications of flow microreactor synthesis

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Experimental Integrated Chemical Systems

Code   10W420   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-302   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   K.Mae and S.Hasebe

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design of Green Chemical Processing

&

Code 10W422 Course Year Master and Doctor Course Term 1st term Class day & Period Wed 1st

Location A2-303 Credits 2 Restriction Lecture Form(s) Lecture Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	4	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W424

Environmental-friendly Technology for Sound Material Cycle

Code   10W424   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 3rd

Location   C1-192   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   , , , , ,

Course Description   Global warming, ecosystem crisis, and depletion of natural resources are of great concern today. To solve these problems, we have to build the sustainable society where low carbon dioxide emission, low environmental burdens, and the reduction of wastes by recycling are realized. It is possible to utilize municipal wastes, wastewaters, and unused biomass as resources instead of the natural resources used at present. Recycling-oriented technologies that enable sustainable utilization of those wastes and the concept to develop those technologies are introduced.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	7	
	4	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Functionalized Nucleic Acids Chemistry

Code   10V426   Course Year   Master and Doctor Course   Term   Class day & Period

Location   A2-303   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nishimoto and Tanabe

Course Description   A number of challenges have been made on development of modified DNA, RNA and proteins, chemical or physical properties of which are controlled by several triggers. These intelligent materials are promising for next generation gene diagnostics and therapy. In this lecture, we discuss the molecular design of these artificial biological materials and their application.

Grading   attendance and report

Course Goals   Synthetic chemistry of DNA, RNA and protein//Chemical structure and basic funciton of biological materials//Regulation of biological function//Medical applications of artificial DNA, RNA and protein

Course Topics

Theme	Class number of times	Description
Chemical structure and synthesis	2	Synthetic chemistry of nucleic acids
Gene manipulation	2	Synthesis of protein Gene Sequencing
Functions of intelligent molecules	2	Function of artificial peptides Functions of artificial nucleic acids
Drugs related to DNA	2	DNA cleavage by drugs Crosslinking by artificial nucleic acids Alkylation by drugs
Expansion of genetic code	2	Artificial nucleobases Synthesis of modified protein in cells
Medical application	2	Molecular targeting Molecular imaging
Recent topics	3	

Textbook

Textbook(supplemental)   No textbooks are used.

Prerequisite(s)   Basic knowledge in organic chemistry and biological chemistry is requisite.

Web Sites

Additional Information

Laboratory and Exercise on Materials Engineering and Chemistry I

Code   10W432   Course Year   Master 1st   Term   1st term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Laboratory and Exercise on Materials Engineering and Chemistry

Code   10W433   Course Year   Master 1st   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Laboratory and Exercise on Materials Engineering and Chemistry III

Code   10W434   Course Year   Master 2nd   Term   1st term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Laboratory and Exercise on Materials Engineering and Chemistry IV

Code   10W435   Course Year   Master 2nd   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W437

Advanced Seminar on Materials Engineering and Chemistry I

Code   10W437   Course Year   Doctor Course   Term   1st 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Seminar on Materials Engineering and Chemistry II

Code   10W438   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   1   Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W439

Advanced Seminar on Materials Engineering and Chemistry III

Code   10W439   Course Year   Doctor Course   Term   1st 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Seminar on Materials Engineering and Chemistry III

Advanced Seminar on Materials Engineering and Chemistry IV

Code   10W440   Course Year   Doctor Course   Term   2nd 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W441

Advanced Seminar on Materials Engineering and Chemistry V

Code   10W441   Course Year   Doctor Course   Term   1st 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Seminar on Materials Engineering and Chemistry VI

Code 10W442 Course Year Doctor Course Term 2nd term Class day & Period Location Credits

Restriction Lecture Form(s) Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W444   Course Year   Master and Doctor Course   Term   1st+2nd 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W445   Course Year   Master and Doctor Course   Term   1st+2nd 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W446   Course Year   Master and Doctor Course   Term   1st+2nd 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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W447   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W448   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship

Code   10W449   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Advanced Material Science and Technology   English lecture

Code   10K001   Course Year   Master and Doctor Course   Term   1st term

Class day & Period   Friday,4th-5th

Location   KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)   Credits   2

Restriction   No Restriction   Lecture Form(s)   Relay Lecture   Language   English   Instructor

Course Description   The various technologies used in the field of material science serve as bases for so-called "high technologies", and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

Grading   In order to obtain two credits, students must attend at least ten lectures, and at least five of the submitted reports must be evaluated as " passed" by each lecturer. Each report should be submitted to the lecturer within two weeks after his/her lecture. NOTE: Reports are NOT acceptable from those who do not attend the lecture.

Course Goals

Course Topics

Theme	Class number of times	Description
	2	Advanced Beam Processes and Characterization Technique for Nanotechnology//J. Matsuo
		Microreactor TechnologyforProductionofHighFunctional Chemical Materials//K. Mae
		Nano-optical Spectroscopy/Microscopy:Applications in Material Science//H. Aoki
	2	Rheology Control by Associating Polymers//T. Koga
		Hyperthermophiles and their thermostable biomolecules//H. Atomi
	1	ISO Standards in Analytical Chemistry//J. Kawai
	1	Advanced Polymer Foam Technology//M. Ohshima
	1	Photonic Materials//K. Hirao
	1	Nanostructure Control in Structural MetallicMaterials//N. Tsuji
	1	Electrodeposition and Electroless Deposition for Materials Processing//N. Tsuji
		Confirmation of study achievement

Textbook   None

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   Check the notice on the bulletin board.

New Engineering Materials, Adv.　English lecture

Code　10K004　Course Year　Master and Doctor Course　Term　2nd term　Class day & Period　Thu 5th

Location　KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)　Credits　2　Restriction　No Restriction　Lecture Form(s)　Relay Lecture

Language　English　Instructor

Course Description　Outline: New materials are necessary for the advancement of high technologies, but in order to develop these new materials for practical applications, a number of problems must be solved. In this course, the problems encountered in the fields of chemical engineering, electrical / electronic engineering, mechanical engineering and civil engineering are discussed. Discussions are also held on natural resources, and how computers are being used in the development of new materials. Lectures are given in English.

Grading　Credit: The evaluation of a student's work will be given on a pass / fail basis, based on his / her attendance and reports, not on examinations.(1) Attending the class 10 times or more and submitting at least 5 reports with passing marks is required to receive 2 credits.(2) A report assignment will be given by every lecturer and must be submitted within 2 weeks from the end of the lecture.(3) A student's report on any lecture from which he / she is absent will not be accepted.

Course Goals

Course Topics

Theme	Class number of times	Description
Improving Sanitation and Resource Recovery in both Developing and Developed Countries (Yoshihisa SHIMIZU)	1	
Soils Recovered from Disaster Debris (Takeshi KATSUMI)	1	
Separation Analyses in Micro- and Nano-scale (Koji OTSUKA)	1	
Polymer Synthesis beyond the 21st Century: Precision Polymerizations and Novel Polymeric Materials (Mitsuo SAWAMOTO)	1	
Solid State Lighting based on Light Emitting Diodes (Yoichi KAWAKAMI)	1	
Material Properties of Fiber Reinforced Cementitious Composites and Applicability to Structures (Yoshio KANEKO)	1	
Materials in Micro Electro Mechanical Systems (MEMS) (Toshiyuki TSUCHIYA)	1	MEMS
Composite Materials: Smart, Lightweight and Strong Materials (Masaki HOJO)	2	
Inorganic New Materials (Koichi EGUCHI)	1	
Structural biochemistry of proteins (Masahiro SHIRAKAWA)	1	
Semiconductor Materials and Devices (Tsunenobu KIMOTO)	2	
High Temperature Superconductivity and Its Application to Electronics (Itsuhiro KAKEYA)	1	

Textbook

Textbook(supplemental)　Class handouts

Prerequisite(s)

Web Sites

Additional Information

Business Japanease I

Code   10i005   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   B-Cluster 2F Seminar Room   Credits   2   Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Lect. Kurihara

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

Business Japanease II

II

Code 10i006 Course Year Master and Doctor Course Term 2nd term Class day & Period Wed 2nd

Location B-Cluster 2F Seminar Room Credits 2 Restriction Lecture Form(s) Lecture

Language Japanese Instructor Lect. Kurihara

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Professional Scientific Presentation Exercises　English lecture

Code　10i041　Course Year　Doctor Course　Term　1st term　Class day & Period　Wed 5th

Location　B-Cluster 2F Seminar Room　Credits　1

Restriction　The number of students might be limited if too many students will get enrolled.

Lecture Form(s)　Semina　　Language　English　Instructor　Juha Lintuluoto

Course Description　It is imperative for future engineers to be able to communicate and deliver effectively scientific information to large variety of audiences. This skill enables engineers to share and absorb information to more extended audiences, and facilitates success in selling ideas and products, publishing and team working. The purpose of this course is to teach the basic rules needed for successful professional scientific presentation, both orally and written. The course also prepares students to deliver scientific information presentations to wide audiences. The course is consisted of excessive exercises, of which the student should complete seven (7) tasks. The course holds 3-4 tasks for oral presentation exercises, and 3-4 tasks for professional scientific writing exercises. The exact number of both exercises is adjusted for each student's needs. The course is aimed for doctor course (DC) students, both Japanese and Foreign nationals

Grading　Reports, class activity, presentation

Course Goals　This course is aimed to foster engineering students' scientific presentation skills. The successfully course completed students will be able to express and present complicated and specific scientific information at more generally understandable level. The students will also be able to pose relevant questions and effectively answer to the wide variety of questions.

Course Topics

Theme	Class number of times	Description
		Guidance and Professional presentation rules and etiquette
		Oral presentations & questioning I, Written report I
		Oral presentations & questioning I, Written report I
		Oral presentations & questioning II, Written report II
		Oral presentations & questioning II, Written report II
		Oral presentations & questioning III, Written report III
		Oral presentations & questioning III, Written report III
		Oral presentations & questioning IV, Written report IV
		Oral presentations & questioning IV, Written report IV I
		Course summary and discussion

Textbook　Course materials will be provided.

Textbook(supplemental)　Will be informed if necessary.

Prerequisite(s)　-Fundamental skills about scientific presentation

-Advanced English skills

-Sufficient personal research results

Web Sites　The web-site will be opened in the home page of the GL education center.

Additional Information　Students are requested to check in advance whether the credit of this course is counted as the unit for graduation requirement at department level. Course starts at April 10th, and the 1st lesson is repeated on April 17th. The course schedule is irregular. Most classes are biweekly, the detailed schedule is provided at the 1st lecture.

Advanced Engineering and Economy　English lecture

Code　10i042　Course Year　Master and Doctor Course　Term　1st term　Class day & Period　Thu 5th　Location　B-Cluster 2F Seminar Room

Credits　2　Restriction　The number of students might be limited if too many students will get enrolled.

Lecture Form(s)　Lectures, Group works&tasks　Language　English　Instructor　Juha Lintuluoto

Course Description　Engineering economics plays central role in any industrial engineering project. For an engineer, it is important to apply the engineering know-how with the economic analysis skills to obtain the best available materials, methods, devices, etc. in the most economical way. This course is aimed to teach engineering students the basic economic methods to manage economically an engineering project. In addition, the report writing on various engineering economic issues prepares to write reports in a professional form. The lab sessions are meant for the verbal skills improvement as well as improvement of analytical thinking. The topics are of current relevant topics Small-group brain-storming method is used. The exercise sessions cover the use of Ms-Excel for various quantitative economic analyses.

Grading　Final test, reports, class activity

Course Goals　This course is aimed to strengthen engineering students' skills in economics. The course concept is to teach students selectively those subjects which serve as major tools to solve economic tasks in engineering environment. The reports and lab sessions provide students stimulating and analytical thinking requiring tasks, and presentation skills training is an important part of this course.

Course Topics

Theme	Class number of times	Description
Student orientation and Introduction to engineering economy	1	
Cost concepts and design economics	1	
Cost estimation techniques	1	
The time value of money	1	
Evaluating a single project	1	
Comparison and selection among alternatives	1	
Depreciation and income taxes	1	
Price changes and exchange rates	1	
Replacement analysis	1	
Evaluating projects with the benefit-cost ratio method	1	
Breakeven and sensitivity analysis	1	
Probabilistic risk analysis	1	
The capital budgeting process	1	
Decision making considering multiattributes	1	
Final test	1	
		Additionally, students will submit five reports during the course on given engineering economy subjects. Also, required are the five lab participations (ca.60 min/each) for each student. Additionally, three exercise sessions (ca.60 min/each), where use of Ms-Excel will be practiced for solving various engineering economy tasks, should be completed

Textbook　Engineering Economy 15th ed. William G. Sullivan (2011)

Textbook(supplemental)　Will be informed if necessary.

Prerequisite(s)　-This course is highly recommended for those who attend " Inter-Engineering -Highly interactive lessons (discussion), Small group working method

Web Sites　The web-site will be opened in the home page of the GL education center.

Additional Information　Students are requested to check in advance whether the credits of this course are counted as the units for graduation requirement at department level. The course starts on Apr.11th.

Engineering Project Management   English lecture

Code   10i047   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 5th

Location   B-Cluster 2F Seminar Room   Credits   1

Restriction   The number of students might be limited if too many students will get enrolled.

Lecture Form(s)   Lectures, Group works&tasks   Language   English

Instructor   Lintuluoto, Kojima, Oishi, Takatori

Course Description   The purpose of this course is to teach the basic skills needed for expressing and initiating ideas, and presenting information in successful international engineering group work. The course provides simulations for students in group managing and decision making in international engineering teams. International teamwork ethics subjects for successful engineering project will be practiced. The course consists of lectures, case studies, the invited lecture from an industry representative and the final examination. Also, a project report exercise is included in this course.

The course is basically designed for doctor course (DC) students, both Japanese and foreign nationals. If place are available they may be given to master course students.

Grading   Report, class activity, presentation

Course Goals   This course is the pre-course for Engineering Project Management II which will be held in the second semester. Students will learn project management tools, apply project strategies and perform qualitative risk analyses. Also students will learn how to carry out projects with group members from various countries and engineering fields.

Course Topics

Theme	Class number of times	Description
	1	Introduction of the class (All)
	1	Project Management I (Lintuluoto)
	1	Special Lecture from an Industry Representative (Kojima)
	1	Project Management II (Lintuluoto)
	1	Leadership skills (Kojima)
	1	Special Lecture from an Industry Representative (Kojima)
	1	Leadership skills in group work (Kojima)
	1	Strategies viewpoints in Engineering Projects I (Oishi)
	1	Cultural aspects in project development (Lintuluoto)
	1	Strategies viewpoints in Engineering Projects II (Oishi)
	1	Strategies viewpoints in Engineering Projects (case study) (Oishi)
	1	Engineering project communication I (Takatori)
	1	Engineering project communication II (Takatori)
	1	Special Lecture from an Industry Representative
	1	

Textbook   Course materials will be provided.

Textbook(supplemental)   Will be informed if necessary.

Prerequisite(s) ' -This course is recommended for those who later intend to attend " Engineering Project Management II " .

-Highly interactive lessons (discussion), Small group work methodologies.

Web Sites   The web-site will be opened in the home page of the GL education center.

Additional Information   Students are requested to check in advance whether the credit from this course will be accepted as a graduation requirement for their department. The course starts on Apr. 12th.

Engineering Project Management   English lecture

Code   10i048   Course Year   Doctor Course   Term   2nd term   Class day & Period   Fri 5th

Location   B-Cluster 2F Seminar Room   Credits   1   Restriction   Student number will be limited.

Lecture Form(s)   Semina   Language   English   Instructor   Lintuluoto   Kojima   Oishi, Takatori

Course Description   In this course, students will apply the engineering know-how and the skills of management, group leadership, and international communication which they learned in the course of "Engineering Project Management I" to build and carry out a virtual inter-engineering project. This course provides a forum where students' team-plan based on ideas and theories, decision making, and leadership should produce realistic engineering project outcomes. The course consists of intensive group work and a few intermediate discussions. The course will be held 6 weeks for group work, and two (2) intermediate discussions, project presentation to a wide audience, and a written report will be required.

Grading   Report, class activity, presentation

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

Course Topics

Theme	Class number of times	Description
Guidance		
Group work I		
Group work II		
Intermediate discussion I		
Group work III		
Group work IV		
Intermediate discussion II		
Group work V		
Group work VI		
Project presentation and discussion		
		Each project team may freely schedule the group work within the given time frame. In addition to " Intermediate discussion" sessions, the course instructors are available if any such need arises.

Textbook   Course materials will be provided.

Textbook(supplemental)   Will be informed if necessary.

Prerequisite(s) ' -Complete the course " Engineering Project Management I" in the 1st term.

-Attendance on " Advanced Engineering Economics" course in the 1st term is strongly recommended.

-Fundamental skills about group leading and communication, scientific presentation.

Web Sites   The web-site will be opened in the home page of the GL education center.

Additional Information   Students are requested to check in advance whether the credit from this course will be accepted as a graduation requirement for their department.

Social Core Advanced Materials I

Code   10C273   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 4th

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

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	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Social Core Advanced Materials

Code   10C275   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 4th

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

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	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W472   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W473   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W474   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W475   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W476   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W477   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W478   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Engineering and Chemistry

Code   10W479   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D043

Instrumental Analysis, Adv.

Code   10D043   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Instrumental Analysis, Adv.

Code   10D046   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise in Practical Scientific English

Code   10i045   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Seminar   Language   English

Instructor   Kim Sunmin, Kenji Wada. etc

Course Description   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Grading   Attendance 60%, midterm reports 20%, final report 20%. The final report must be submitted by the deadline date.

Course Goals   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Course Topics

Theme	Class number of times	Description
Introduction	2	Course Guidance, etc.
Exercise-1	1	Definition of technical writing 3C in technical writing Weaknesses of Japanese writers Good examples and bad examples
Exercise-2	1	Punctuation Presentation skills 1 -organization
Exercise-3	1	Organizing your thoughts for the title and abstract Presentation skills 2 ?Visual aspects
Exercise-4	1	Presenting the background of your research Presentation skills 3 ?Oral Aspects
Exercise-5	1	Describing how you did your research Presentation skills 4 ?Physical Aspects
Exercise-6	1	Presenting what you observed Presentation Practice
Exercise-7	1	Placing your findings in the field Presentation Practice
Exercise-8	1	Expressing thanks and listing references Presentation practice
Exercise-9	1	Writing your proposal Presentation practice
Exercise-10	1	Presentation practice Reviews & Feedbacks Evaluation
Presentation	2	Current situation of studying abraod, etc.
Wrap-up lecture	1	Achievement Assessment

Textbook   No textbook is required.

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.glc.t.kyoto-u.ac.jp/ja/study/grad/10d040 (needs passwords).

Additional Information

Experimental Integrated Chemical Systems

Code   10W459   Course Year   Master and Doctor Course   Term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor   J.Yoshida,S.Hasebe,K.Mae

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	4	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C283

International Student Seminar on Integrated Materials

Code   10C283   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Exercise   Language   English   Instructor

Course Description   In this course, students organize an international seminar on Integrated Materials, which covers a wide variety of topics in materials science and chemistry, in cooperation with students at foreign universities.

Grading   Evaluations are made on the basis of the overall activity in organizing the international seminar.

Course Goals   Learning skills in scientific presentation, discussion, and negotiation in English via organizing the seminar in cooperation with students at foreign universities.

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W463   Course Year   Master and Doctor Course   Term   Class day & Period

Location   Katsura Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W464   Course Year   Master and Doctor Course   Term   Class day & Period

Location   Katsura Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W465   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Katsura Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W466   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Katsura Campus   Credits   1   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W467   Course Year   Master and Doctor Course   Term   Class day & Period

Location   Yoshida Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W468   Course Year   Master and Doctor Course   Term   Class day & Period

Location   Yoshida Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W469   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Yoshida Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Materials Engineering and Chemistry

Code   10W470   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Yoshida Campus   Credits   1   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Frontiers in Modern Science & Technology

Code   10D051   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   Katsura Hall   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W603

Introduction to Biomedical Engineering

Code 10W603   Course Year Master and Doctor Course   Term 1st term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Intensive Lecture   Language Japanese

Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code 10W603   Course Year Master and Doctor Course   Term 1st term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Intensive Lecture   Language Japanese

Introduction to Quantum Science

Code   10C070   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	9	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D636

Polymer Design for Biomedical and Pharmaceutical Applications

Code   10D636   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to the Design and Implementation of Micro-Systems

Code   10V201   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 4b   Credits   2   Restriction   Take class 10G205 "Microsystem Engineering"

Lecture Form(s)   Lecture and Pactice   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   This is a joint lecture with Hong Kong University of Science and Technology (HKUST). A team consists of two students from each University work together to fullfill the assignment (design a microsystem) through paper survey, analysis,design, and presentation. A student can acquire not only the basic knowledge of a microsystem, but also comprehensive ability of English such as technical knowledge in English, skill for team work, and communication.

Grading   Presentation, Assignments, and Achievement

Course Goals   Acquire the knowledge and skill to design and analyze a microsystem.

Course Topics

Theme	Class number of times	Description
Tutorial on microsystem CAD software	3	Master CAD program for microsystem design and analysis which will be utilized to accomplish an assignment.
Lecture and Task Introduction	2	Learn basic knowledge necessary to design a microsystem/MEMS(Micro Electromechical Systems) utilizing microfabrication technology.
Design and analysis work	3	Analyze and design a microsystem by communicating with a team member of HKUST.
Presentation I	2	The designed device and its analyzed results is presented in detail by team in English.
Evatuation of device	3	Evaluate the fabricated microsystem.
Presentation II	2	The measured results and comparison between the analyzed results of the fabricated microsystem is presented by team in English.

Textbook

Textbook(supplemental)

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is required to take the course 10G205 "Microsystem Engineering", which provide the knowledge about the theory of sensing and actuating in microsystem. Those who wants to take this course have to take training course for CAD in advance. For more detail, please contact one of the instructors as early as possible.

10W620

Radiation Measurement for Medicine

Code　10W620　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Fri 2nd

Location　C3-Lecture Room 5　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor　Hidetsugu Tsuchida, Yoshinori Sakurai

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Fundamentals for Physical Effects of Radiation Interactions	1-2	
Fundamentals for Chemical Effects of Radiation Interactions	1	
Fundamental Quantities and Units for Radiation	1-2	
Radiation Measurements in Medical Physics	2-3	
Radiation Dosimetry	1-2	
Estimation for Dose Distribution	1-2	
Techniques for Radiation Control and Measurement in Medical Radiation Field	1	
Laws and Ordinances for Radiation Therapy	1	
Check of Study Achievement	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Advanced Nuclear Engineering

Code   10C072   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10G203

Micro Process and Material Engineering

Code   10G203   Course Year   Master Course   Term   1st term   Class day & Period   Mon 4th

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   H. Kotera, O. Tabata, K. Eriguchi, I. Kanno, T. Tsuchiya

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Semiconductor microfabrication	3	
Thin-film process and evaluation	3	
Silicon micromachining	3	
3D lithography	2	
Soft-micromachining	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Multi physics Numerical Analysis

Code 10G209   Course Year Master and Doctor Course   Term 2nd term   Class day & Period Wed 1st

Location Engineering Science Depts Bldg.-101   Credits 2   Restriction   Lecture Form(s) Lecture

Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	2	
	2	
	5	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10G041

Advanced Finite Element Methods

Code   10G041   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and Practice

Language   English   Instructor   Kotera and Nishiwaki

Course Description   This course presents the basic concept and mathematical theory of the Finite Element Method (FEM), and explains how the FEM is applied in engineering problems. We also address important topics such as the physical meaning of geometrical non-linearity, material non-linearity, and non-linearity of boundary conditions, and we explore numerical methods to deal with these nonlinearities. Also, we guide students in class in the use of software to solve several numerical problems, to develop practical skill in applying the FEM to engineering problems.

Grading   Grading is based the quality of two or three reports and the final exam.

Course Goals   The course goals are for students to understand the mathematical theory of the FEM and the numerical methods for analyzing non-linear problems based on the FEM.

Course Topics

Theme	Class number of times	Description
Basic knowledge of the FEM	3	What is the FEM? The history of the FEM, classifications of partial differential equations, linear problems and non-linear problems, mathematical descriptions of structural problems (stress and strain, strong form and weak form, the principle of energy).
Mathematical background of the FEM	2	Variational calculus and the norm space, the convergence of the solutions.
FEM formulations	3	FEM approximations for linear problems, formulations of iso-parametric elements, numerical instability problems such as shear locking, formulations of reduced integration elements, non-conforming elements, the mixed approach, and assumed-stress elements.
Classifications of nonlinearities and their formulations	4	Classifications of nonlinearities and numerical methods to deal with these nonlinearities.
Numerical practice	2	Numerical practice using COMSOL.
Evaluation of student achievements	1	

Textbook

Textbook(supplemental)   Bath, K.-J., Finite Element Procedures, Prentice Hall

Belytschko, T., Liu, W. K., and Moran, B.., Nonlinear Finite Elements for Continua and Structures, Wiley

Prerequisite(s)   Solid Mechanics

Web Sites

Additional Information

Microsystem Engineering

Code   10G205   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 3rd

Location   C3-Lecture Room 4a   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   Microsystem covers not only technologies related to individual physical or chemical phenomenon in micro scale, but also complex phenomena which are eveolved from their interaction. In this course, the physics and chemistry in micro and nanoscale will be lectured in contrast to those in macro scale. The various kinds of application devices (ex. physical (pressure, flow, force) sensors, chemical sensors, biosensors, actuators (piezoelectric, electrostatic, and shape memory) and their system are discussed.

Grading   The evaluation will be based on the reports given in each lecture.

Course Goals   Understand the theory of sensing and actuating in microsystem. Acquire basic knowledge to handle various kinds of phenomena in microscale.

Course Topics

Theme	Class number of times	Description
MEMS modeling	2	Multi-physics modeling in microscale. Electro-mechanical coupling analysis.
MEMS simulation	2	System level simulation in MEMS.
Electrostatic microsystem	3	Electrostatic sensors and actuators. Theory and application devices.
Physical sensors	4	Physical sensors as a fundamental application in microsystem. Accelerometer, vibrating gyroscope, pressure sensors.
Micro total analysys system	4	Chemical analysis system and bio-sensing device using microsytem.

Textbook   Provided in the lecture.

Textbook(supplemental)   Provided in the lecture.

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is strongly recommended to take a course 10V201 "Introduction to the Design and Implementation of Micro-Systems", which is a practice for designing microsystem. Those who wants to take this course, please contact one of the instructors as early as possible.

Quantum Science

Code   10C074   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 1st

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description   This course involves fundamental interactions of electrons, ions and photons to atoms, molecules and condensed matters, and practical applications for nanotechnology. Great emphases are on fundamental mechanisms of beam-solid interactions, characterization techniques, material synthesis and processing for quantum devices with quantum beam. Recent progress of related area of quantum beam will be also introduced in this course.

Grading   Coursework will be evaluated with attendance and report on subjects.

Course Goals   To provide students to understand fundamental interactions in quantum science.

Course Topics

Theme	Class number of times	Description
Interactions between quantum beams and solids	7	Interactions between quantum beams and solids are described with various formulas. Collisions with nucleus, electronic excitation, defect formation and energy loss will be discussed and related scientific topics, such as discovery of electron will be introduced.
Applications of quantum beams	7	The interactions of quantum beam are widely used for various applications. Material processing and analysis with quantum beams are essential in nanotechnology and quantum beams are also important for diagnostics of diseases and cancer therapy in medical field. Practical applications will be presented with recent progress and challenges.
Final examination and report	1	Evaluation will be given by the contents of the reports and quizzes of the subjects leaned in this course.

Textbook   Ion-Solid Interactions: Fundamentals and Applications (Cambridge Solid State Science Series) M. Nastasi, J. Mayer, J. Hirvonen

Textbook(supplemental)

Prerequisite(s)   Solid state physics, Quantum mechanics(beginner's), Electromagnetism

Web Sites

Additional Information

Radiation Physics and Engineering

Code   10C017   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 1st

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C047

Radiation Medical Physics

Code   10C047   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Yoshinori Sakurai, Tooru Kobayashi

Course Description   Medical physics is the general term for the physics and technology which are supporting radiation diagnosis and therapy, and particle therapy. As it covers many different fields, the important subjects are " promotion for the advance of radiation therapy" and " quality assurance for radiation therapy" . The scope of this course is to learn the fundamental knowledge for radiation medical physics. Especially, the focus is put on the understanding for (1) the bases of physics, biology and so on for radiation, (2) the physics for the radiations applied to diagnosis, (3) the characteristics of radiations and particle beams applied to therapy, and (4) the radiation protection, quality assurance and so on for radiation diagnosis and therapy.

Grading   Attendance and reports

Course Goals   To learn the fundamental knowledge of medical physics, mainly for radiation physics in diagnosis and therapy

Course Topics

Theme	Class number of times	Description
Fundamental physics for radiation	2	
Fundamental bilology for radiation	2	
Radiation measurement and evaluation	2	
Physics in radiation diagnosis	3	
Physics in radiation therapy	3	
Quality assurance and standard dosimetry	1	
Radiation protection	1	
Achievement Assessment	1	

Textbook   Not specified. Handouts will be given for each topic.

Textbook(supplemental)   F.M.Khan, " The Physics of Radiation Therapy: Mechanisms, Diagnosis, and Management" (Lippincott Williams & Wilkins, Baltimore, 2003)

Prerequisite(s)   It is recommended to attend the course, " Radiation Measurement for Medicine" , concurrently.

Web Sites

Additional Information

Radiation Biology and Medicine

Code   10C046   Course Year   Master Course   Term   1st term   Class day & Period   Mon 2nd

Location   Bldg.No.1-Nuclear Engineering Sminar Room 1   Credits   2   Restriction   No Restriction

Lecture Form(s)   Relay Lecture   Language   Japanese   Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	5	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C078

Hybrid Advanced Accelerator Engineering

Code   10C078   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Yoshiharu Mori

Course Description   Particle accelerator is essential for proceeding nuclear and particle physics but also becomes a very important tool for future nuclear sciences and engineering. In this lecture, a basics theory of accelerator physics including beam optics and dynamics of the circular accelerators is given, and also various applications of the accelerators are also presented.

Grading   Reports on practical issues and subjects.

Course Goals   This lecture aims to learn a basic accelerator theory and to attain abilities to make a primitive design of circular accelerator.

Course Topics

Theme	Class number of times	Description
Hisitory and outline of particle accelerator	1	
Basic theory of beam dynamics in circular accelerator	2	
Beam oribit theory	3	
Hardwares of particle accelerator	2	
Strong focusing theory and lattice design	3	
Radio frequency acceleration theory	3	
Summary and check the accomplishment	1	

Textbook

Textbook(supplemental)   J.J.Livingood, Cyclic Particle Accelerator, Van Nostland, New York (1961).E.D. Courant and H.S.Snyder, Ann. Physics, 3,1(1958).

Prerequisite(s)

Web Sites

Additional Information

Diagnostic Imaging

Code 10W606   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Intensive Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Radiation Treatment Planning,Radiation Treatment Metrology,Practice

Code   10W618   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits 2   Restriction No Restriction   Lecture Form(s) Intensive Lecture   Language Japanese

Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nuclear Engineering Application Experiments

Code   10C068   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Research Reactor Institute   Credits   2   Restriction   No Restriction   Lecture Form(s)   Exercise

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nuclear Engineering, Adv.

Code   10C084   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	11	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Polymer Synthesis

Code   10D649   Course Year   Master Course   Term   1st term   Class day & Period   Wed 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

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

10D651

Polymer Physical Properties

Code   10D651   Course Year   Master Course   Term   1st term   Class day & Period   Thu 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hirokazu Hasegawa, Takenao Yoshizaki, Tsuyoshi Koga, Mikihito Takenaka, Hiroyuki Aoki

Course Description   A concise explanation is given of physical properties of polymer solutions and polymeric solids along with relevant basic theories.

Grading   Final grades will be evaluated in a comprehensive manner on the basis of attendance, reports, and examinations.

Course Goals   Fundamental knowledge of physical properties of polymer materials.

Course Topics

Theme	Class number of times	Description
Polymer Chain Conformation in Dilute Solutions	3	After a clarification of basic factors which determine the conformations of real polymer chains in dilute solutions, some polymer chain models are introduced to describe the equilibrium conformational behavior of the real chains. Further, behavior of average chain dimensions as a functions of molecular weight is considered based on the chain models.
Thermodynamics and Phase Behavior of Polymer Solutions	3	Various phase transition phenomena in polymer solutions (phase separation, hydration, association, gelation, etc.) are systematically explained from thermodynamic and statistical-mechanical viewpoints. "Phase separation of polymer solutions", "Aqueous polymer solutions", and "Association and gelation of polymers" are discussed in the lectures.
Exercise	1	Exercise in polymer solutions.
Structure and Mechanical Properties of Polymeric Solids	4	Polymeric solids such as rubber and plastics, especially thermodynamics of rubber elasticity, polymer crystallization and crystalline/amorphous higher-order structures, are discussed. Moreover, fundamentals of viscoelastic properties of polymers are introduced to provide the understandings of relaxation phenomena such as glass transition.
Electronic and Optical Properties of Polymeric Solids	3	The electronic and optical properties of polymers is reviewed. The application of polymer materials in the opto-electronics and display devices is also presented.
Exercise	1	Exercise in polymeric solids.

Textbook   Lecture notes distributed in the class.

Textbook(supplemental)

Prerequisite(s)   Fundamental knowledge of physical chemistry.

Web Sites

Additional Information

Polymer Functional Chemistry

Code   10D645   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D607

Design of Polymerization Reactions

Code 10D607   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

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

Instructor   Mitsuo Sawamoto and Makoto Ouchi

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	2	
	3	
	3	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Reactive Polymers

Code   10D610   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D613

Polymer Structure and Function

Code   10D613   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd   Location

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

Instructor   S. Ito, H. Ohkita, H. Aoki

Course Description   Polymers are indispensable in our modern society, fundamental in industry, and functional for chemistry, medicine, electronics, and many other advanced and emerging technologies. In this class, photo- and electric functions of polymeric materials are discussed on the basis of photochemistry and photophysics. In particular, the importance of designing nanostructures of polymer assembly is highlighted by explaining examples of state-of-the-art real systems.

Grading   Evaluated with the grade on the final test or the quality of report submitted after the final class.

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Photofunctional Polymers	5	
Nanostructure and Dynamics of Polymers	2	
Electronic Functions of Polymers	5	
Advanced Functionality of Polymers	2	

Textbook   None: Some handouts will be dealt in the class of every lecture.

Textbook(supplemental)   None:

Prerequisite(s)   Students are expected to have knowledge of Physical Chemistry and Polymer Chemistry provided in chemisty course of undergraduate.

Web Sites

Additional Information   This lecture is held biannually, not offered in 2013.

Polymer Supermolecular Structure

Code   10D616   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Location

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

Instructor   Hirokazu Hasegawa, Mikihito Takenaka

Course Description   Polymers self-assemble or self-organize by intra- and/or intermolecular interaction to form assembled structures of polymer molecules. Such structures are closely related to the properties of the polymeric materials, it is necessary to control the assembled structures of the constituent polymer molecules in order to control the properties of polymeric materials, especially solid materials. In this lecture particularly, formation mechanisms, analytical techniques, and elucidated structures of crystalline polymers, phase-separated structures of polymer mixtures, microphase-separated structures of block and graft copolymers will be discussed.

Grading   The grading is based on the short tests and report assignments.

Course Goals   This course aims for the development of the faculty to infer the properties of polymeric materials from their morphology based on the knowledge of structure-property relationships of higher-order structures of crystalline polymers, phase-separated structures of polymer mixtures (blends), microdomain stuctures of block copolymers, etc.

Course Topics

Theme	Class number of times	Description
Self-assembly and Self-organization	1	The differences between self-assembly and self-organization will be discussed by referring the examples in natural phenomena and polymeric systems.
Crystalline Polymers	3	In the lectures, unit cell structures and hierarchical higher-order structures of polymer crystals such as folded-chain lamellar crystals and spherulites, as well as deformation and thermal behavior of polymer crystals will be discussed.
Polymer Blends	5	Miscibility, phase-diagrams, mechanisms and dynamics of phase transitions, relationships between phase-separated structures and properties, methods to control the phase-separated structures will be discussed.
Block and Graft Copolymers	5	The lectures include nano-scale domain formation of block copolymers by microphase-separation, miscibility and phase diagrams, order-disorder and order-order transitions, bicontinuous structures, structure formation in thin films, blends with homopolymers or other block copolymers, multi-component multi-block copolymers, miktoarm star block copolymers, and more.
Evaluation of Degree of Understandings	1	Degree of understandings of the lectures will be evaluated by means of a short test and group discussions.

Textbook   Not used.

Textbook(supplemental)   Introduced in the lectures.

Prerequisite(s)   Thermodynamics preferable.

Web Sites

Additional Information

Biomacromolecular Science

Code   10D611   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   A2-307   Credits 2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10D611   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Polymer Solution Science

Code   10D643   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Takenao Yoshizaki, Yo Nakamura

Course Description   Effects of stiffness and local conformations of polymer chains on polymer solution properties observed in the light scattering and viscosity experiments are considered based on appropriate polymer chain models.

Grading   Term-end examination.

Course Goals

Course Topics

Theme	Class number of times	Description
Review	1	Definitions of physical quantities determined from the light scattering and viscosity measurements and the theoretical formulations of those quantities.
Experiments in dilute polymer solutions	4	Principles of the light scattering and viscosity experiments.
Polymer chain models and their statistics	4	Static models for polymer chains: the Gaussian chain, the wormlike chain, and the helical wormlike chain. A comparison of experimental data for the mean-square radius of gyration with relevant theories.
Excluded-volume effects	2	Intra- and intermolecular excluded-volume effects represented by the expansion factors and the second virial coefficient, respectively.
Steady-state transport properties	2	A comparison of experimental data for the intrinsic viscosity and diffusion coefficient with relevant theories.
Dynamic properties	2	Dynamic models for polymer chains: the Rouse-Zimm spring-bead model and the dynamic helical wormlike chain. A comparison of experimental data for the first cumulant of the dynamic structure factor with relevant theories.

Textbook   Lecture note distributed in the class.

Textbook(supplemental)

Prerequisite(s)   Basic knowledge of polymer solutions given in the lecture "Polymer Physical Properties (10 D651)."

Web Sites

Additional Information

10D622

Physical Chemistry of Polymers

Code   10D622   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Polymer Spectroscopy

Code 10D625   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	2	
	2	
	3	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D628

Design of Polymer Materials

Code   10D628   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period

Location   ICR Seminar Room   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Polymer Controlled Synthesis

Code 10D647   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D633

Biomaterials Science and Engineering

Code   10D633   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Polymer Physics and Function

Code 10D028   Course Year Master Course   Term (not held; biennially)   Class day & Period   Location

Credits 2   Restriction   Lecture Form(s)   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering for Chemical Materials Processing

Code 10E022   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   M.Ohshima,S.Nagamine

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fine Particle Technology, Adv.

Code   10E016   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location   A2-303   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Shuji Matsusaka

Course Description   Analyses of particle behavior in gases, Particle handling operations, and measurement methods are lectured. Also, particle charging that affect particle behavior in gases are theoretically explained. Furthermore, the control of the particle charging and its applications are lectured.

Grading   Examination

Course Goals   Understand the analysis and modeling of dynamic behavior of particles. Furthermore develop the ability to apply the knowledge for particle handling and processing.

Course Topics

Theme	Class number of times	Description
Particle properties and measurements	3	Mathematical description of particle diameter distribution, properties of fine particles, and their measurement methods are explained.
Particle adhesion and dynamical analysis	4	Measurement methods for adhesion forces of particles and dynamical analysis method for particle collision and elastic deformation are lectured. Furthermore, distinct element method is explained.
Behavior of particles in airflow	4	Temporal and spatial distribution of deposition and reentrainment of fine particles in gas-solid flow are explained using physical models and probability theory. In addition, complicated reentrainment phenomena during particle collision are discussed.
Particle charging and control	3	Concept of particle charging and quantitative analysis methods of charging process are explained; also, charge distribution of particles is analyzed. Furthermore, new methods to control particle charge are introduced.
Particle sampling	1	Sampling of fine particles and statistical evaluation methods are explained.

Textbook   Lecture notes

Textbook(supplemental)   K. Okuyama, H. Masuda and S. Morooka: Biryuushi Kougaku − Fine particle technology, Ohmsha, Tokyo (1992)

Prerequisite(s)   Basic knowledge on powder technology in bachelor course

Web Sites

Additional Information

Surface Control Engineering

Code   10E019   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   A2-305   Credits   2   Restriction   No Restriction   Lecture Form(s)   Language   Japanese

Instructor   M.Miyahara

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	4	
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermodynamics for Materials Science, Adv. A

Code 10C205 Course Year Master and Doctor Course Term 1st term Class day & Period Fri 2nd

Location Engineering Science Depts Bldg.-112 Credits 2 Restriction No Restriction

Lecture Form(s) Lecture Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Thermodynamics and Elasticity	2	
Generalization of thermodynamic potneitals	3	
Basic of micromechanics	2	
Basic of statistical thermodyanamics	1	
Statistical physics of lattice	3	
Landau's phenomenology for phase transtision	3	
Basic science of glasses	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C206

Thermodynamics for Materials Science, Adv. B

Code   10C206   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	3	
	3	
	3	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.aqua.mtl.kyoto-u.ac.jp/

Additional Information

Chemistry of Polymer Materials

Code   10D007   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd

Location   A2-302   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	3	
	8	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Chemistry of Biomaterials

Code　10D031　　Course Year　Master Course　　Term　2nd term　　Class day & Period　Tue 2nd

Location　A2-302　　Credits　2　　Restriction　　　Lecture Form(s)　　　Language　Japanese　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Functionalized Nucleic Acids Chemistry

Code   10V426   Course Year   Master and Doctor Course   Term   Class day & Period

Location   A2-303   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nishimoto and Tanabe

Course Description   A number of challenges have been made on development of modified DNA, RNA and proteins, chemical or physical properties of which are controlled by several triggers. These intelligent materials are promising for next generation gene diagnostics and therapy. In this lecture, we discuss the molecular design of these artificial biological materials and their application.

Grading   attendance and report

Course Goals   Synthetic chemistry of DNA, RNA and protein//Chemical structure and basic funciton of biological materials//Regulation of biological function//Medical applications of artificial DNA, RNA and protein

Course Topics

Theme	Class number of times	Description
Chemical structure and synthesis	2	Synthetic chemistry of nucleic acids
Gene manipulation	2	Synthesis of protein Gene Sequencing
Functions of intelligent molecules	2	Function of artificial peptides Functions of artificial nucleic acids
Drugs related to DNA	2	DNA cleavage by drugs Crosslinking by artificial nucleic acids Alkylation by drugs
Expansion of genetic code	2	Artificial nucleobases Synthesis of modified protein in cells
Medical application	2	Molecular targeting Molecular imaging
Recent topics	3	

Textbook

Textbook(supplemental)   No textbooks are used.

Prerequisite(s)   Basic knowledge in organic chemistry and biological chemistry is requisite.

Web Sites

Additional Information

10D812

Molecular Biology

Code 10D812 Course Year Master and Doctor Course Term 1st term Class day & Period Location

Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor

Course Description Biological responses are elicited at the interface of intrinsic genetic information and extrinsic environmental factors. This course discusses on molecular aspects of brain function and immunity. Experimental tools such as fluorescent probes for second messenger molecules are also explained through performance of experiments using the probes.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Basics	1	
Principles of neurotransmission	3	
Immunity and inflammation	3	
Gaseous bioactive molecules	3	
Experiments to observe cellular responses	3	

Textbook Provided in the course

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biorecognics

Code   10D815   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 2nd

Location   A2-308   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Bioorganic Chemistry

Code 10D813 Course Year Master and Doctor Course Term 2nd term Class day & Period Location

Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biotechnology

Code   10D816   Course Year   Master and Doctor Course   Term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D808

Physical Organic Chemistry

Code   10D808   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   A2-308   Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Organic Chemistry

Code 10D818   Course Year Master Course   Term 1st term   Class day & Period Tue 1st

Location A2-306   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biomolecular Function Chemistry

Code   10D448   Course Year   Master and Doctor Course   Term   (not held; biennially)

Class day & Period   Mon 2nd   Location   A2-304   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	4	
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Frontiers in the Field of Chemical Biology and Biological Chemistry

Code   10W409   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 5th

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Relay Lecture

Language   Japanese

Instructor   S.Nishimoto,M.Shirakawa,Y.Tabata,H.Iwata,I.Hamachi,Y.Mori,M.Umeda,H.Atomi

Course Description   In the cutting-edge of reseach fields, chemistry and biologi are being closely related each other. In this class,progress in such interdisciplinary areas and topics including natural products, biophysics, bioimaging , baimaterials, strucural biology, chemical biology,molecular physiology and others, are briefly explained and discussed.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physiology

Code 10W641   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Intensive Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Beam Science, Adv.

Code   10R001   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 4th

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Neutron Science

Code   10C018   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 1st

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	6	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Manipulation Technology

Code 10C031   Course Year Master and Doctor Course   Term 1st term   Class day & Period Fri 1st

Location Bldg.No.1-Nuclear Engineering 2   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture

Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	14	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Applied Neutron Engineering

Code   10C082   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 3rd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

High Precision Radiation Therapy

Code 10W651   Course Year Master and Doctor Course   Term 2nd term   Class day & Period   Location

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

Instructor   , , , , , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Human Anatomy

Code   10W696   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd

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

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Seminar on Polymer Industry

Code   10D638   Course Year   Master Course   Term   1st term   Class day & Period   Fri 3rd and 4th

Location   A2-306   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C234

Physics of Mesoscopic Materials

Code   10C234   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   Akira Sakai, Shu Kurokawa

Course Description   The first half of the lecture explains the mesoscopic phenomena, a variety of electronic transport phenomena observed in a nano- or atomic-scale specimen that is smaller in size than the mean free path of electrons. The second half covers scanning probe microscopy (SPM), a powerful observation tool widely exploited in nanotechnology. Principles of various types of SPM and their applications in materials science are exposited with many illustrative examples.

Grading   Grading will be made based on the report on the assigned problems.

Course Goals   The final goal of this lecture is to make students acquire basic understanding on the mesoscopic phenomena and the characterization of materials with SPM.

Course Topics

Theme	Class number of times	Description
Mesocopic electron transport phenomena	7	1. Introduction to electronic conduction 2. Quantum interference between electrons and its influence on electronic conduction 3. Ballistic conduction 4. Single-electron tunneling 5. Electron transport through atom-sized contacts of metals 6. Electron transport through single molecules 7. Newest topics of mesoscopic electronic conduction
Materials characterization with SPM	8	1. Atomic and electronic structures of surfaces 2. Properties of tunneling electrons 4. Forces acting across ultrasmall junctions 5. Materials characterization with SPM (1) 6. Materials characterization with SPM (2) 7. Materials characterization with SPM (3) 8. Cutting-edge SPM researches

Textbook   Lacture notes in a paper form will be distributed.

Textbook(supplemental)

Prerequisite(s)   Prerequisite courses: "Solid state physics", or equivalent, in the undergraduate course.

Web Sites

Additional Information

Biomechanics

Code 10V003 Course Year Master and Doctor Course Term 1st term Class day & Period Wed 4th

Location Credits 2 Restriction Lecture Form(s) Language Japanese Instructor Taiji Adachi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D450

Biomolecular Dynamics

Code　10D450　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Thu 3rd

Location　C3-Lecture Room 2　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	2	
	2	
	3	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Robotics

Code   10B407   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Fumitoshi Matsuno

Course Description   Understanding of intelligent behaviors of living things is very interesting. And realization of their intelligent motion by a robot is also attractive for mechanical engineering. In this lecture, we consider basic understanding of beautiful human skill "manipulation" on the point of view of dynamics and control. First modeling methodologies for a rigid multibody system and a general dynamic model of a manipulator are provided. Next, a typical nonlinear control law is introduced and some problems for applying the controller are shown. Based on nature of the dynamics of the manipulator, a very simple and robust controller can be derived by designing energy of the system. This lecture provides modeling methodologies and controller design strategies of the rigid multibody system and we analyze a beautiful human skill of the manipulation.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D413

Molecular Materials

Code   10D413   Course Year   Master and Doctor Course   Term   (not held; biennially)

Class day & Period   Wed 2nd   Location   A2-304   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   K. Tanaka and A. Ito

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	12	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Green and Sustainable Chemistry

Code   10S202   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   A2-303   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   K.Ohe,Y.Tsuji,T.Kakiuchi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Excited-State Hydrocarbon Chemistry

Code   10D207   Course Year   Master and Doctor Course   Term   Class day & Period

Location A2-303   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   S.Nishimoto

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Special Topics in Transport Phenomena

Code   10E001   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 4th

Location   A2-305   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   R.Yamamoto

Course Description   Theoretical approaches on momentum, heat, and mass transports will be discussed. For example, problems of non-steady transport such as transient behavior, hydrodynamics of complex fluids such as polymeric liquids will be treated.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Polymeric Liquids	6	
Higher Dimensional Problems (Flow)	3	
Heat Transfar in Fluids	3	
Higher Dimensional Problems (Heat Transfar))	2	
Understanding Check	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10E007

Chemical Reaction Engineering, Adv.

Code   10E007   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 2nd

Location   A2-305   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Miura, Kawase

Course Description   Kinetic analysis of gas-solid-catalyst reaction and gas-solid reaction

Operation and design of reactors for gas-solid-catalyst and gas-solid reactions

Industrial reactors including fixed bed, fluidized bed, moving bed, simulated moving bed, and stirred tank types

Grading   Based on the result of examination at the end of term and the results of quizzes and reports imposed every week

Course Goals

Course Topics

Theme	Class number of times	Description
Gas-solid reaction I. Industrial gas-solid reactions	2	As examples of industrial gas-solid reactions, the pyrolysis (carbonization) and gasification of coal as well as reactors for these reactions are explained.
Gas-solid reaction II. Kinetic analysis of gas-solid reaction	3.5	Kinetic measurement and analysis of complicated reactions, particularly coal pyrolysis, are explained from the first-order reaction model to the distributed activation energy model (DAEM).
Gas-solid reaction III. Models of gas-solid reactions	2.5	Concepts and derivation of the reaction models including the grain model and the random-pore model are explained. Application of the models to coal gasification is overviewed.
Gas-solid-catalyst reaction I. Effectiveness factor and selectivity	2	Commercial catalysts and industrial gas-solid-catalyst reactions are overviewed. The generalized effectiveness factor and the selectivity affected by mass transfer are explained.
Gas-solid-catalyst reaction II. Industrial catalytic reactors	2	Industrial catalytic reactors including fixed-bed and fluidized-bed reactors are overviewed. Design and operation of these reactors including thermal stability are explained.
Gas-solid-catalyst reaction III. Deactivation and regeneration of catalyst	3	Deactivation mechanisms of solid catalysts are overviewed. The deactivation and consequent change in selectivity are explained in terms of the decay function and specific activity.

Textbook   Prints are distributed.

Textbook(supplemental)

Prerequisite(s)   Needs knowledge of chemical reaction engineering including heterogeneous reactions.

Web Sites

Additional Information

Separation Process Engineeering, Adv.

Code   10E004   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   A2-305   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   H.Tamon, N.Sano

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Advanced Material Science and Technology　English lecture

Code　10K001　　Course Year　Master and Doctor Course　　Term　1st term

Class day & Period　Friday,4th-5th

Location　KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)　　Credits　2

Restriction　No Restriction　　Lecture Form(s)　Relay Lecture　　Language　English　　Instructor

Course Description　The various technologies used in the field of material science serve as bases for so-called "high technologies", and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

Grading　In order to obtain two credits, students must attend at least ten lectures, and at least five of the submitted reports must be evaluated as "passed" by each lecturer. Each report should be submitted to the lecturer within two weeks after his/her lecture. NOTE: Reports are NOT acceptable from those who do not attend the lecture.

Course Goals

Course Topics

Theme	Class number of times	Description
	2	Advanced Beam Processes and Characterization Technique for Nanotechnology//J. Matsuo
		Microreactor TechnologyforProductionofHighFunctional Chemical Materials//K. Mae
		Nano-optical Spectroscopy/Microscopy:Applications in Material Science//H. Aoki
	2	Rheology Control by Associating Polymers//T. Koga
		Hyperthermophiles and their thermostable biomolecules//H. Atomi
	1	ISO Standards in Analytical Chemistry//J. Kawai
	1	Advanced Polymer Foam Technology//M. Ohshima
	1	Photonic Materials//K. Hirao
	1	Nanostructure Control in Structural MetallicMaterials//N. Tsuji
	1	Electrodeposition and Electroless Deposition for Materials Processing//N. Tsuji
		Confirmation of study achievement

Textbook　None

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information　Check the notice on the bulletin board.

New Engineering Materials, Adv.　English lecture

Code　10K004　Course Year　Master and Doctor Course　Term　2nd term　Class day & Period　Thu 5th

Location　KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)　Credits　2　Restriction　No Restriction　Lecture Form(s)　Relay Lecture

Language　English　Instructor

Course Description　Outline: New materials are necessary for the advancement of high technologies, but in order to develop these new materials for practical applications, a number of problems must be solved. In this course, the problems encountered in the fields of chemical engineering, electrical / electronic engineering, mechanical engineering and civil engineering are discussed. Discussions are also held on natural resources, and how computers are being used in the development of new materials. Lectures are given in English.

Grading　Credit: The evaluation of a student's work will be given on a pass / fail basis, based on his / her attendance and reports, not on examinations.(1) Attending the class 10 times or more and submitting at least 5 reports with passing marks is required to receive 2 credits.(2) A report assignment will be given by every lecturer and must be submitted within 2 weeks from the end of the lecture.(3) A student's report on any lecture from which he / she is absent will not be accepted.

Course Goals

Course Topics

Theme	Class number of times	Description
Improving Sanitation and Resource Recovery in both Developing and Developed Countries (Yoshihisa SHIMIZU)	1	
Soils Recovered from Disaster Debris (Takeshi KATSUMI)	1	
Separation Analyses in Micro- and Nano-scale (Koji OTSUKA)	1	
Polymer Synthesis beyond the 21st Century: Precision Polymerizations and Novel Polymeric Materials (Mitsuo SAWAMOTO)	1	
Solid State Lighting based on Light Emitting Diodes (Yoichi KAWAKAMI)	1	
Material Properties of Fiber Reinforced Cementitious Composites and Applicability to Structures (Yoshio KANEKO)	1	
Materials in Micro Electro Mechanical Systems (MEMS) (Toshiyuki TSUCHIYA)	1	MEMS
Composite Materials: Smart, Lightweight and Strong Materials (Masaki HOJO)	2	
Inorganic New Materials (Koichi EGUCHI)	1	
Structural biochemistry of proteins (Masahiro SHIRAKAWA)	1	
Semiconductor Materials and Devices (Tsunenobu KIMOTO)	2	
High Temperature Superconductivity and Its Application to Electronics (Itsuhiro KAKEYA)	1	

Textbook

Textbook(supplemental)　Class handouts

Prerequisite(s)

Web Sites

Additional Information

10D051

Frontiers in Modern Science & Technology

Code   10D051   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   Katsura Hall   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise in Practical Scientific English

Code   10i045   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Seminar   Language   English

Instructor   Kim Sunmin, Kenji Wada. etc

Course Description   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Grading   Attendance 60%, midterm reports 20%, final report 20%. The final report must be submitted by the deadline date.

Course Goals   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Course Topics

Theme	Class number of times	Description
Introduction	2	Course Guidance, etc.
Exercise-1	1	Definition of technical writing 3C in technical writing Weaknesses of Japanese writers Good examples and bad examples
Exercise-2	1	Punctuation Presentation skills 1 -organization
Exercise-3	1	Organizing your thoughts for the title and abstract Presentation skills 2 ?Visual aspects
Exercise-4	1	Presenting the background of your research Presentation skills 3 ?Oral Aspects
Exercise-5	1	Describing how you did your research Presentation skills 4 ?Physical Aspects
Exercise-6	1	Presenting what you observed Presentation Practice
Exercise-7	1	Placing your findings in the field Presentation Practice
Exercise-8	1	Expressing thanks and listing references Presentation practice
Exercise-9	1	Writing your proposal Presentation practice
Exercise-10	1	Presentation practice Reviews & Feedbacks Evaluation
Presentation	2	Current situation of studying abraod, etc.
Wrap-up lecture	1	Achievement Assessment

Textbook   No textbook is required.

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.glc.t.kyoto-u.ac.jp/ja/study/grad/10d040 (needs passwords).

Additional Information

10D043

Instrumental Analysis, Adv.

Code   10D043   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Instrumental Analysis, Adv.

Code   10D046   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Experiments and Exercises on Bio-Medical Engineering, Adv. I

Code   10W681   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W683

Experiments and Exercises on Bio-Medical Engineering, Adv. II

Code   10W683   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Bio-Medical Engineering A(MC)

(

Code 10W670 Course Year Master Course Term 1st term Class day & Period Location

Credits 2 Restriction Lecture Form(s) Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Bio-Medical Engineering B(MC)

(

Code   10W671   Course Year   Master Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10W685

Seminar on Bio-Medical Engineering A

A

Code   10W685   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Bio-Medical Engineering B

B

Code   10W687   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Bio-Medical Engineering C

C

Code   10W689   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Bio-Medical Engineering D

D

Code   10W690   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Bio-Medical Engineering Internship M

M

Code   10W691   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Bio-Medical Engineering Internship D

D

Code   10W692   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Professional Scientific Presentation Exercises　English lecture

Code　10i041　Course Year　Doctor Course　Term　1st term　Class day & Period　Wed 5th

Location　B-Cluster 2F Seminar Room　Credits　1

Restriction　The number of students might be limited if too many students will get enrolled.

Lecture Form(s)　Semina　　　Language　English　Instructor　Juha Lintuluoto

Course Description　It is imperative for future engineers to be able to communicate and deliver effectively scientific information to large variety of audiences. This skill enables engineers to share and absorb information to more extended audiences, and facilitates success in selling ideas and products, publishing and team working. The purpose of this course is to teach the basic rules needed for successful professional scientific presentation, both orally and written. The course also prepares students to deliver scientific information presentations to wide audiences. The course is consisted of excessive exercises, of which the student should complete seven (7) tasks. The course holds 3-4 tasks for oral presentation exercises, and 3-4 tasks for professional scientific writing exercises. The exact number of both exercises is adjusted for each student's needs. The course is aimed for doctor course (DC) students, both Japanese and Foreign nationals

Grading　Reports, class activity, presentation

Course Goals　This course is aimed to foster engineering students' scientific presentation skills. The successfully course completed students will be able to express and present complicated and specific scientific information at more generally understandable level. The students will also be able to pose relevant questions and effectively answer to the wide variety of questions.

Course Topics

Theme	Class number of times	Description
		Guidance and Professional presentation rules and etiquette
		Oral presentations & questioning I, Written report I
		Oral presentations & questioning I, Written report I
		Oral presentations & questioning II, Written report II
		Oral presentations & questioning II, Written report II
		Oral presentations & questioning III, Written report III
		Oral presentations & questioning III, Written report III
		Oral presentations & questioning IV, Written report IV
		Oral presentations & questioning IV, Written report IV I
		Course summary and discussion

Textbook　Course materials will be provided.

Textbook(supplemental)　Will be informed if necessary.

Prerequisite(s)　-Fundamental skills about scientific presentation

-Advanced English skills

-Sufficient personal research results

Web Sites　The web-site will be opened in the home page of the GL education center.

Additional Information　Students are requested to check in advance whether the credit of this course is counted as the unit for graduation requirement at department level. Course starts at April 10th, and the 1st lesson is repeated on April 17th. The course schedule is irregular. Most classes are biweekly, the detailed schedule is provided at the 1st lecture.

Advanced Engineering and Economy　English lecture

Code　10i042　Course Year　Master and Doctor Course　Term　1st term　Class day & Period　Thu 5th　Location　B-Cluster 2F Seminar Room

Credits　2　Restriction　The number of students might be limited if too many students will get enrolled.

Lecture Form(s)　Lectures, Group works&tasks　Language　English　Instructor　Juha Lintuluoto

Course Description　Engineering economics plays central role in any industrial engineering project. For an engineer, it is important to apply the engineering know-how with the economic analysis skills to obtain the best available materials, methods, devices, etc. in the most economical way. This course is aimed to teach engineering students the basic economic methods to manage economically an engineering project. In addition, the report writing on various engineering economic issues prepares to write reports in a professional form. The lab sessions are meant for the verbal skills improvement as well as improvement of analytical thinking. The topics are of current relevant topics Small-group brain-storming method is used. The exercise sessions cover the use of Ms-Excel for various quantitative economic analyses.

Grading　Final test, reports, class activity

Course Goals　This course is aimed to strengthen engineering students' skills in economics. The course concept is to teach students selectively those subjects which serve as major tools to solve economic tasks in engineering environment. The reports and lab sessions provide students stimulating and analytical thinking requiring tasks, and presentation skills training is an important part of this course.

Course Topics

Theme	Class number of times	Description
Student orientation and Introduction to engineering economy	1	
Cost concepts and design economics	1	
Cost estimation techniques	1	
The time value of money	1	
Evaluating a single project	1	
Comparison and selection among alternatives	1	
Depreciation and income taxes	1	
Price changes and exchange rates	1	
Replacement analysis	1	
Evaluating projects with the benefit-cost ratio method	1	
Breakeven and sensitivity analysis	1	
Probabilistic risk analysis	1	
The capital budgeting process	1	
Decision making considering multiattributes	1	
Final test	1	
		Additionally, students will submit five reports during the course on given engineering economy subjects. Also, required are the five lab participations (ca.60 min/each) for each student. Additionally, three exercise sessions (ca.60 min/each), where use of Ms-Excel will be practiced for solving various engineering economy tasks, should be completed

Textbook　Engineering Economy 15th ed. William G. Sullivan (2011)

Textbook(supplemental)　Will be informed if necessary.

Prerequisite(s)　-This course is highly recommended for those who attend " Inter-Engineering -Highly interactive lessons (discussion), Small group working method

Web Sites　The web-site will be opened in the home page of the GL education center.

Additional Information　Students are requested to check in advance whether the credits of this course are counted as the units for graduation requirement at department level. The course starts on Apr.11th.

Engineering Project Management   English lecture

Code   10i047   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 5th
Location   B-Cluster 2F Seminar Room   Credits   1
Restriction   The number of students might be limited if too many students will get enrolled.
Lecture Form(s)   Lectures, Group works&tasks   Language   English
Instructor   Lintuluoto, Kojima, Oishi, Takatori
Course Description   The purpose of this course is to teach the basic skills needed for expressing and initiating ideas, and presenting information in successful international engineering group work. The course provides simulations for students in group managing and decision making in international engineering teams. International teamwork ethics subjects for successful engineering project will be practiced. The course consists of lectures, case studies, the invited lecture from an industry representative and the final examination. Also, a project report exercise is included in this course.
The course is basically designed for doctor course (DC) students, both Japanese and foreign nationals. If place are available they may be given to master course students.
Grading   Report, class activity, presentation
Course Goals   This course is the pre-course for Engineering Project Management II which will be held in the second semester. Students will learn project management tools, apply project strategies and perform qualitative risk analyses. Also students will learn how to carry out projects with group members from various countries and engineering fields.
Course Topics

Theme	Class number of times	Description
	1	Introduction of the class (All)
	1	Project Management I (Lintuluoto)
	1	Special Lecture from an Industry Representative (Kojima)
	1	Project Management II (Lintuluoto)
	1	Leadership skills (Kojima)
	1	Special Lecture from an Industry Representative (Kojima)
	1	Leadership skills in group work (Kojima)
	1	Strategies viewpoints in Engineering Projects I (Oishi)
	1	Cultural aspects in project development (Lintuluoto)
	1	Strategies viewpoints in Engineering Projects II (Oishi)
	1	Strategies viewpoints in Engineering Projects (case study) (Oishi)
	1	Engineering project communication I (Takatori)
	1	Engineering project communication II (Takatori)
	1	Special Lecture from an Industry Representative
	1	

Textbook   Course materials will be provided.
Textbook(supplemental)   Will be informed if necessary.
Prerequisite(s) ' -This course is recommended for those who later intend to attend " Engineering Project Management II " .
-Highly interactive lessons (discussion), Small group work methodologies.
Web Sites   The web-site will be opened in the home page of the GL education center.
Additional Information   Students are requested to check in advance whether the credit from this course will be accepted as a graduation requirement for their department. The course starts on Apr. 12th.

Engineering Project Management   English lecture

Code   10i048   Course Year   Doctor Course   Term   2nd term   Class day & Period   Fri 5th

Location   B-Cluster 2F Seminar Room   Credits   1   Restriction   Student number will be limited.

Lecture Form(s)   Semina   Language   English   Instructor   Lintuluoto   Kojima   Oishi, Takatori

Course Description   In this course, students will apply the engineering know-how and the skills of management, group leadership, and international communication which they learned in the course of "Engineering Project Management I" to build and carry out a virtual inter-engineering project. This course provides a forum where students' team-plan based on ideas and theories, decision making, and leadership should produce realistic engineering project outcomes. The course consists of intensive group work and a few intermediate discussions. The course will be held 6 weeks for group work, and two (2) intermediate discussions, project presentation to a wide audience, and a written report will be required.

Grading   Report, class activity, presentation

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

Course Topics

Theme	Class number of times	Description
Guidance		
Group work I		
Group work II		
Intermediate discussion I		
Group work III		
Group work IV		
Intermediate discussion II		
Group work V		
Group work VI		
Project presentation and discussion		
		Each project team may freely schedule the group work within the given time frame. In addition to " Intermediate discussion" sessions, the course instructors are available if any such need arises.

Textbook   Course materials will be provided.

Textbook(supplemental)   Will be informed if necessary.

Prerequisite(s) ' -Complete the course " Engineering Project Management I" in the 1st term.

-Attendance on " Advanced Engineering Economics" course in the 1st term is strongly recommended.

-Fundamental skills about group leading and communication, scientific presentation.

Web Sites   The web-site will be opened in the home page of the GL education center.

Additional Information   Students are requested to check in advance whether the credit from this course will be accepted as a graduation requirement for their department.

10X001

Prospects of Interdisciplinary Photonics and Electronics

Code   10X001   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X003

Advanced Experiments and Exercises in Interdisciplinary Photonics and Electronics

Code   10X003   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X005

Advanced Experiments and Exercises in Interdisciplinary Photonics and Electronics

Code   10X005   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Seminar on Interdisciplinary Photonics and Electronics

Code   10X007   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C825

Quantum Mechanics for Electronics Engineering

Code   10C825   Course Year   Master Course   Term   1st term   Class day & Period   Tue 3rd   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Charged Particle Beam Apparatus

Code 10C801   Course Year   Master Course   Term   2nd term   Class day & Period   Wed 4th

Location A1-001   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   Yasuhito Gotoh

Course Description   Fundamental technologies of an ion beam system, such as ion sources, formation and evaluation of ion beams, transport of ion beams, and ion-solid interaction will be presented. Taking ion implantation as one of the example of the ion beam application, the relationship between the incident ion energy and implantation depth will be presented. Each element of a typical ion beam system is explained in detail.

Grading   Evaluation will be made with the results of final examination. Achievements of exercises in the class are also taken into consideration.

Course Goals   To understand the details of an ion beam apparatus: generation, transport and evaluation of an ion beam. Understanding of the entire ion beam apparatus as a system is also purpose of the class.

Course Topics

Theme	Class number of times	Description
Ion beam systems and their applications	1	Outline of the class is presented. Physical properties of ions in vacuum are given, and ion beam apparatuses and their application will be introduced with some typical examples.
Ion-solid interaction	3	Interaction between high energy ion and solid atoms are given. Major topics are: how the ions transfer their energy to the target atoms, i.e., how the ions are decelerated in the solid, and relationship between incident ion energy and implantation depth is given.
Generation and transport of ion beam	4	Methods of ion generation for various elements are explained. Important euqations of beam extraction and beam transport are given. Starting with the paraxial ray equation, concept of transfer matrix is given. Finally, some important physical parameters of ion beams are given.
Mass separators and energy analyzers	4	Details of magnetic sector as mass separator are given. Transfer matrix of the mass separator are presented and focusing effect is described. An important parameter of mass resolution is given. Some different kinds of energy analyzers are also introduced.
Vacuum pumping system	1	Fundamentals of vacuum pumping is given. Several pumps used for ion beam systems are also introduced.
Design of ion beam systems	2	Design of an ion beam system under a given condition will be presented. In the last class, achievment test will be performed.

Textbook   Yasuhito Gotoh, Charged Particle Beam Appratus, 2013 version (to be sold at CO-OP shop in Katsura Campus)

Textbook(supplemental)   Junzo Ishikawa, Charged Particle Engineering (Corona).

Prerequisite(s)   Vacuum Electronic Engineering 1, 2 (undergraduate course)

Web Sites

Additional Information

10C807

Plasma Science and Engineering, Adv.

Code   10C807   Course Year   Master Course   Term   1st term   Class day & Period   Mon 3rd   Location

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

Instructor   Osamu SAKAI

Course Description   Main regimes of plasma generation such as capacitive-coupled discharges, inductive-coupled discharges, and wave-propagation discharges are investigated and categorized with discussion of wave-heating mechanisms and particle/energy balance equations. These discussions are based on elementary process of atoms and molecules and wave dispersions in a plasma. In addition, various wave modes emerging in a spatiotemporal structure of plasmas are addressed.

Grading   Judged by regular examination and submitted report sheet. (In some years, regular examination is replaced by a set of report sheets.)

Course Goals   Reviewing fundamentals of plasma engineering, understandings of industrially-available plasma sources and electromagnetic-wave propagation in a plasma are required.

Course Topics

Theme	Class number of times	Description
Fundamentals	2-3	Reviewing fundamentals of plasma engineering, basic phenomena including elementary processes in a plasma are addressed.
Plasma sources	6-7	Based on wave propagation in a plasma, regimes of plasma generation such as capacitive-coupled discharges, inductive-coupled discharges, and wave-propagation discharges are investigated and categorized with discussion of wave-heating mechanisms and particle/energy balance equations.
Electromagnetic wave propagation	5-6	Various wave modes emerging in a spatiotemporal structure of plasmas are addressed; not only gaseous plasmas but also plasmas in solids are discussed.
Final check point of comprehension	1	Comprehension of the above lectures is checked out.

Textbook

Textbook(supplemental)   F. F. Chen and J. P. Chang, Lecture Notes on Principles of Plasma Processing (Kluwar Academic/Plenum Publishing, New York, 2003)

Prerequisite(s)   Knowledge addressed in plasma science and engineering in the bachelor course, or similar one corresponding to this subject.

Web Sites

Additional Information

Semiconductor Engineering Adv.

Code   10C810   Course Year   Master Course   Term   1st term   Class day & Period   Wed 3rd   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description   This course explores the fundamentals of physics of semiconductors, which are esseantial to understand semiconductor materials and devices.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Band theory	3-4	Electronic Band Structures are discussed. Nearly free electron and tight-binding approachs, k dot p theory, pseudopotential method are explained. Band structures of major semiconductors such as Si and GaAs are also discussed.
	3-4	
	3-4	
	3-4	

Textbook

Textbook(supplemental)   S. M. Sze Physics of Semiconductor Devices (Wiley Interscience)
P.Y.Yu and M. Cardona Fundamentals of Semiconductors (Springer)

Prerequisite(s)   Semiconductor engineering, quantum mechanics (undergraduate level)

Web Sites

Additional Information

10C813

Electronic Materials Adv.

Code   10C813   Course Year   Master Course   Term   2nd term   Class day & Period   Thu 2nd

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Semiconductors	6-7	
Superconductors	4-5	
Epitaxial growth	3-4	Semiconductor heterostructures are fabricated by using a crystal growth method called "epitaxy". Fundamentals of epitaxial growth are discussed. One of epitaxial growth methods, molecular-beam epitaxy, is discussed in detail.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Molecular Electronics

Code   10C816   Course Year   Master Course   Term   1st term   Class day & Period   Mon 5th

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Surface Electronic Properties

Code   10C819   Course Year   Master Course   Term   1st term   Class day & Period   Tue 5th   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	3	
	6	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Optical Properties and Engineering

Code   10C822   Course Year   Master Course   Term   1st term   Class day & Period   Tue 4th   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C828

Quantum Optoelectronics Devices

Code   10C828   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 4th   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Optics

Code   10C829   Course Year   Master 1st   Term   1st term   Class day & Period   Tue 2nd

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	3	
	3	
	3	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C830

Quantum Measurement

Code   10C830   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 4th   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description   As an example of high precision measurements using quantum phenomena, frequency standards, which is realized with the smallest uncertainty in all measurement quantities at present, are discussed. The principle and evaluation of frequency standards are explained.

Grading   Report(two times, at the first lecture and the after all lectures)

Course Goals   The goal of this lecture is to understand that precision measurements are realized with combination of the best technologies and is based on physics.

Course Topics

Theme	Class number of times	Description
Introduction and principle of time measurement	1.5	Two principles of time measurement: Reproducibility postulate and dynamic model
Time and relativistic theory	3	Impact of special and general relativistic theory on time measurement
Fundamentals of atomic frequency standards	2.5	Atomic states, its energy shifts, high-resolution spectroscopy and high-sensitive detection
Cesium frequency standard and atom interferometer	2.5	Principle of Ramsey resonance and its interpretation as atom interferometer
Specification of frequency standards: evaluation methods and theoritical limit	2	Fundamentals of evaluation of frequency stability with Allan variance, and theoretical limit of frequency stability
Noise	2.5	Incoherent signals and shot noise
Evaluation of understanding	1	

Textbook

Textbook(supplemental)   C. Audoin and B. Guinot,The Measurement of Time, (Cambridge University Press, 2001). M. Kitano, Fundamentals of electronic circuits (Reimei publishing, 2009) in Japanese.

Prerequisite(s)   Fundamentals of physics (quantum physics, in particular) and electric circuits including linear system.
The level which average graduate students of electric and electronic science and technology acquire is sufficient.

Web Sites   https://www.kogaku.kyoto-u.ac.jp/lecturenotes/

Additional Information

Electrical Conduction in Condensed Matter

Code   10C851   Course Year   Master 1st   Term   1st term   Class day & Period   Wed 2nd

Location   Electrical Engineering Bldg.-Lecture Room (M)   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C834

High Performance Thin Film Engineering

Code   10C834   Course Year   Master 1st   Term   1st term   Class day & Period   Tue 1st   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2-3	
	2	
	2-3	
	5-6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Integrated Circuits Engineering, Advanced.

Code　693631　　Course Year　Master and Doctor Course　　Term　1st term　　Class day & Period　Wed 4th

Location　Electrical Engineering Bldg.-Lecture Room (M) etc.　　Credits　2　　Restriction　No Restriction

Lecture Form(s)　Lecture　　Language　Japanese　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

State Space Theory of Dynamical Systems

Code   10C628   Course Year   Master Course   Term   1st term   Class day & Period   Wed 3rd   Location

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

Instructor   T. Hagiwara, Y. Ebihara

Course Description   The course deals with the dynamical system theory based on linear time-invariant state equations. It covers such topics as state equations, controllability and observability, mode decomposition and its relevance to controllability/observability, stability of dynamical systems, and the Kalman canonical decomposition.

Grading   The grading will be based on the exam.

Course Goals   To acquire the knowledge on the basic theory for linear system analysis by means of state equations.

Course Topics

Theme	Class number of times		Description
feedback systems and state equations	3	4	fundamentals of state equations, their relationship to transfer functions and block diagram representations
responses of linear systems	5	6	state transition matrices, equivalence transformation of systems, mode decomposition and Lyapunov stability
controllability and observability	5	6	controllability and observability, mode decomposition and its relevance to controllability/observability, controllable subspace and unobservable subspace, and the Kalman canonical decomposition; Checking degrees of understanding of all the lecture topics closes the class.

Textbook

Textbook(supplemental)

Prerequisite(s)   classical control theory (in terms of transfer functions), linear algebra and calculus

Web Sites

Additional Information   Handouts will be given at the class.

Applied Systems Theory

Code   10C604   Course Year   Master 1st   Term   2nd term   Class day & Period   Tue 1st

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   E. Furutani

Course Description   The course deals with mathematical methods of system optimization mainly for combinatorial optimization problems. It covers such topics as the integer optimization and its typical problems, exact solution methods including the dynamic programming and the branch and bound method, approximate solution methods including the greedy method, meta-heuristics including the genetic algorithms, the simulated annealing method, and the tabu search.

Grading   The grading will be based on an exam and the evaluation of the reports on the subjects given in the class.

Course Goals   To acquire the knowledge on formulation of combinatorial optimization problems into integer programming problems, basic concepts, algorithms, characteristics, and application procedures of exact solution methods, approximate solution methods, and meta-heuristics.

Course Topics

Theme	Class number of times	Description
combinatorial optimization problems and complexity	2	necessity and importance of combinatorial optimization, typical problems, complexity, classes P and NP, complexity of combinatorial optimization problems, limitation of exact solution methods, necessity of approximate solution methods and meta-heuristics
exact solution methods	3	principle of optimality, dynamic programming, branch and bound method, and their applications
integer programming	2-3	formulation into integer programming problem, relaxation problem, and cutting plane algorithm
approximate solution methods	1-2	greedy method, relaxation method, partial enumeration method, etc.
meta-heuristics	5-6	local search, basic ideas of meta-heuristics, genetic algorithms, simulated annealing method, tabu search, etc. The level of understanding will be confirmed.

Textbook

Textbook(supplemental)   M. Fukushima: Introduction to Mathematical Programming (in Japanese), Asakura, 1996.

Y. Nishikawa, N. Sannomiya, and T. Ibaraki: Optimization (in Japanese), Iwanami, 1982.

M. Yagiura, and T. Ibaraki: Combinatorial Optimization ---With a Central Focus on Meta-heuristics--- (in Japanese), Asakura, 2001.

B. Korte, and J. Vygen: Combinatorial Optimization ---Theory and Algorithms, Third Edition, Springer, 2006.

Prerequisite(s)   linear programming, nonlinear programming

Web Sites

Additional Information   Handouts and exercises are given at the class.

Applied Mathematics for Electrical Engineering

Code   10C601   Course Year   Master Course   Term   1st term   Class day & Period   Thu 1st

Location   A1-001   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   T. Hikihara & S. Doi

Course Description   In the class, fundamental mathematics is lectured for electrical engineering, electronics, system engineering, and material science. In particular, system theory, nonlinear dynamics, and particle dynamics in force field can be discussed with mathematical clear image.

Grading   Students are requested to reply to report assignments. The grading is based on the evaluation of the reports.

Course Goals   Professors expect students to model their system and analyze the models theoretically. Students will be requested to understand their system in principle mechanics and control them based on system theory.

Course Topics

Theme	Class number of times	Description
	1	
	3	
	3	
Introduction 2	1	Relationship between the previous classes and further will be explained. The introduction to nonlinear dynamics will be explained based on oscillation theory.
Hamiltonian mechanics	4	Hamiltonian mechanics on linear symplectic space is lectured.
Manifold and vector field	3	Manifold is discussed in nonlinear system with relation to vector filed analysis.

Textbook

Textbook(supplemental)   S. Wiggins, Introduction to Applied Nonlinear Dynamical Systems and Chaos, Springer-Verlag.

Prerequisite(s)   Linear algebra

Web Sites   https://www.t.kyoto-u.ac.jp/lecturenotes/gse/kueeng/10C601/syllabus

Additional Information   Appropriate references will be shown in classes.

Electrical and Electromagnetic Circuits

Code   10C647   Course Year   Master 1st   Term   1st term   Class day & Period   Wed 2nd   Location

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

Instructor   Osami Wada

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	8	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C610

Electromagnetic Theory, Adv.

Code   10C610   Course Year   Master 1st   Term   2nd term   Class day & Period   Wed 3rd   Location

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

Instructor   T. Matsuo

Course Description   The first half: computational electromagnetics
The latter half: the special theory of relativity and the covariance of Maxwell's equations

Grading   Submission of reports (twice)

Course Goals   1. Understanding of computational methods for electromagnetic field analysis
2. Understanding of the basic concepts of special theory of relativity and the covariant formulation of Maxwell's equations

Course Topics

Theme	Class number of times	Description
Finite integration method for electromagnetic field analysis	3-4	- Introduction to finite integration method - Application to electromagnetic field analysis
Finite element method for magnetic field analysis	1	- Introduction to finite element analysis for magnetic field analysis - Edge element for three-dimensional magnetic field analysis
Maxwell's equations in differential form	2-3	- Introduction to differential form to represent Maxwell's equations
Introduction to special theory of relativity	2-3	- Galilean relativity and special relativity - Lorentz transformation
Tensor representation and relativistic dynamics	2-3	- Introduction to tensor representation - Relativistic dynamics
Covariant formulation of Maxwell's equations	2-3	- Electromagnetic field tensor - Lorentz covariance of Maxwell's equations

Textbook

Textbook(supplemental)   Y. Kazama, Introductory Lectures on the Theory of Relativity (in Japanese), Baifukan,1997.

Prerequisite(s)   Basic electromagnetic theory

Web Sites

Additional Information

Superconductivity Engineering

Code 10C613 Course Year Master Course Term 1st term Class day & Period Mon 4th Location

Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C614

Biological Function Engineering

Code   10C614   Course Year   Master Course   Term   2nd term   Class day & Period   Wed 2nd   Location

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

Instructor   Tetsuo Kobayashi

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Basics of nervous system	3	
Neurones and glial cells	1	
Neuroimaging techniques	5	
Visual functions	3	
Auditory functions	1	
Motor functions	1	
Evaluation of learning achivement	1	

Textbook

Textbook(supplemental)   Tetsuo Kobayashi, Isamu Ozaki and Ken Nagata (eds.): "Brain topography and multimodal imaging", (Kyoto Univ. Press, 2009)

Prerequisite(s)   Electricity and magnetism, Fundamentals of biomedical engineering

Web Sites

Additional Information

Applied Hybrid System Engineering

Code 10C621   Course Year   Master Course   Term 1st term   Class day & Period Wed 1st

Location A1-001   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   Takashi Hikihara, Shinji Doi, Yoshihiko Susuki, Syun'ichi Azuma

Course Description   Many engineering systems show hybrid dynamical structure, which is accompanied with discrete change of vector flow by control and regulate the trajectory to target dynamically. In the course, the fundamental characteristics and theorems are lectured. The framework of hybrid system, automaton model, and singular perturbation theorem are explain. Dynamic quantizer, power system, and network are picked up as examples.

Grading   Exercise and repots are evaluated.

Course Goals   Students are requested to understand the characteristics of hybrid system, approaching method, and control methods.

Course Topics

Theme	Class number of times	Description
Fundamentals of hybrid system	4	As fundamentals, the definition of hybrid system and the method of modeling is explained.
Singular perturbation and asymptotic expansion	3	Singular perturbation theorema and asymptotic expansion are explained. For the global oscillation of singular perturbed system, analytical and geometrical singular perturbation methods are introduced.
Application of hybrid system-1: power system	3	The application to power system is explained. The outline of power system, then safety and examination, the stability analysis, and the modeling towards control are given.
Application of hybrid system-2: dynamic quantizer	2	As an application, dynamic quantizer is adopted. The outline of the dynamic quantizer, the analysis, and the design of the system are given.
Application of hybrid system-3: networking	3	As an application, the communication network is adopted. The internet network is also explained as an example of modeling and control.

Textbook   Each professors prepare the prints of lectures.

Textbook(supplemental)   No textbook.

Prerequisite(s)   Nothing.

Web Sites

Additional Information   This course is held every two years.

10C625

Theory of Electric Circuits, Adv.

Code 10C625   Course Year Master Course   Term 2nd term   Class day & Period Mon 2nd

Location A1-001   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Modeling by circuit	4	
Circuit equation	4	
Phenomena in circuit	3	
Property of circuit	2	
Achievement test	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design of Control Systems

Code   10C631   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 2nd   Location

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

Instructor   T. Hagiwara, Y. Ebihara

Course Description   The course is based on State Space Theory of Dynamical Systems, and provides the applications of the concepts given therein to systematic control system design. The course covers such topics as state feedback and pole assignment, observers, synthesis of feedback control systems, servo conditions and feedforward, and optimal control under quadratic performance indices.

Grading   In principle, the grading will be based on the absolute and comprehensive evaluation of the reports on the subjects given in the class. Should this change due to inadequate efforts on the submitted reports, an exam might be also imposed, in which case the details will be announced at the class at least two weeks before the exam term.

Course Goals   To understand the basic ideas of control system design based on state space representations, and acquire fundamental knowledge and skills on practical control system design through simulated experiences with the report subjects.

Course Topics

Theme	Class number of times		Description
pole assignment by state feedback	4	5	state feedback, controllable canonical forms and pole assignment of scalar/multivariable systems, computation of the state feedback gains for pole assignment, transient responses, uncontrollable poles and stabilizability
observers	3	4	observable canonical forms and observability conditions, full-order observer, minimal-order observer, conditions for observers and observer-based feedback
synthesis of feedback systems	2	3	feedback systems with integral compensation, servo systems, internal model principle, synthesis of servo systems
optimal control under quadratic performance index	3	4	optimal regulators and their closed-loop poles, Riccati equations and their solutions, relationship with the pole assignment problem; Checking degrees of understanding of all the lecture topics closes the class.

Textbook   Handouts will be given at the class.

Textbook(supplemental)

Prerequisite(s)   The contents given in State Space Theory of Dynamical Systems, and linear algebra.

Web Sites   (Info) http://www-lab22.kuee.kyoto-u.ac.jp/~hagiwara/ku/matlab-octave.html

Additional Information

10C616

Electric Power Transmission System

Code   10C616   Course Year   Master Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C611

Computer Simulations of Electrodynamics

Code   10C611   Course Year   Master 1st   Term   1st term   Class day & Period   Tue 5th

Location   A1-101/Electrical Engineering Bldg.-Lecture Room (M)/Uji Campus(Remote Lecture Room)   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   English   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Variables and Classification of Simulation Codes	1	
Finite Difference Methods	1	
Difference Form of Maxwell's Equation and Grid Assignment / Time Step Chart	1	
Courant Condition	1	
Electromagnetic Radiation from a Thin Current	1	
Buneman-Boris Method for Equation of Motion (Relativistic Eqs.)	1	
Interporation of Electromagnetic Field	1	
Computatin of Charge and Current Densities, Self-force Cancellation	1	
Initilization of Particles and Fields	1	
Renormalization and Diagnostics	1	
Advection/Wave Equation for 1D Case (FTCS, Lax, Upwind and Lax-Wendroff Methods)	1	
von Neumann Stability Analysis	1	
Limiter Function	1	
Advection/Wave Equation for Multi-Dimensional Case	1	
Vlasov Equation	1	

Textbook

Textbook(supplemental)   (1) H. Matsumoto and Y. Omura, Computer Space Plasma Physics: Simulation Techniques and Softwares, Terra Scientific, Tokyo, 1993.

(2) H. Usui and Y. Omura, Advanced Methods for Space Simulations, Terra Pub, 2007.

Prerequisite(s)   Electrodynamics, Vector Analysis, Computer Language

Web Sites

Additional Information

10C612

Space Radio Engineering

Code   10C612   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 3rd

Location   N1 lecture room in the Faculty of engineering building No. 3, A1-131 in Katsura campus, Uji

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

Instructor   Hiroshi Yamakawa, Hirotsugu Kojima

Course Description   The present lecture provides the guideline how the technology on the electronics and propulsion system is used for the development of spacecraft and space systems. Furthermore, in order to understand the environment in space, we also give a lecture on the space plasma physics.

Grading   attendance and reports

Course Goals   Mastery of the way how we can make use of the knowledges of the physics and technology to the space engineering.

Course Topics

Theme	Class number of times	Description
Space environment	2	The space environment in the view point of spacecraft desing such as thermal condition, plasmas, and charging.
Spacecraft system and its related technology	6	The spacecraft system and its technology related to power system, communication system, EMC, and payload desings.
Spacecraft dynamics	3	Spacecraft orbit design and its attitude control
System engineering of spacecraft	4	Spacecraft propulsion system including the advanced systems which make use of solar power, GPS navigation system, and space debris

Textbook

Textbook(supplemental)

Prerequisite(s)   Plasma physics, Electromagnetics. Radio engineering, Electronics

Web Sites

Additional Information

Applied Microwave Engineering

Code   10C617   Course Year   Master Course   Term   1st term   Class day & Period   Tue 4th

Location   (Katsura)A1-131, (Yoshida)N1, (Uji)S-143H   Credits 2   Restriction   Lecture Form(s) Lecture

Language   Japanese   Instructor   (RISH) Shinohara, (RISH) Mitani

Course Description   This lecture picks up microwave power transmission (MPT) technology, rectifying antenna (rectenna), antenna and propagation for the MPT, microwave transmitters, and some MPT applications like the Space Solar Power Satellite/Station. This lecture also picks up the other wireless power transmission technologies like resonnance coupling, energy harvesting, and applied microwave technologies of microwave processing, wireless communications, and radar.

Grading   Reports

Course Goals   Students learn about applied microwave engeering, mainly microwave power transmission.

Course Topics

Theme	Class number of times	Description
Introduction	1	The purpose and constitution of the lecture, and review of microwave engineering are explained.
Applications of Wireless Power Tramsmission	3-4	Space Solar Power Satellite/Station and Ubiquitous power source as applications of microwave power transmission, the resonance coupling and energy harvesting as the other battery-less technologies are explained.
rectifying antenna (rectenna)	1-2	rectifying antenna (rectenna) for the MPT are explained.
antenna and propagation for the MPT	5-6	Calculation of beam collection efficiency and beam propagation with FDTD method are explained. Phased array technologies, beam targetting method, non linear physics of microwave-plasma interation are overviwed.
Microwave transmitters	2	High efficient semi-conductor amplifiers and microwave tubes are explained.
microwave processing, wireless communications, and radar	2	Microwave processing, wireless communications, and radar texhnologies are explained.

Textbook   Naoki Shinohara, "Solar Power Satellite (in Japanese)", ISBN978-4-274-21233-8, Ohm-Sya

Textbook(supplemental)   Naoki Shinohara and Kimiya Komurasaki, "Wireless Power Transmission Technologies - Inductive Coupling, Resonance Coupling and Microwave Power Transmission - (in Japanese)", ISBN978-4-904-77402-1, Kagaku-Gijutsu-Syuppan

Prerequisite(s)   Microwave engineering

Web Sites

Additional Information   Number of the lectures may change.

10C714

Spacio-Temporal Media Analysis

Code   10C714   Course Year   Master Course   Term   1st term   Class day & Period   Tue 3rd

Location   3   N1   A1-131   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   Yuichi Nakamura

Course Description   Representation, feature extraction, recognition of media with two or higher dimensions, especially image and videos, are explained with comparing to human ability and biological systems.

Grading   Evaluation is based on attendance and reports.

Course Goals   To learn the basic of representation, feature extraction, od recognition of signals or media with two or higher dimension, and their applications.

Course Topics

Theme	Class number of times	Description
Spatio-Temporal Media	1	What is spatio-temporal media. Some examples.
Light and Colors	1-2	Intensity, colors, and spectrum in image media.
Features and Segmentation	2	Features such as edge, region, etc. for analysing image media.
Filtering and Wavelet Transform	1-2	Introduction to filtering and Wavelet Transform.
Discrete Wavelet Transform and Applications	1-2	Dicrete Wavelet Transform and applications such as image enhancement, image compression, etc.
Geometry of Image Capturing	1-2	The mechanism and geometry of image capturing: projection of a 3D world into 2D images.
3D Measurements and Reconstruction	2	3D measurements and 3D world reconstrunction from a set of 2D images.
Measurement of Motions	1-2	Motion detection and measurement, and oject tracking.
Pattern Recognition	0-2	The basic idea of pattern recognition and usuful tools such as Support Vector Machine.

Textbook   No specific textbook. Handsout will be given when necessary.

Textbook(supplemental)   Computer Vision: A Modern Approach, Forsyth and Ponce, Prentice Hall

Prerequisite(s)   Fundamental knowledge of digital signal processing

Web Sites   TBA

Additional Information

Visualized Simulation Technology

Code   10C716   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 4th   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10G021

Engineering Optics and Spectroscopy

Code   10G021   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 1st

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	1	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physical Properties of Crystals Adv.

Code   10C263   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 2nd

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   ,

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	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10C271

Magnetism and magnetic materials

Code   10C271   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   Engineering Science Depts Bldg.-112   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	8	
	7	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Micro Process and Material Engineering

Code　10G203　　Course Year　Master Course　　Term　1st term　　Class day & Period　Mon 4th

Location　C3-Lecture Room 2　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor　H. Kotera, O. Tabata, K. Eriguchi, I. Kanno, T. Tsuchiya

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Semiconductor microfabrication	3	
Thin-film process and evaluation	3	
Silicon micromachining	3	
3D lithography	2	
Soft-micromachining	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Science

Code　10C074　　Course Year　Master and Doctor Course　　Term　2nd term　　Class day & Period　Tue 1st

Location　C3-Lecture Room 5　　Credits　2　　Restriction　No Restriction　　Lecture Form(s)　Lecture

Language　Japanese　　Instructor

Course Description　　This course involves fundamental interactions of electrons, ions and photons to atoms, molecules and condensed matters, and practical applications for nanotechnology. Great emphases are on fundamental mechanisms of beam-solid interactions, characterization techniques, material synthesis and processing for quantum devices with quantum beam. Recent progress of related area of quantum beam will be also introduced in this course.

Grading　　Coursework will be evaluated with attendance and report on subjects.

Course Goals　　To provide students to understand fundamental interactions in quantum science.

Course Topics

Theme	Class number of times	Description
Interactions between quantum beams and solids	7	Interactions between quantum beams and solids are described with various formulas. Collisions with nucleus, electronic excitation, defect formation and energy loss will be discussed and related scientific topics, such as discovery of electron will be introduced.
Applications of quantum beams	7	The interactions of quantum beam are widely used for various applications. Material processing and analysis with quantum beams are essential in nanotechnology and quantum beams are also important for diagnostics of diseases and cancer therapy in medical field. Practical applications will be presented with recent progress and challenges.
Final examination and report	1	Evaluation will be given by the contents of the reports and quizzes of the subjects leaned in this course.

Textbook　　Ion-Solid Interactions: Fundamentals and Applications (Cambridge Solid State Science Series) M. Nastasi, J. Mayer, J. Hirvonen

Textbook(supplemental)

Prerequisite(s)　　Solid state physics, Quantum mechanics(beginner's), Electromagnetism

Web Sites

Additional Information

Molecular Materials

Code   10D413   Course Year   Master and Doctor Course   Term   (not held; biennially)

Class day & Period   Wed 2nd   Location   A2-304   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   K. Tanaka and A. Ito

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	12	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D422

Molecular Materials Science

Code   10D422   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   A2-304   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kaji

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Chemistry of Polymer Materials

Code   10D007   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd

Location   A2-302   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	3	
	8	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D613

Polymer Structure and Function

Code   10D613   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd   Location

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

Instructor   S. Ito, H. Ohkita, H. Aoki

Course Description   Polymers are indispensable in our modern society, fundamental in industry, and functional for chemistry, medicine, electronics, and many other advanced and emerging technologies. In this class, photo- and electric functions of polymeric materials are discussed on the basis of photochemistry and photophysics. In particular, the importance of designing nanostructures of polymer assembly is highlighted by explaining examples of state-of-the-art real systems.

Grading   Evaluated with the grade on the final test or the quality of report submitted after the final class.

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Photofunctional Polymers	5	
Nanostructure and Dynamics of Polymers	2	
Electronic Functions of Polymers	5	
Advanced Functionality of Polymers	2	

Textbook   None: Some handouts will be dealt in the class of every lecture.

Textbook(supplemental)   None:

Prerequisite(s)   Students are expected to have knowledge of Physical Chemistry and Polymer Chemistry provided in chemisty course of undergraduate.

Web Sites

Additional Information   This lecture is held biannually, not offered in 2013.

Fundamentals of Quantum Optics

Code   10X011   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 1st

Location   Credits   2   Restriction   Lecture Form(s)   Language   Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693637

Digital Signal Processing, Advanced

Code   693637   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 3rd

Location   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Digital Communication Engineering

Code   693622   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

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

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693628

Information Network

Code 693628   Course Year Master and Doctor Course   Term 1st term   Class day & Period Tue 2nd

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

Instructor   ,

Course Description   This course introduces architecture of information networks including communication protocol and layered structure.   Various networks and their technologies, such as circuit switching network, IP network, photonic network, and mobile network, are explained.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   http://www.i.kyoto-u.ac.jp/curriculum/syllabus.html

Recent Advances in Interdisciplinary Photonics and Electronics

Code   10X009   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 5th

Location   A1-131   Credits   2   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X015

Advanced Seminar in Interdisciplinary Photonics and Electronics ，

1(   )

Code   10X015   Course Year   Master Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X017

Advanced Seminar in Interdisciplinary Photonics and Electronics ,

2(   )

Code   10X017   Course Year   Master Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X019

Research Internship (M,D)

M(   )

Code   10X019   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10X019   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Research Internship (M,D)

D(   )

Code   10X021   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X023

Advanced Exercises on Interdisciplinary Photonics and Electronics I, II

1

Code   10X023   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10X023   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Advanced Exercises on Interdisciplinary Photonics and Electronics I, II

2

Code   10X025   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10X025   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Frontiers in Modern Science & Technology

Code   10D051   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 5th

Location   Katsura Hall   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise in Practical Scientific English

Code   10i045   Course Year   Master and Doctor Course   Term   1st term   Class day & Period

Location   A2-304   Credits   1   Restriction   Lecture Form(s)   Seminar   Language   English

Instructor   Kim Sunmin, Kenji Wada. etc

Course Description   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Grading   Attendance 60%, midterm reports 20%, final report 20%. The final report must be submitted by the deadline date.

Course Goals   This course is designed to develop basic communication and presentation skills in English required for scientific and industrial career prospects.

Course Topics

Theme	Class number of times	Description
Introduction	2	Course Guidance, etc.
Exercise-1	1	Definition of technical writing 3C in technical writing Weaknesses of Japanese writers Good examples and bad examples
Exercise-2	1	Punctuation Presentation skills 1 -organization
Exercise-3	1	Organizing your thoughts for the title and abstract Presentation skills 2 ?Visual aspects
Exercise-4	1	Presenting the background of your research Presentation skills 3 ?Oral Aspects
Exercise-5	1	Describing how you did your research Presentation skills 4 ?Physical Aspects
Exercise-6	1	Presenting what you observed Presentation Practice
Exercise-7	1	Placing your findings in the field Presentation Practice
Exercise-8	1	Expressing thanks and listing references Presentation practice
Exercise-9	1	Writing your proposal Presentation practice
Exercise-10	1	Presentation practice Reviews & Feedbacks Evaluation
Presentation	2	Current situation of studying abraod, etc.
Wrap-up lecture	1	Achievement Assessment

Textbook   No textbook is required.

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.glc.t.kyoto-u.ac.jp/ja/study/grad/10d040 (needs passwords).

Additional Information

Introduction to Advanced Material Science and Technology   English lecture

Code   10K001   Course Year   Master and Doctor Course   Term   1st term

Class day & Period   Friday,4th-5th

Location   KatsuraA2-308,Yoshida Research Bldg.No4,-Room3(Distance lectures)   Credits   2

Restriction   No Restriction   Lecture Form(s)   Relay Lecture   Language   English   Instructor

Course Description   The various technologies used in the field of material science serve as bases for so-called "high technologies", and, in turn, the high technologies develop material science. These relate to each other very closely and contribute to the development of modern industries. In this class, recent progresses in material science are briefly introduced, along with selected current topics on new biomaterials, nuclear engineering materials, new metal materials and natural raw materials. The methods of material analysis and future developments in material science are also discussed.

Grading   In order to obtain two credits, students must attend at least ten lectures, and at least five of the submitted reports must be evaluated as " passed" by each lecturer. Each report should be submitted to the lecturer within two weeks after his/her lecture. NOTE: Reports are NOT acceptable from those who do not attend the lecture.

Course Goals

Course Topics

Theme	Class number of times	Description
	2	Advanced Beam Processes and Characterization Technique for Nanotechnology//J. Matsuo
		Microreactor TechnologyforProductionofHighFunctional Chemical Materials//K. Mae
		Nano-optical Spectroscopy/Microscopy:Applications in Material Science//H. Aoki
	2	Rheology Control by Associating Polymers//T. Koga
		Hyperthermophiles and their thermostable biomolecules//H. Atomi
	1	ISO Standards in Analytical Chemistry//J. Kawai
	1	Advanced Polymer Foam Technology//M. Ohshima
	1	Photonic Materials//K. Hirao
	1	Nanostructure Control in Structural MetallicMaterials//N. Tsuji
	1	Electrodeposition and Electroless Deposition for Materials Processing//N. Tsuji
		Confirmation of study achievement

Textbook   None

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   Check the notice on the bulletin board.

Human Security Engineering

Code   10X301   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 5th
Location   C1-171   Credits   2   Restriction   Lecture Form(s)   Relay Lecture   Language   English
Instructor   MATSUOKA Yuzuru, MONNAI Teruyuki, OHTSU Hiroyasu, TANAKA Hiroaki, TATANO Hirokazu, KOBAYASHI Kiyoshi, MATSUSHITA Kazuo

Course Description   This lecture aims to get student to comprehensively and deeply understand issues related to "Human Security Engineering" as a system of technologies for designing and managing cities that enable inhabitants to live under better public health conditions, and environemntal destruction, as listed in the Millennium Development Goals from the viewpoint of four existing fields, i.e. urban governance, urban infrastructure management, health risk management, and disaster risk management. In addition, we'll provide lectures on this new discipline systematically based on the relationship between four existing fields.

Grading   Participation, Presentation, and Report

Course Goals

Course Topics

Theme	Class number of times	Description
Orientation	1	
Tentative Overview of Human Security Engineering	1	
Urban Governance	2	
Urban Infrastructure Management	2	
Health Risk Management	2	
Disaster Risk Management	2	
Human Security and Environmental Security	1	
Human Right, Property and Social Capital	1	
Poverty Traps	1	
Discussion on Human Security Engineering	1	
Evaluation and Report	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://hse.gcoe.kyoto-u.ac.jp/en/inside/kyomu/index.html

Additional Information

10X303

Urban Governance

Code   10X303   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English   Instructor

Course Description   The key to raising the human quality of life lies in well-designed cities that make good use of human and physical resources. In this course, we will explore the methodology of urban governance, including bottom-up decision making based on collaboration of various actors, in order to solve the multi-dimensional human security problems of safety, health, convenience, comfort, amenity, and sustainability. Moreover, multiple lecturers will provide interesting topics of urban governance, with concrete problems for students to discuss.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Lectures in Urban Governance 1

Code 10X305 Course Year Doctor Course Term 1st term Class day & Period Supervisor

Location Supervisor Credits 2 Restriction Lecture Form(s) Seminar Language Instructor

Course Description This class will cover the hot topics on urban governance within human security engineering. Instructors will present current literature and expect students to develop arguments.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information Tailor-made lectures by supervisor

Lectures in Urban Governance 2

Code   10X307   Course Year   Doctor Course   Term   2nd term   Class day & Period   Supervisor

Location   Supervisor   Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Instructor

Course Description   In this class, research topics related to urban governance within human security engineering will be assigned to students to enable them to solve human security problems. The students are required to review the latest or important fundamental papers, including related areas, and debate ideas with their teachers.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   Tailor-made lectures by supervisor

733101

Global Environmental Law and Policy

Code 733101 Course Year Doctor Course Term 1st term Class day & Period Wed 2nd Location Credits 2 Restriction

Lecture Form(s) Lecture Language English Instructor MATSUSHITA Kazuo, OBATA Fumiko

Course Description The course will examine the legal and institutional framework of global environmental policy as well as the activities of various actors including governments, international organizations, businesses and civil society.

Grading Students will be evaluated principally by class presentations as well as an end-of-term report, taking active and constructive participation in the class into account.

Course Goals The objective of this course is to identify ways and means to create global benefits and realize sustainable societies.

Course Topics

Theme	Class number of times	Description
Introduction and Explanation of Course Outline	1	
Stockholm to Rio	1	
Rio to Johannesburg	1	
Environmental Accords	1	
The Ozone Layer Protection and Climate Change Regimes	1	
The UN Systems, Development Assistance and the Environment	1	
Civil Society and Governance without Government	1	
	1	
Outline of the Japanese Environmental Law	1	
Corporate Social Responsibility	1	
Smoking Regulations in Japan	1	
Basic Environmental Law, Air Pollution Control Law, Environmental Impact Assessment Law	4	

Textbook Speth, J.G., and Haas, P.M., Global Environmental Governance, Island Press, 2006

2007

2002

http://www.env.go.jp/en/lar/lar-index.html

Textbook(supplemental) WCED, Our Common Future, Oxford University Press, 1997

UNEP, Global Environment Outlook(GEO)4, 2007

UNEP, Global Environment Outlook(GEO)3, Earthcan, 2002

Elliot, Lorraine, The Global Politics of the Environment, Macmillan Press Ltd, 1998

World Watch Institute, State of the World, Norton, annual publications

1994

1998

2000

2007

2002

2003

– – 2004

2004

Prerequisite(s)

Web Sites

Additional Information Students are divided into several groups. Each group is required to make presentations in the class on assigned subjects.

10X311

Urban Infrastructure Management

Code   10X311   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 3rd

Location   C1-117   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   OHTSU Hiroyasu

Course Description   This lecture aims to provide interdisciplinary knowledge associated with how urban infrastructure is comprehensively management, from viewpoint of not only economy but also "human security engineering". In detail, the contents of lectures consist of following topics:

Urban Infrastructure Asset Management,

Urban Environment Accounting System,

Urban Energy Supply Management,

Urban Food/Water Supply Management,

Urban Transport/Logistics Management.

Grading   Attendance(10), Participation(10), Report(80)

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

Course Topics

Theme	Class number of times	Description
Guidance, Introduction of Urban Infrastructure Asset Management	1	
Urban Infrastructure Asset Management	3	
Urban Transport/Logistics Management	3	
Urban Environment Accounting System	2	
Urban Food/Water Supply Management	2	
Urban Energy Supply Management	2	
Presentation	2	

Textbook

Textbook(supplemental)   Geotechnical Infrastructure Asset Management (Third Edition), Kyoto University Global COE Global Center for Education and Research on Human Security Engineering for Asian Megacities, 2011.

Prerequisite(s)

Web Sites

Additional Information

10X313

Governance for Regional and Transportation Planning

Code   10X313   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Tue 4th

Location   C1-171   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   KOBAYASHI Kiyoshi

Course Description   This lecture aims to provide interdisciplinary knowledge associated with appropriate governance strategies for regional, urban, transportation planning. In detail, the contents of lectures consist of following topics: Urban development management based upon PPP, landscape design to support activities, public transportation system for sustainable growth, urban facilities planning considering the variety in behaviors, ITS to support highly-advanced transportation behavior, advanced logistic system, and remote sensing technology for urban and regional planning

Grading   Participation (30), Report (70)

Course Goals   To achieve the knowledge for urban and regional governance.

Course Topics

Theme	Class number of times	Description
Introduction of Urban Infrastructure Management	1	Prof. Kobayashi
New Settlement Systems for Transportation Services	1	Assoc. Prof. Matsushima
Landscape Policy of Kyoto City	1	Assoc. Prof. Kubota
Urban Design Considering Amenity in the River-Front	1	Prof. Kawasaki
Concepts and visions for city logistics	2	Prof. Taniguchi and Assoc. Prof. Yamada
Expectations for ITS and issues	1	Assoc. Prof. Uno
Mobility Management	2	Prof. Fujii
Disaster Risk Governance	1	Assoc. Prof. Yokomatsu
Concepts and visions for city logistics	3	Assoc. Prof. Susaki, Assic. Prof. Maki, and Dr. Suanpaga (Kasetsart Univ.)
Traffic modeling with Digital Image Processing	1	Dr. Suanpaga (Kasetsart Univ.)
Summary	1	Summarize classes and check whether students could understand them.

Textbook   None

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X315

Lectures in Urban Infrastructure Management 1

1

Code 10X315 Course Year Doctor Course Term 1st term Class day & Period Location

Credits 2 Restriction Lecture Form(s) Seminar Language English Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X317

Lectures in Urban Infrastructure Management 2

2

Code   10X317   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

733102

Global Environmental Economics

Code 733102   Course Year Doctor Course   Term 1st term   Class day & Period Mon 2nd   Location   Credits 2   Restriction   Lecture Form(s) Lecture Language English   Instructor   UETA Kazuhiro, MORI Akihisa

Course Description   Lectures will be given on the theory and policy of sustainable development in view of environmental/ecological economics. In particular the focus will be on:

- Reconstructing relations between humans and nature, taking environmental constraints, material cycles, efficiency, equity and sustainability into account

- Clarify socio-economic mechanisms of global and local environmental problems and policies and measures to deal with them

- Valuing the environment and evaluating the policies and institutions that cause current environmental problems

The lecure will then discuss multi-level environmental governance that enables to manage local and global common-pool resources and/or environmental assets, to finance for sustainable development.

Grading   Evaluated mainly by end-of-term examination scores, taking active and constructive participation in the class into account.

Course Goals   To aquire basic theory and methodology on global environmental economics and policies, and economics of sustainable development.

Course Topics

Theme	Class number of times	Description
Introduction: Economics and the Environment	1	
Topics and Challenges of Environmental Economics	1	
Sustainable Development: Economics of Environment and Development	1	
Theory of Environmental Valuation and Decision Making	1	
Environmental Policy: Goals, Instruments and Actors	1	
Environmental Policy Instruments	1	
Environmental Policy Integration	1	
Environmental Policy Innovation, Diffusion and Technological Innovation	1	
International Trade, FDI and the Environment	1	
Inernational Environmental Aid and Financial Mechanisms for Global Environment	1	
Poverty and Environment	1	
Economic Development and Environmental Policy in East Asia	1	
	1	
	2	

Textbook   1996
                                        2008

Textbook(supplemental)   Dasgupta, Partha, 2007. Economics: A Very Short Introduction. Oxford: Oxford University Press

Adams, William M., Green Development: Environment and Sustainability in a Developing World. 3rd Edition. London: Routledge.

Kerry Turner, David Pearce and Ian Batemen, 1994. Environmental economics: An Elementary Introduction. Pearson Education Limited.

Atkinson, Giles, Simon Dietz and Eric Neumayer (eds.) 2007. Handbook of Sustainable Development. Cheltenham; Edward Elgar.

Maler, Karl-Goran and Jeffery R. Vincent (eds.) 2003. Handbook of Environmental Economics Vol.1: Environmental degradation and Institutional Responses. Amsterdam: Norh-Holland.

Dasgupta, Partha, Human Well-Being and the Natural Environment. Oxford: Oxford University Press

Jordan, Andrew J. and Andrea Lenschow, 2008. Innovation in Environmental Policy? Integrating the Environment for Sustainability. Cheltenham: Edward Elgar.

                                        2006/07   2006
                1-8
                                        1-5

Prerequisite(s)

Web Sites

Additional Information

10X321

Lecture on Environmental Management Leader

Code 10X321   Course Year Master and Doctor Course   Term 1st term   Class day & Period Thu 5th   Location C1-171   Credits 2   Restriction
Lecture Form(s) Relay Lecture   Language English   Instructor   TANAKA Hiroaki, SHIMIZU Yoshihisa, FUJII Shigeo
 Course Description   In this class, we'll give lectures on theory of risk analysis, risk identification, risk assessment, risk evaluation, and risk reduction and avoidance in the field of urban human security including human health risk and ecological risk. The main purpose of this lecture is to provide students basic viewpoint and knowledge required for environmental leaders who can practically solve environmental issues occurring in developing countries, showing several international environmental projects as practical case works.
 Grading   Participation, Oral and Poster Presentation, and Report
 Course Goals   The main purpose of this lecture is to provide students with the basic viewpoint and knowledge required for environmental leaders able to practically solve environmental issues occurring in developing countries, focusing on several international environmental projects as practical case works.
 Course Topics

Theme	Class number of times	Description
Introduction	1	In this introductory lecture, the current situation and problems of the environment in Asian developing countries are explained, and basic ideas for their improvement measures are given together with fundamental terminologies.
Energy and Environment	1	
View point and commitment to rural environmental issues	1	
Disaster Risk Management and Grass-roots International Cooperation	1	
Environmental Risk Assessment and Risk Communication	1	
Water, Sanitation and Solid Waste Management for Developing Countries	1	
Presentations and Discussions	2	
Japan's Lessens on Economy & Development	1	
Solid Waste Management	1	
Ensuring Sustainability in Water Supply and Sewerage Sector	1	
Water Supply and Human Security	1	
Impending Issues in Lake Biwa-Yodo River Water Management and the Basin Governance	1	
Environment & Sanitary Engineering Research International Session	1	
Poster Presentation in Environment & Sanitary Engineering Research Symposium	1	

 Textbook
 Textbook(supplemental)
 Prerequisite(s)
 Web Sites
 Additional Information   To be announced at class about poster presentation in Environment & Sanitary Engineering Research Symposium.

Lectures in Health Risk Management 1

1

Code   10X323   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X325

Lectures in Health Risk Management 2

2

Code   10X325   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X327

Environmental Engineering for Asia

Code 10X327   Course Year Doctor Course   Term 2nd term   Class day & Period   Location C1-171

Credits 2   Restriction   Lecture Form(s) Lecture   Language English

Instructor   SHIMIZU Yoshihisa, FUJII Shigeo, TSUNO Hiroshi, TANAKA Hiroaki, MATSUOKA Yuzuru, TAKAOKA Masaki, KURATA Gakuji

Course Description   The course is a simultaneously conducted distance-learning conducted at Kyoto University, and from remote lecture stations in the University of Malaya, and Tsinghua University. A hybrid system is used for this distance learning, which consists of prerecorded lecture videos, VCS (Video Conference System) and SS (Slide Sharing System). The students are requested to give short presentations in English at the end of the lecture course. This course seeks to improve students' English skills and international senses through lectures, presentations, and discussions.

Grading   Evaluation by class attendance, Q&A and presentations.

Course Goals   This course covers, in English, various kinds of engineering issues related to water environments, atmospheric environment and solid waste management, encompassing fundamental knowledge, the latest technologies and regional application examples. These lectures, together with English presentations by students, and discussions enhance the English capability and internationality of students.

Course Topics

Theme	Class number of times	Description
	1.4	
	4.2	
	1.4	
	1.4	
	1.4	
	1.4	
	1.4	
	1.4	
	1.4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   Either "New Environmental Engineering I, advanced" or "New Environmental Engineering II, advanced" will be acceptable as corresponding to this course. PowerPoint slides are the main teaching materials in the lectures, and hard copies are distributed to the students. In addition, a list of technical terms and difficult English words will be given to the students with their explanations and Japanese translations.

733103

Management of Global Resources and Ecosystems

Code   733103   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English   Instructor   , ,

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

733104

Environmental Ethics and Environmental Education

Code 733104 Course Year Doctor Course Term 1st term Class day & Period Tue 5th Location C1-171 Credits 2 Restriction Lecture Form(s) Lecture Language English Instructor FUJII Shigeo, TANIGUCHI Fumiaki, SUGIMOTO Kazuo

 Course Description Ethical approaches and educational activities are essential for solving environmental problems, especially to facilitate consensus-building among conflicting stakeholders. This lecture, provides the principles of environmental education, the relationship between education and ethics, the chemical management of chemical substances, the ISO14000 series and some case studies. Students will join the class not only by auditing, but also by discussion and presentations.

 Grading Several reports and group presentation.

 Course Goals The objectives of this lecture are to study the "Environmental Ethics" that are essential to the recognition of environmental problems, and to consider the "Environmental Education" that is it necessary to provide to the public.

 Course Topics

Theme	Class number of times	Description
Environmental ethics overview	1	
Goal of environmental education and categories of environments of nature, society and mind	1	
Pedagogy of environmental education based on environmental philosophy	1	
Environmental education oriented by environmental ethics	1	
Case studies of environmental education	1	
Solutions for global environmental issues through environmental education	1	
Precautionary principles, focusing on hazardous chemical problems	1	
ISO 14000 series	1	
Group discussion on environmental ethics/education	1	
Group presentation about environmental ethics/education	1	
	1	
	1	
	1	
	1	
	1	

 Textbook

 Textbook(supplemental)

 Prerequisite(s)

 Web Sites

 Additional Information

10X333

Disaster Risk Management

Code 10X333   Course Year Master and Doctor Course   Term 1st term   Class day & Period Wed 4th   Location C1-171
Credits 2   Restriction   Lecture Form(s) Lecture   Language English
Instructor   TATANO Hirokazu, YOKOMATSU Muneta

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

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

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

Course Topics

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

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

Textbook(supplemental)   Froot ,K.A.(ed)"The Financing of Catastrophic Risk", the University of Chicago Press Kunreuther H. and Rose, A.,"The Economics of Natural Hazards", Vol.1 & 2, The International Library of Critical Writings in Economics 178, Edward Elgar publishers, 2004

Okuyama, Y., and Chang, S.T.,(eds.)"Modeling Spatial and Economic Impacts of Disasters"(Advances in Spatial Science), Springer, 2004.

Prerequisite(s)   Nothing
Web Sites   No web site
Additional Information

10X335

Lectures in Disaster Risk Management 1

1

Code 10X335   Course Year Doctor Course   Term 1st term   Class day & Period   Location

Credits 2   Restriction   Lecture Form(s) Seminar   Language English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X337

Lectures in Disaster Risk Management 2

2

Code   10X337   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X339

Internship for Human Security Engineering

Code   10X339   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Capstone Project

Code   10X341   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   8   Restriction   Lecture Form(s)   Language   English   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10X341   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Design Methodology

Code   10X401   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 4th

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

Instructor   ,

Course Description   In the 21st century, it is required to reconsider what is a design and what is a design method. The era a simple artifact is requested is over, and we have to create environmental and social systems including various relations such as the relation among artifacts, the relation between artifacts and men & environment, and the relation among human beings. The role of design is to develop "Human Centered Design (HCD)" which creates meaningful experiences through system integration of man-environmental systems. In this lecture, we explore the design methodology as a basic theory of design after 1960's, explaining design problems, design process, design method, design thinking, and design science based on the design studies in various design fields such as craft, product, architecture, city, landscape, environment, community, education, society, mobility, business, and information. Especially to investigate the mechanism of creative design thinking is very important to solve the daily life problems and many difficult problems human kind encounters. Therefore we explain the design semiotics to clarify the mechanism of generating creative designs and to show valuable examples.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Theory for Designing Artifacts

Code   10X402   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 5th

Location   C3-Lecture Room 4a   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description   The activity of design is fundamentally similar across a wide variety of domains. I use artifact in a broad and atypical sense to describe any product of intentional creation, including physical goods, services, information systems, buildings, landscapes, organizations, and societies. The central theme of this lecture is that a unifying framework informs the human activity of design across all domains. For this purpose, the following steps of the design process are described: Sense gap, Define problem, Explore alternatives, and Select plan according to the Ulrich's classification. The principles and methodologies for each of those steps are provided in the lecture. Moreover, understanding user needs is a key element of problem definition, and that understanding is usually best developed with interactive and immersive methods. In this lecture, a variety of methodologies for participatory systems approach and an idea of user-experience are provided, and its contributions to the design process are discussed.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   698541   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 5th

Location   C3-Lecture Room 4a   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description   Any valuable information or knowledge does not make sense if it is not transferred effectively among human beings and our society. We need to organize, design and present information in a way that fosters efficient and effective understanding of it. This course lectures information design, interaction design and visual design. Main topics of the course are: information design and information comprehension (sense-making) theory, information credibility, information organization, spatial cognition/cognitive maps/way finding, linguistics and information design, designing user interface & interactions, photo grammar & film grammar, story-telling, and information visualization.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Organization and Community Design

Code   10X403   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 4th

Location   C3-Lecture Room 4a   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   ,

Course Description   Design of social organizations and communities is a critical component of any design. As we design any artifact--material or otherwise, we need to understand how people understand and act upon the artifacts. Social organizations and communities are then understood and redesigned. For this redesign, designers need to participate in the social organization or the community so that the design they produce is part of the organization or community. In this course, students will learn the basic ideas of organizational and community design and then experience the practices in the field. To do some work in the field, many sessions will be held over the weekend. Any students who seek to learn design are encouraged to take this course to acquire the basic literacy for design of any kind.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code 698542 Course Year Master and Doctor Course Term 2nd term Class day & Period Fri 5th

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

Instructor

Course Description As a methodology of field analysis required to make product designs of products, services and business in the real field, we give some lectures and related exercise which include field research methods (ethnography, surveys method), quantitative analysis methods (various statistical analysis methods) and model building and simulation methods. After learning of the target field selection, setting of the investigation, and determination of the contents of the survey, you carry out the field research work using ethnography, survey methods and so on. At the next step, you learn data analysis methods using field data obtained from the field works. Finally, we hold the design workshop using the results of the actual field works which are obtained from construction of field analysis model, system dynamics, multi-agents simulation and so forth.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	4	
	3	
	4	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design of Complex Mechanical Systems

Code   10X411   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 4th

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   , , , , ,

Course Description   Design of mechanical systems in the future will require developing novel technologies that are able to achieve a harmonized and symbiotic relationship with the environments. This lecture elucidates mechanical phenomenon that realize autonomous adaptation in harmony with the environment, especially with respect to material systems characterized by microscopic structure and macroscopic properties, living organism systems with diversity and self-repair, human-machine systems characterized by interaction and coordination, etc. Therein, complex behaviors emerge being caused by complex interactions at different spatio-temporal scales. This lecture provides a number of governing principles of such complex mechanical phenomenon, and then introduces methods for utilizing those phenomenon to design flexible and adaptive artifacts whose constituent parts are able to alter their functions in response to the surrounding environments.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Dynamic Systems Control Theory

Code   10G013   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design and Manufacturing Engineering

Code   10G011   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 1   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Robotics

Code 10B407   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Fumitoshi Matsuno

Course Description   Understanding of intelligent behaviors of living things is very interesting. And realization of their intelligent motion by a robot is also attractive for mechanical engineering. In this lecture, we consider basic understanding of beautiful human skill " manipulation" on the point of view of dynamics and control. First modeling methodologies for a rigid multibody system and a general dynamic model of a manipulator are provided. Next, a typical nonlinear control law is introduced and some problems for applying the controller are shown. Based on nature of the dynamics of the manipulator, a very simple and robust controller can be derived by designing energy of the system. This lecture provides modeling methodologies and controller design strategies of the rigid multibody system and we analyze a beautiful human skill of the manipulation.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Theory for Design Systems Engineering

Code   10Q807   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Tetsuo Sawaragi and Hiroaki Nakanishi

Course Description   The lecture focuses on the human design activity; designing artifacts (things, events and systems) based on human intuitions, and designing human-machine systems in which the relations between human and objects are of importance.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Ethics and Management of Technology

Code   10G057   Course Year   Master 1st   Term   1st term   Class day & Period   Thu 3rd

Location   Butsurikei-Kousya   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lectures and Exercise

Language   Japanese   Instructor   Sawaragi, Nishiwaki, Tomita, M. Komori, Tsuchiya, Noda, Sato, Iseda

Course Description   Basic knowledge of Engineering Ethics and Management of Technology needed for future project leaders in companies and society is taught. Students have to make group work after-class hours as well as presentations of wrapping-up the discussions. Engineering ethics is the field of applied ethics and system of moral principles that apply to the practice of engineering. The field examines and sets the obligations by engineers to society, to their clients, and to the profession. Management of Technology is a set of management disciplines that allows organizations to manage their technological fundamentals to create competitive advantage. This course consists of lectures, exercises, discussions and oral presentations under supervision of professional faculties and extramural lecturers.

Grading   Submission of reports and presentations

Course Goals   To cultivate a spirit of self-sufficiency needed for engineers

Course Topics

Theme	Class number of times	Description
Engineering Ethics	9	1. Introduction to Engineering Ethics (EE) 2. Medical Engineering Ethics 3. EE by Institution of Professional Engineers, Japan and abroad 4. Product Safety and Product Liability 5. Comprehensive Manufacturing and EE (1) 6. Comprehensive Manufacturing and EE (2) 7. Group Discussions 8. History and Philosophy of EE 9. Presentation on exercise of EE
Management of Technology	5	1. Product Portfolio, Strategy for Competition 2. Bussiness Domain and MOT for Marketing 3. Organizational Strategy for Corporates' R & D 4. Management Theory for R & D 5. Presentation on exercise of MOT
Summary	1	

Textbook   No textbook

Textbook(supplemental)   Nothing

Prerequisite(s)   Nothing particular

Web Sites   No Web Site

Additional Information   Nothing particular

Optimum System Design Engineering

Code   10G403   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 2nd

Location   C3-Lecture Room 3   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	4	
	2	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X412

Design Theory of Man-Environment Systems

Code 10X412 Course Year Master and Doctor Course Term 2nd term Class day & Period Fri 2nd

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

Instructor , ,

Course Description We are now strongly required to extend the design object from the artifact environment to man-environment system in the field of architecture, city, environment, and landscape. It is not enough to construct the general theory of design separated from specific design fields, and we have to develop " Man-environment System Design Theory" to organize design objects and design methods, because the feeling and knowledge on design object have a great influence on design process. In this lecture, we explain design theories and design methods in architectural and urban fields from the multiple viewpoints such as architectural and urban planning & design, landscape design, history and design, social system engineering, and environmental engineering. Moreover we will try to illustrate some design projects as case studies.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	3	
	4	
	2	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Theory of Architectural Structure

Code 10X413   Course Year Master 1st   Term 1st term   Class day & Period Fri 4th   Location C2-101

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	6	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X414

Theory of Architectural and Environmental Planning

Code   10X414   Course Year   Term   1st term   Class day & Period   Thu 2nd   Location   C2-102

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

Instructor   Teruyuki Monnai

Course Description   Living environment including architectural and urban space is generated by means of the dynamic interaction between man and environment. We are able to find multi-layered complex relations such as function, performance, meaning and value, changing with the time. The role of design is to read various networks of relations, and to develop them to human living environment. The objectives of this lecture are as follows; 1) to read the principles of multi-layered man-environment relations based on "semiotics", "design methodology", and "system theory", 2) to explore the possibility to design comfortable environments and fascinating landscapes based on those principles of man-environment system.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Basic Theory of Semiotics	4	
Architectural and Urban Semiotics	2	
Development of Townscape Semiotics	2	
Creative Regeneration of Townscape in Historical City Kyoto	1	
System Theory of Designa and Evaluation of Living Environment	1	
Development of Design Methodology	2	
Perspactive on Theory of Architectural and Environmental Planning	1	
Confirmation of the Learning Degree	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Theory of Architecture and Human Environment

Code   10B035   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd

Location   C2-102   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   KANKI Kiyoko

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	2	
	5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Theory of Architecture and Environment Design, Adv.

Code   10B024   Course Year   Master Course   Term   2nd term   Class day & Period   Wed 2nd

Location   C2-213   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   Waro Kishu, Takahiro Taji

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Mechanics for Building Structures

Code 10B037 Course Year Master Course Term 1st term Class day & Period Mon 1st Location C2-101

Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor I. Takewaki, M. Tsuji

Course Description Basic mechanics and inverse problem for design of building structures are explained. Structural optimization methods are also presented. Rational structural design approaches are introduced in place of conventional try-and-error approaches.

Grading Grading is based on the examination at the end of semester.

Course Goals Obtain the knowledge on basic mechanics for design of building structures. Also obtain advanced knowledges on new theories and methodologies of structural optimization and inverse-problem formulations.

Course Topics

Theme	Class number of times	Description
Fundamentals of mathematical programming		Fundamentals of mathematical programming methods are explained. Linear and nonlinear programming methods are introduced and some examples are presented.
Design sensitivity analysis	1	Basic methods of sensitivity analysis for computing derivatives (sensitivity coefficients) of static responses and frequencies of free vibration with respect to vatiations of design parameters, shape sensitivity analysis with respect to nodal
Application to optimization of framed structures	1	Application of mathematical programming methods to optimization of framed structures is presented.
Earthquake response constrained design	1	Design earthquakes defined in response spectrum and earthquake response constrained design for shear building models
Earthquake response constrained design for response controlled		Earthquake response constrained design for response controlled structures and isolated structures including the design of control devices.
	1	
Exercise 1	1	Exercise on simple structural optimization problem.
Concept of inverse problem	1	Examples of inverse problem in terms of shear building models
Hybrid inverse problem of structural systems	1	Examples of hybrid inverse problem in vibration and classification of hybrid inverse problems. The solution procedure of hybrid inverse mode problems is discussed.
Strain-controlled design method for moment-resisting frames		Simple examples are used for understanding fundamental concepts of strain-controlled design.
Inverse problem via design sensitivity analysis		An inverse problem formulation via design sensitivity analysis (direct method) is explained.
Earthquake-response constrained design		A method of earthquake-response constrained design for shear building models is explained. Design loads in terms of the design response spectrum are used in the design method.
Performance-based Design		A design methodology based on the concept of performance-based design is explained.
Exercise 2		Exercise on inverse problems.
	1	

Textbook

Textbook(supplemental) Design Mechanics and Control Dynamics of Building, Architectural Institute of Japan, 1994.

Prerequisite(s) Mechanics of Building Structures, Basic Linear Algebra, Basic Calculus

Web Sites

Additional Information

High Performance Structural Systems Engineering

Code   10B231   Course Year   Master Course   Term   2nd term   Class day & Period   Wed 2nd

Location   C2-313   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Masayoshi Nakashima, Keiichiro Suita,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	4	
	5	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Environmental Control Engineering, Adv.

Code   10B222   Course Year   Master Course   Term   1st term   Class day & Period   Mon 2nd

Location   C2-101   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kazunori HARADA

Course Description   This lecture deals with functional aspects of building envelope as a shelter from outdoor climate. Lecture will be given on specified topic on principles of thermal and moisture insulation, control strategy of indoor environment, the prediction methods of air flow, thermal radiation and indoor air quality. Examples will be shown for use in building design for thermal environment control and safety problems during fire.

Grading   Score is evaluated by end-term examination.

Course Goals   To acquire basic concepts on fundamental concepts on thermal environment control for preparation of master thesis development.

Course Topics

Theme	Class number of times	Description
introduction	1	The history of numerical methods in architectural environmental control is briefly introduced, followed by introduction of mathematical formulation of physical phenomena.
numerical methods in heat conduction	4	As a common knowledge, heat conduction equation is dealt with in order to understand the basic framework in numerical methods. At the end of this term, report will be obligatory to understand the meaning of discrete equations and their nature.
numerical methods on fluid motion	5	Lecture will be given for standard methods of calculation of fluid dynamics. At the end of this term, simple practice on control volume method and SIMPLE algorithm will be obligatory.
simultaneous system and turbulence	4	Lecture will be given for simultaneous systems of fluid motion and thermal field. In a similar way, turbulence model is to be introduced. The participants are expected to have learned on environmental engineering in architecture at bachelor level.
Evaluation of archivements	1	Evaluation of archivements will be conducted.

Textbook   None specified.

Textbook(supplemental)   To be specified during the course.

Prerequisite(s)   The participants are expected to have learned on environmental engineering in architecture at bachelor level.

Web Sites

Additional Information

693689

Design in ICT

Code 693689 Course Year Doctor Course Term 1st term Class day & Period Wed 5th Location

Credits 2 Restriction Lecture Form(s) Lecture Language Japanese Instructor ,

Course Description   Computers and communication networks are representative complex technical artifacts, but it is not an easy task to perceive their construction principles because their design processes are invisible for us. In this course, we study design principles for information and computer technology (ICT) in terms of (1) hierarchical abstraction, (2) tradeoff, and (3) human and social analogy, being the computers and the communication networks as specific examples. Recent advances and directions for the design of future ICT will be also discussed using the above design principles.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	7	
6		
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Industrial mathematics and design

Code   693547   Course Year   Doctor Course   Term   2nd term   Class day & Period   Tue 1st   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   , , ,

Course Description   Methodologies of mathematical modeling, statistical data analysis, and mathematical optimization are discussed as mathematical common languages supporting inter-disciplinary viewpoints and design thinking for resolving complex problems in today's societies. Various concepts in industrial mathematics used in modeling objects are reviewed to develop high-angle viewpoints for modeling, and data analysis and optimization are lectured as systematic problem-solving methodologies utilizing mathematical modeling. Tools and solvers useful for dealing with practical problems are also reviewed.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693164

Pattern Recognition, Adv.

Code 693164   Course Year Doctor Course   Term 1st term   Class day & Period Wed 2nd   Location

Credits 2   Restriction   Lecture Form(s) Lecture   Language English   Instructor , , , ,

Course Description   We first explain fundamentals of pattern recognition, clustering methods with several distance measures, and discriminant functions with their learning methods. We then introduce advanced classifiers such as HMM, SVM and CRF and also related topics of machine learning theory, which includes EM learning, the MDL criteria, and Bayesian learning.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Language Information Processing, Adv.

Code   693125   Course Year   Doctor Course   Term   1st term   Class day & Period   Mon 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English   Instructor   ,

Course Description   This lecture focuses on morphological analysis, syntactic analysis, semantic analysis, and context analysis, including machine learning approaches, which are necessary to process natural language texts. We also explain their applications such as information retrieval and machine translation.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Algorithms and Informatics

Code   10X431   Course Year Doctor Course   Term   1st term   Class day & Period Wed 2nd   Location

Credits   2   Restriction   Lecture Form(s) Lecture   Language   English   Instructor

Course Description   This is an introductory course on algorithms and informatics for students with no prior knowledge of the subject matter. The course content will include a look at the early history of algorithms, how computers store data (image, sound, and video), privacy and security issues, web design and algorithms, algorithms for optimization, data mining, and machine learning. Along the way, we will consider a broad variety of algorithms which have had a major impact on computing, including many of the celebrated "Top 10 Algorithms of the 20th Century," chosen by the editors of Computers in Science and Engineering.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Transmission Media Engineering, Adv.

Code   693625   Course Year   Doctor Course   Term   1st term   Class day & Period   Mon 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   ,

Course Description   This course introduces the following: (1) the technical foundations of wireless and wired transmission technologies such as synchronization; (2) communications link analysis; (3) multiple access and medium access control schemes; and (4) radio resource management based on optimization and game theory.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2	
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code 698035 Course Year Doctor Course Term 2nd term Class day & Period Wed 5th Location

Credits 2 Restriction Lecture Form(s) Lecture Language Japanese Instructor , , ,

Course Description Because of the recent progress in a computer or the maintenance of intelligence infrastructure technology, the increase of the quantity of the data generated from the social activity performed through the Internet such as cloud computing and the quantity of the data obtained through the computer simulation which is an important technique of computational science, is being enhanced every day. It is the purpose of this course to study the technique for analyzing and visualizing those big data. In particular, the data analysis to the large sparse matrix is exercised using the C language.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	1	
	3	
	3	
	7	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Supercomputing, Advanced

Code   693541   Course Year   Doctor Course   Term   2nd term   Class day & Period   Tue 5th   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   ,

Course Description   This lecture is for learning architectural and software issues in supercomputing focusing on parallel high-performance scientific computing. The students will use the supercomputer in ACCMS to learn how a real supercomputer works. The lecture is open to students from any graduate schools whose convenience to attend the lecture is regarded by assigning the fifth period for the lecture.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693422

Optimization Theory, Advanced

Code 693422 Course Year Doctor Course Term 1st term Class day & Period Thu 2nd Location

Credits 2 Restriction   Lecture Form(s) Lecture Language Japanese Instructor

Course Description   Lecture on basic optimization theory and algorithm design for solving mathematical programming problems. Topics include duality in nonlinear optimization, interior point methods for linear and convex programming problems, convex optimization approaches to real-world problems.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	6	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Artificial Intelligence,   Adv.

Artificial Intelligence,   Adv.

Code   693168   Course Year   Doctor Course   Term   2nd term   Class day & Period   Wed 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English   Instructor   , ,

Course Description   Conversational interaction is considered to be a powerful communication means for intelligent actors, either natural or artificial, to interact each other to act as a collective intelligence. In this course, we study the mechanism of conversational interactions with verbal and nonverbal cues from computational points of view and discuss key issues in designing conversational systems that can interact with people in a conversational fashion.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

693419

Control Systems Theory, Advanced

Code 693419 Course Year Doctor Course Term 2nd term Class day & Period Wed 2nd

Location Integrated Research Bldg.-213 Credits 2 Restriction Lecture Form(s) Lecture

Language Japanese Instructor

Course Description This course introduces fundamental ideas regarding robust control theory and explores control system design methods, with system model uncertainty taken into account. The course also discusses the importance of system model uncertainty based on frequency-domain and state-space methods. Topics covered include robust stability conditions and feedback system design that achieves robustness.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Statistical Systems Theory

Code 693536 Course Year Doctor Course Term 1st term Class day & Period Wed 2nd

Location Integrated Research Bldg.-111 Credits 2 Restriction Lecture Form(s) Lecture

Language Japanese Instructor

Course Description Introduction to stochastic and statistical models, which appear in various physical/engineering systems. Topics include model selection, statistical signal processing, Kalman filter, application of stochastic analysis, and related matters.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	3	
	3	
	2	
	2	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Theory of Symbiotic Systems

Code 693518 Course Year Doctor Course Term 2nd term Class day & Period Mon 4th

Location Integrated Research Bldg.-213 Credits 2 Restriction No Restriction Lecture Form(s) Lecture

Language Japanese Instructor , ,

Course Description Various theories on developing and maintaining harmonious symbiosis among humans, artifacts, and environments are lectured and discussed. Topics include typical forms of harmonious coexistence such as in ecological systems, caring and artistic nature of communication and interactions, philosophical discussions on deep-ecology, and methodologies for designing symbiotic systems.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	2	
	1	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Social Informatics

Code   693247   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   , , , , , ,

Course Description   This course introduces social issues dealing with the impact of information technology on society: information policy, information and law, information and economics, information ethics, and information and education. Students will learn the social aspects of information technology from multi-disciplinary viewpoints: the history and trends of information technology; problematic issues regarding an information society; social revolution brought on by information technology, privacy, and security issues; policies concerning information, intellectual properties, and the way IT experts think and the responsibilities they bear.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	3	
	3	
	3	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

698014

Information and Intellectual Property

Code 698014 Course Year Doctor Course Term 2nd term Class day & Period Thu 5th

Location Engineering Science Depts Bldg.-315 Credits 2 Restriction Lecture Form(s) Lecture

Language Japanese Instructor

Course Description This course introduces the copy right law and copy rights of digital contents, the patent law and patents related to IT area (software patent, business model patent etc.), information technology for management and creation of intellectual properties, the law for the protection of computer-processed personal data held by administrative organs, information ethics and information security. Students are required to acquire the fundamental knowledge of the copy right law, the patent law, information technology for management and creation of intellectual properties, the law for the protection of computer-processed personal data held by administrative organs, information ethics and information security.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Information Network

Code 693628 Course Year Master and Doctor Course Term 1st term Class day & Period Tue 2nd

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

Instructor ,

Course Description This course introduces architecture of information networks including communication protocol and layered structure. Various networks and their technologies, such as circuit switching network, IP network, photonic network, and mobile network, are explained.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information http://www.i.kyoto-u.ac.jp/curriculum/syllabus.html

Information Systems Design

Code   10X433   Course Year   Doctor Course   Term   1st term   Class day & Period   Thu 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   , , , , ,

Course Description   This course introduces fundamental concepts, methodologies and underlying technologies for analyzing, designing and implementing social information systems. In particular, the course presents fundamental concepts regarding object-oriented computing, object-oriented design and analysis methodology, database design, user interface design, and design and practice of Web-based information systems including databases. Students will examine design methodology and implementation/operation technologies to learn how information systems are designed, implemented and operated. In conjunction with lectures, students will complete exercises on information system design so that they may understand the theory and technology by applying them to real information system design.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	3	
	4	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Designs for Emergency Management

Code   10X434   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 1st

Location   Integrated Research Bldg.-213   Credits   2   Restriction   Lecture Form(s)   Lecture   Language

Instructor   , ,

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

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Ethnography

Code   10X451   Course Year   Doctor Course   Term   2nd term   Class day & Period   Mon 4th   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description   Ethnography is seen as one of the key methods for design. At minimum, designers need to understand the field in which they are to introduce their designs. For this, it is not enough to ask people; it is necessary to gain a first-hand understanding through experiencing the lives in the field. Through ethnography, designers can grasp taken-for-granted experiences and start to look at their problems from a fresh perspective. In this course, students will learn the basics of ethnography (e.g., how to write fieldnotes, how to make observations and how to analyze the data) and develop their skills through group projects. This course focuses on the ethnography part of design although in reality it cannot be separated from the rest of the design. Students are encouraged to take other courses on design so that they can fully exploit the insights gained through ethnography.

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

Business Design

Code 10X452   Course Year Doctor Course   Term 2nd term   Class day & Period Mon 3rd   Location

Credits 2   Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description   This course is a practical business-design workshop in a leading Graduate School of Design. We learn business plan generation such as new business planning, evaluation and improvement on an existing business, and developing new innovative idea for an existing business. In this course, we learn the business planning framework " Business Model Canvas" in a book Business Model Generation. And using this framework we learn wide variation of business components and adjustment of them so as to form a whole system. We will be able to plan a comprehensive and consistent business. Therefore, this class consists of lecture on business components, mini group discussion, group work and presentation to analyze of an existing business model and to plan a reform plan base on " Business Model Canvas."

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X453

Design Management

Code   10X453   Course Year   Doctor Course   Term   2nd term   Class day & Period   Mon 5th   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description   Nowadays, "design" has become more and more important factor in business field. In this course, we discuss the various aspects of design in the business context, which are design strategies, marketing, customer experience, creative organizations and service design as well as a definition of a design. Furthermore, students learn ways of thinking such as "functional approach" and "design thinking." In addition, "designer's elaboration" is also learned. This course is planned for students who want to obtain a broad perspective of relationship between design and management.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Magaging Innovation: From R&D towards New Business Development

Code 10X454   Course Year Doctor Course   Term 2nd term   Class day & Period Fri 3rd   Location

Credits 2   Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor ,

Course Description   Innovation management is increasingly important for enterprises to sustain their businesses. However, it would not be easy, in particular, for Japanese enterprises to conduct innovation management with an entrepreneur mindset. In order to learn innovation management with entrepreneurship, we will focus on the innovation process from R&D towards composing strategies for new business development in this course. Over the semester, we will learn key innovation management aspects, e.g., finding business opportunities, making business models, figuring finance models, analyzing existing business with SEC annual reports, and designing value creation processes. The course consists of lectures, case analyses, special lectures given out by visiting experts, and student presentations based on the knowledge that they gained throughout this course. Those who wish to work for global businesses, business development for high-tech industries, start-ups, service design management, etc., are welcome to enroll.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Service Innovation Management

Code   10X455   Course Year   Doctor Course   Term   2nd term   Class day & Period   Fri 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description   Designing value creation from the viewpoint of service dominant logic is increasingly important for any business. The purpose of this course is to educate students to become a part of the Service Creative Class, where they acquire the capabilities of deeply understanding human behaviors, extracting the vital economic and social values through the combined knowledge of the natural and social sciences. In order to pursue such design capabilities, various kinds of interdisciplinary knowledge are required. In this course, we will focus on key service innovation management. The components that are included in this course are; service marketing, human resource management, service strategies, service accounting service hospitality, IT service management, and applications to several vertical domains as public services or professional services. The course is provided by a series of omnibus style lectures. Those who wish to work for global businesses, business development for high-tech industries, start-ups, service design management, etc. in the context of knowledge and servicizing economy, are welcome to enroll.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Marketing Research

Code   10X456   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description   This course (Marketing Research) is designed to give an overview or process of marketing in order to identify and solve marketing problems. It focuses not only on giving fundamental knowledge but also on applying its knowledge to marketing problems. It should be practical.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X461

Cognitive Theory of Design

Code　10X461　　Course Year　Doctor Course　　Term　1st term　　Class day & Period　Thu 1st　　Location

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

Instructor　　, , , ,

Course Description　　Cognitive psychology posits that the human activities involved in the design process can be grasped by examining the brain, mind, and behavior. The objective of this course is to encourage comprehensive discussions of design based on cognitive psychology theory. First, we will gain a better understanding of how the brain, the mind, and behavior are designed. Second, we will discuss their respective constraints and explore the relationships that exist between those constraints and the rich cognitive activity that results when we turn constraints into advantages. Third, we will examine examples drawn from literature, art, and music that will serve as the basis for discussions about the relationships that exist among the functions of the brain, the mind, and behavior. We will also examine the rich designs each function can produce. Finally, to improve students' abilities to produce rich designs, we will discuss various environmental factors to encourage the development and activation of our own brains, minds, and behaviors.

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

Seminar on Psychology and Design Studies

Code   10X462   Course Year   Doctor Course   Term   1st term   Class day & Period   Fri 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor   , , , ,

Course Description   This course aims to deepen students' research content. Faculty and students will provide presentations and engage in mutual discussions of the latest research. This will help students acquire broader knowledge of diverse specialized disciplines. Students will also examine and discuss literature selected from related disciplines. The course will help students discover new directions for research by helping them plot their research themes on a time axis (the flow of students' research from the past to the present) and on a space axis (the relationship of students' research to research being conducted in neighboring disciplines). It will also help them reexamine their research in relation to these axes. This course has three objectives related to students' research themes: (1) deepening students' abilities to think so they can achieve higher standards; (2) deepening students' understanding of the latest research trends in various specialized fields; (3) helping students acquire skills needed to report research in an interesting, easily-understandable way; and (4) helping students acquire skills required to conduct constructive discussions.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Psychology and Design Studies

Code   10X463   Course Year   Doctor Course   Term   2nd term   Class day & Period Fri 2nd   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor , , , ,

Course Description   This course aims to deepen students' research content. Faculty and students will provide presentations and engage in mutual discussions of the latest research. This will help students acquire broader knowledge of diverse specialized disciplines. Students will also examine and discuss literature selected from related disciplines. The course will help students discover new directions for research by helping them plot their research themes on a time axis (the flow of students' research from the past to the present) and on a space axis (the relationship of students' research to research being conducted in neighboring disciplines). It will also help them reexamine their research in relation to these axes. This course has three objectives related to students' research themes: (1) deepening students' abilities to think so they can achieve higher standards; (2) deepening students' understanding of the latest research trends in various specialized fields; (3) helping students acquire skills needed to report research in an interesting, easily-understandable way; and (4) helping students acquire skills required to conduct constructive discussions.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Seminar on Data Analysis in Psychology and Design Studies

Code 10X464 Course Year Doctor Course Term 1st term Class day & Period Wed 2nd Location

Credits 2 Restriction Lecture Form(s) Seminar Language Japanese Instructor ,

Course Description This course will review the major methods used in multivariate data analysis (factor analysis, regression analysis, structural equation modeling, etc.) of psychological data employed during the exploration of human cognition and design processes. The primary goal of this course is to increase students' abilities to understand and perform these types of statistical analyses on their own experimental data. Students will learn to use a number of software packages (SPSS, R, etc.). In addition, students will acquire the skills required to write high-level academic papers.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design of Cognitive Functions

Code   10X465   Course Year   Doctor Course   Term   1st term   Class day & Period   Wed 4th   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Instructor

Course Description   This course explains recent findings related to the relationship that exists between the brain and cognitive function. Primary focus is placed on frontal lobe functions, memory, emotion, and social cognition. The objectives of this course are to help students develop a foundation in cognitive neuroscience and to help students employ this knowledge in their research. These objectives will be achieved by presenting essential knowledge in the simplest manner possible. Students will acquire and improve their developmental and constructive thinking abilities by discussing lectures presented by eminent researchers worldwide.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Studies: Cognitive Sciences

Code   10X466   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Intensive Lecture   Language   Japanese   Instructor

Course Description   Language divides the world by the use of symbols known as words. However, how do children learn to use language? How do children change as they acquire language? How dependent is thought on language? How does thought differ among speakers of different languages? In this course, students will consider the following questions by engaging in experimental research in cognitive science: (1) what are the processes involved in child language acquisition; (2) what are the processes involved in the development of concepts; (3) what kinds of relationships exist between language and concept learning; and (4) what kinds of relationships exist between language and thought?

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

Seminar on Brain Function and Design Studies

Code   10X467   Course Year   Doctor Course   Term   2nd term   Class day & Period   Tue 3rd   Location

Credits   2   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description   This seminar, which is primarily rooted in neuroscience, is aimed at graduate students who are currently engaged in research or are interested in engaging in research related to cognition, emotion, and broader areas in the life sciences. Students will participate in a review of research that may serve as a background to students' own areas of interest. This course will consider practical aspects involved in the study of human cognition at an advanced level. Topics include experiment planning, measurement of brain functions, data analysis and interpretation, and drafting and completion of research papers.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Field based Learning/Problem based Learning (FBL/PBL) 1

/   (FBL/PBL)

Code   10X471   Course Year   Master Course   Term   1st term   Class day & Period   Location

Credits   1   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description   This course is designed to enable students to put design theories and design methods into practice and to acquire these theories and methods. In Field based Learning (FBL), students can experience the process of finding the problems to be solved from a given real-world fields as a team project. In Problem based Learning (PBL), students can experience the process of solving a given real-world problem as a team project.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Field based Learning/Problem based Learning (FBL/PBL) 2

／　　　　　(FBL/PBL)

Code　10X472　Course Year　Master Course　Term　2nd term　Class day & Period　　Location

Credits　1　Restriction　　Lecture Form(s)　Exercise　Language　Japanese　Instructor

Course Description　This course is designed to enable students to put design theories and design methods into practice and to acquire these theories and methods. In Field based Learning (FBL), students can experience the process of finding the problems to be solved from a given real-world fields as a team project. In Problem based Learning (PBL), students can experience the process of solving a given real-world problem as a team project.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Open Innovation Practice 1

Code   10X473   Course Year   Doctor Course   Term   1st term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description   This course facilitates additional skills development opportunities. Especially students are expected to train the skills necessary to develop and manage their careers across a broad range of employment sectors, including academia in design. To attain this, students are to conduct with the relevant specialists and stakeholders and to appreciate the importance of initiating new projects for open innovation, proactively reacting to newly identified needs or aiming to resolve persistent problems. For this problem solving, students are requested to form a team and to develop and maintain effective relationships with colleagues by working in a collaborative environment and to organizing a series of workshops with those colleagues. Through these practices, students are obliged to understand leadership in team environments, recognizing the strengths of team members and work effectively to achieve mutual goals as well as to understand the role of innovation and creativity in research. Students are to respond to abstract problems that expand and redefine existing procedural knowledge. Also they are required to demonstrate effective writing and publishing skills, demonstrating design methodologies and exhibiting knowledge of design theories.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X474

Open Innovation Practice 2

Code   10X474   Course Year   Doctor Course   Term   2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor

Course Description   This course facilitates additional skills development opportunities. Especially students are expected to train the skills necessary to develop and manage their careers across a broad range of employment sectors, including academia in design. To attain this, students are to conduct with the relevant specialists and stakeholders and to appreciate the importance of initiating new projects for open innovation, proactively reacting to newly identified needs or aiming to resolve persistent problems. For this problem solving, students are requested to form a team and to develop and maintain effective relationships with colleagues by working in a collaborative environment and to organizing a series of workshops with those colleagues. Through these practices, students are obliged to understand leadership in team environments, recognizing the strengths of team members and work effectively to achieve mutual goals as well as to understand the role of innovation and creativity in research. Students are to respond to abstract problems that expand and redefine existing procedural knowledge. Also they are required to demonstrate effective writing and publishing skills, demonstrating design methodologies and exhibiting knowledge of design theories.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Filed Internship

Code   10X475   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description   This course provides a program of field internship in which doctoral students are sent to external fields out of the campus (either of domestic or abroad) for mid- or long-term periods of 30 days or longer to be engaged in the group work. The proposals to attend the international internship programs organized by the third parties such as IAESTE, ISEC, and Vulcanus are also accepted. Recipients are selected via a competitive assessment process evaluated at the steering committee as well as by overseas researchers. Recipients are obliged to exhibit knowledge of advances and developments in design and to demonstrate knowledge by comprehending and effectively employing appropriate design methodologies. Recipients are obliged to be monitored during their stay by their mentors and to give a debriefing presentation when they come back from the internship.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Research-Intensive Abroad Internship

Code   10X476   Course Year   Doctor Course   Term   1st+2nd term   Class day & Period   Location

Credits   2   Restriction   Lecture Form(s)   Language   Instructor

Course Description   This course provides a program of international internship in which doctoral students are sent to our partner institutions for mid- or long-term periods of 30 days or longer to foster leadership in collaborative reserch environments. This program fosters students capable of creating and developing novel academic and research fields with a vision that crosses different academic boundaries and is to let them conduct independent and autonomous research projects. The proposals to attend the international mid-term schools organized by our partnership institutions are also accepted. Recipients are selected via a competitive assessment process evaluated at the steering committee as well as by overseas researchers with respect to feasibility, significance, preparedness etc. of the proposed plans. Recipients are obliged to be monitored during their stay by their mentors and to give a debriefing presentation when they come back from the internship.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	13	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Science Exercise, Adv. 1

Code   10X481   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Science Exercise, Adv. 2

Code   10X482   Course Year   Master Course   Term   1st+2nd term   Class day & Period   Location

Credits   4   Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Communication Methodology Seminar

Code   698561   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits 1   Restriction   Lecture Form(s) Intensive Lecture   Language Japanese   Instructor

Course Description   This seminar is a short-term intensive seminar to enhance the ability of communication, and consists of Japanese and English courses.

The aim of Japanese course is to strengthen the ability to speak and communicate in the scenes of giving a speech, conducting negotiations. Executive announcers of the Japanese center of NHK Communications Training Institute conduct the seminar by concentrating the know-how owned by the center.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Communication Methodology Seminar

Code   698562   Course Year   Master and Doctor Course   Term   1st+2nd term   Class day & Period

Location   Credits 1   Restriction   Lecture Form(s) Intensive Lecture   Language English   Instructor

 Course Description   This seminar is a short-term intensive seminar to enhance the ability of communication, and consists of Japanese and English courses.
 The aim of English course is to strengthen presentation skills and speaking skills in English. Instructors of Berlitz Japan conduct the seminar by concentrating the rich contents owned by the Berlitz Japan.

 Grading

 Course Goals

 Course Topics

Theme	Class number of times	Description

 Textbook

 Textbook(supplemental)

 Prerequisite(s)

 Web Sites

 Additional Information

Informatics Practice I

Code   698581   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 4th

Location   Credits 2   Restriction No Restriction   Lecture Form(s) Seminar   Language   Instructor

Course Description   This course is dedicated for non-CS (computer science)-major students to understand fundamental information technologies and acquire "information skills" through practices. Enrolled students learn fundamental information technologies and acquire the ability of "information literacy" for acquiring, generating, managing, analyzing, and presenting information.

Practices in this course include computer programming, but neither programming experience nor knowledge of specific programming language are required.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	7	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

698582

Informatics Practice II

Code   698582   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Fri 5th

Location   Credits   1   Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese

Instructor

Course Description   This practice course is to explore and identify "information skills" that are needed in the research of architecture, mechanical engineering, pedagogy, and management science. Information-skill topics are designed by enrolled students themselves in a workshop style. Possible practice topics are (A) Web programming, (B) Web-based survey (crowd-sourcing), (C) 3D CG contents creation, (D) Human behavior analysis, (E) Information Design, and (F) Algorithmic architecture.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Studies: Research Methods in Psychology and Design Studies

Code   10X491   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Fri 4th

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description   The goal of this course is for students to acquire skills required to convey research results in a precise and efficient manner by the use of quantitative data drawn from fields such as design study, psychology, and pedagogy. Students will deepen their understanding of useful and advanced statistical methods employed in the conduct of empirical research and the testing of hypotheses. They will learn to apply these methods to their own research. The course will provide an outline of statistical methods and introduce statistical mechanisms. It will teach students the proper use of these methods based on examinations of research examples. Students will conduct literature reviews to discover studies that employ these methods in their investigations. Students will examine and discuss these studies on several occasions.

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	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X492

Seminar on Research Methods in Psychology and Design Studies

Code　10X492　　Course Year　Master and Doctor Course　　Term　1st term　　Class day & Period　　Location

Credits　2　　Restriction　　　Lecture Form(s)　Intensive Lecture　　Language　Japanese　　Instructor

Course Description　This course has three objectives: (1) students will consider system design at various levels from the perspective of psychology, (2) students will build a foundation that will help them conduct psychological experiments and surveys to examine a variety of research ideas, and (3) students will gain a better understanding of basic statistical methods required to test hypotheses by the use of psychological data. The following themes will be covered in a seminar format: methodology in psychology research; comparisons of various methods, characteristics, and processes involved in data collection; theories of and methods employed in psychological experiments and quasi-experiments; and the basic statistics used to test hypotheses and replicate previous findings.

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

Polymer Design for Biomedical and Pharmaceutical Applications

Code   10D636   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to the Design and Implementation of Micro-Systems

Code   10V201   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 4b   Credits   2   Restriction   Take class 10G205 "Microsystem Engineering"

Lecture Form(s)   Lecture and Pactice   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   This is a joint lecture with Hong Kong University of Science and Technology (HKUST). A team consists of two students from each University work together to fullfill the assignment (design a microsystem) through paper survey, analysis,design, and presentation. A student can acquire not only the basic knowledge of a microsystem, but also comprehensive ability of English such as technical knowledge in English, skill for team work, and communication.

Grading   Presentation, Assignments, and Achievement

Course Goals   Acquire the knowledge and skill to design and analyze a microsystem.

Course Topics

Theme	Class number of times	Description
Tutorial on microsystem CAD software	3	Master CAD program for microsystem design and analysis which will be utilized to accomplish an assignment.
Lecture and Task Introduction	2	Learn basic knowledge necessary to design a microsystem/MEMS(Micro Electromechical Systems) utilizing microfabrication technology.
Design and analysis work	3	Analyze and design a microsystem by communicating with a team member of HKUST.
Presentation I	2	The designed device and its analyzed results is presented in detail by team in English.
Evatuation of device	3	Evaluate the fabricated microsystem.
Presentation II	2	The measured results and comparison between the analyzed results of the fabricated microsystem is presented by team in English.

Textbook

Textbook(supplemental)

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is required to take the course 10G205 "Microsystem Engineering", which provide the knowledge about the theory of sensing and actuating in microsystem. Those who wants to take this course have to take training course for CAD in advance. For more detail, please contact one of the instructors as early as possible.

Micro Process and Material Engineering

Code   10G203   Course Year   Master Course   Term   1st term   Class day & Period   Mon 4th

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   H. Kotera, O. Tabata, K. Eriguchi, I. Kanno, T. Tsuchiya

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Semiconductor microfabrication	3	
Thin-film process and evaluation	3	
Silicon micromachining	3	
3D lithography	2	
Soft-micromachining	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Multi physics Numerical Analysis

Code   10G209   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Wed 1st

Location   Engineering Science Depts Bldg.-101   Credits   2   Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	2	
	2	
	5	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Biomedical Engineering

Code   10W603   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Intensive Lecture   Language   Japanese

Instructor   , ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Finite Element Methods

Code   10G041   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 2nd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture and Practice

Language   English   Instructor   Kotera and Nishiwaki

Course Description   This course presents the basic concept and mathematical theory of the Finite Element Method (FEM), and explains how the FEM is applied in engineering problems. We also address important topics such as the physical meaning of geometrical non-linearity, material non-linearity, and non-linearity of boundary conditions, and we explore numerical methods to deal with these nonlinearities. Also, we guide students in class in the use of software to solve several numerical problems, to develop practical skill in applying the FEM to engineering problems.

Grading   Grading is based the quality of two or three reports and the final exam.

Course Goals   The course goals are for students to understand the mathematical theory of the FEM and the numerical methods for analyzing non-linear problems based on the FEM.

Course Topics

Theme	Class number of times	Description
Basic knowledge of the FEM	3	What is the FEM? The history of the FEM, classifications of partial differential equations, linear problems and non-linear problems, mathematical descriptions of structural problems (stress and strain, strong form and weak form, the principle of energy).
Mathematical background of the FEM	2	Variational calculus and the norm space, the convergence of the solutions.
FEM formulations	3	FEM approximations for linear problems, formulations of iso-parametric elements, numerical instability problems such as shear locking, formulations of reduced integration elements, non-conforming elements, the mixed approach, and assumed-stress elements.
Classifications of nonlinearities and their formulations	4	Classifications of nonlinearities and numerical methods to deal with these nonlinearities.
Numerical practice	2	Numerical practice using COMSOL.
Evaluation of student achievements	1	

Textbook

Textbook(supplemental)   Bath, K.-J., Finite Element Procedures, Prentice Hall

Belytschko, T., Liu, W. K., and Moran, B.., Nonlinear Finite Elements for Continua and Structures, Wiley

Prerequisite(s)   Solid Mechanics

Web Sites

Additional Information

Microsystem Engineering

Code   10G205   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 3rd

Location   C3-Lecture Room 4a   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   English

Instructor   O. Tabata, H. Kotera, T. Tsuchiya, R. Yokokawa

Course Description   Microsystem covers not only technologies related to individual physical or chemical phenomenon in micro scale, but also complex phenomena which are eveolved from their interaction. In this course, the physics and chemistry in micro and nanoscale will be lectured in contrast to those in macro scale. The various kinds of application devices (ex. physical (pressure, flow, force) sensors, chemical sensors, biosensors, actuators (piezoelectric, electrostatic, and shape memory) and their system are discussed.

Grading   The evaluation will be based on the reports given in each lecture.

Course Goals   Understand the theory of sensing and actuating in microsystem. Acquire basic knowledge to handle various kinds of phenomena in microscale.

Course Topics

Theme	Class number of times	Description
MEMS modeling	2	Multi-physics modeling in microscale. Electro-mechanical coupling analysis.
MEMS simulation	2	System level simulation in MEMS.
Electrostatic microsystem	3	Electrostatic sensors and actuators. Theory and application devices.
Physical sensors	4	Physical sensors as a fundamental application in microsystem. Accelerometer, vibrating gyroscope, pressure sensors.
Micro total analysys system	4	Chemical analysis system and bio-sensing device using microsytem.

Textbook   Provided in the lecture.

Textbook(supplemental)   Provided in the lecture.

Prerequisite(s)   Students are required to take the 10G203 course "Micro Process and Material Engineering".

Web Sites

Additional Information   The student of this class is strongly recommended to take a course 10V201 "Introduction to the Design and Implementation of Micro-Systems", which is a practice for designing microsystem. Those who wants to take this course, please contact one of the instructors as early as possible.

10D649

Polymer Synthesis

Code   10D649   Course Year   Master Course   Term   1st term   Class day & Period   Wed 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

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

Polymer Physical Properties

Code   10D651   Course Year   Master Course   Term   1st term   Class day & Period   Thu 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Hirokazu Hasegawa, Takenao Yoshizaki, Tsuyoshi Koga, Mikihito Takenaka, Hiroyuki Aoki

Course Description   A concise explanation is given of physical properties of polymer solutions and polymeric solids along with relevant basic theories.

Grading   Final grades will be evaluated in a comprehensive manner on the basis of attendance, reports, and examinations.

Course Goals   Fundamental knowledge of physical properties of polymer materials.

Course Topics

Theme	Class number of times	Description
Polymer Chain Conformation in Dilute Solutions	3	After a clarification of basic factors which determine the conformations of real polymer chains in dilute solutions, some polymer chain models are introduced to describe the equilibrium conformational behavior of the real chains. Further, behavior of average chain dimensions as a functions of molecular weight is considered based on the chain models.
Thermodynamics and Phase Behavior of Polymer Solutions	3	Various phase transition phenomena in polymer solutions (phase separation, hydration, association, gelation, etc.) are systematically explained from thermodynamic and statistical-mechanical viewpoints. "Phase separation of polymer solutions", "Aqueous polymer solutions", and "Association and gelation of polymers" are discussed in the lectures.
Exercise	1	Exercise in polymer solutions.
Structure and Mechanical Properties of Polymeric Solids	4	Polymeric solids such as rubber and plastics, especially thermodynamics of rubber elasticity, polymer crystallization and crystalline/amorphous higher-order structures, are discussed. Moreover, fundamentals of viscoelastic properties of polymers are introduced to provide the understandings of relaxation phenomena such as glass transition.
Electronic and Optical Properties of Polymeric Solids	3	The electronic and optical properties of polymers is reviewed. The application of polymer materials in the opto-electronics and display devices is also presented.
Exercise	1	Exercise in polymeric solids.

Textbook   Lecture notes distributed in the class.

Textbook(supplemental)

Prerequisite(s)   Fundamental knowledge of physical chemistry.

Web Sites

Additional Information

Reactive Polymers

Code 10D610 Course Year Master and Doctor Course Term 2nd term Class day & Period Wed 2nd

Location A2-307 Credits 2 Restriction No Restriction Lecture Form(s) Lecture Language Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Polymer Structure and Function

Code   10D613   Course Year   Master Course   Term   1st term   Class day & Period   Tue 2nd   Location

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

Instructor   S. Ito, H. Ohkita, H. Aoki

Course Description   Polymers are indispensable in our modern society, fundamental in industry, and functional for chemistry, medicine, electronics, and many other advanced and emerging technologies. In this class, photo- and electric functions of polymeric materials are discussed on the basis of photochemistry and photophysics. In particular, the importance of designing nanostructures of polymer assembly is highlighted by explaining examples of state-of-the-art real systems.

Grading   Evaluated with the grade on the final test or the quality of report submitted after the final class.

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	
Photofunctional Polymers	5	
Nanostructure and Dynamics of Polymers	2	
Electronic Functions of Polymers	5	
Advanced Functionality of Polymers	2	

Textbook   None: Some handouts will be dealt in the class of every lecture.

Textbook(supplemental)   None:

Prerequisite(s)   Students are expected to have knowledge of Physical Chemistry and Polymer Chemistry provided in chemisty course of undergraduate.

Web Sites

Additional Information   This lecture is held biannually, not offered in 2013.

Biomacromolecular Science

Code   10D611   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Tue 2nd

Location   A2-307   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biomaterials Science and Engineering

Code 10D633   Course Year Master and Doctor Course   Term 1st term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering for Chemical Materials Processing

Code 10E022   Course Year   Master and Doctor Course   Term   1st term   Class day & Period Wed 4th

Location A2-302   Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   M.Ohshima,S.Nagamine

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Chemistry of Polymer Materials

Code   10D007   Course Year   Master Course   Term   1st term   Class day & Period   Fri 2nd

Location   A2-302   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	3	
	8	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D031

Chemistry of Biomaterials

Code   10D031   Course Year   Master Course   Term   2nd term   Class day & Period   Tue 2nd

Location   A2-302   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	15	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Chemistry of Functional Materials

Code   10D010   Course Year   Master Course   Term   2nd term   Class day & Period   Wed 1st

Location   A2-302   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Synthesis of Polymer Materials,Advanced

Code 10S022 Course Year Doctor Course Term 2nd term Class day & Period Tue 5th

Location A2-302 Credits 2 Restriction Lecture Form(s) Language Japanese Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Functionalized Nucleic Acids Chemistry

Code   10V426   Course Year   Master and Doctor Course   Term   Class day & Period

Location   A2-303   Credits   2   Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nishimoto and Tanabe

Course Description   A number of challenges have been made on development of modified DNA, RNA and proteins, chemical or physical properties of which are controlled by several triggers. These intelligent materials are promising for next generation gene diagnostics and therapy. In this lecture, we discuss the molecular design of these artificial biological materials and their application.

Grading   attendance and report

Course Goals   Synthetic chemistry of DNA, RNA and protein//Chemical structure and basic funciton of biological materials//Regulation of biological function//Medical applications of artificial DNA, RNA and protein

Course Topics

Theme	Class number of times	Description
Chemical structure and synthesis	2	Synthetic chemistry of nucleic acids
Gene manipulation	2	Synthesis of protein Gene Sequencing
Functions of intelligent molecules	2	Function of artificial peptides Functions of artificial nucleic acids
Drugs related to DNA	2	DNA cleavage by drugs Crosslinking by artificial nucleic acids Alkylation by drugs
Expansion of genetic code	2	Artificial nucleobases Synthesis of modified protein in cells
Medical application	2	Molecular targeting Molecular imaging
Recent topics	3	

Textbook

Textbook(supplemental)   No textbooks are used.

Prerequisite(s)   Basic knowledge in organic chemistry and biological chemistry is requisite.

Web Sites

Additional Information

10D812

Molecular Biology

Code 10D812   Course Year Master and Doctor Course   Term 1st term   Class day & Period   Location

Credits 2   Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor

Course Description   Biological responses are elicited at the interface of intrinsic genetic information and extrinsic environmental factors. This course discusses on molecular aspects of brain function and immunity. Experimental tools such as fluorescent probes for second messenger molecules are also explained through performance of experiments using the probes.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Basics	1	
Principles of neurotransmission	3	
Immunity and inflammation	3	
Gaseous bioactive molecules	3	
Experiments to observe cellular responses	3	

Textbook   Provided in the course

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biorecognics

Code   10D815   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 2nd

Location   A2-308   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D813

Bioorganic Chemistry

Code   10D813   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biotechnology

Code   10D816   Course Year   Master and Doctor Course   Term   Class day & Period   Location

Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D818

Advanced Organic Chemistry

Code   10D818   Course Year   Master Course   Term   1st term   Class day & Period   Tue 1st

Location   A2-306   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Advanced Biological Chemistry

Code   10D836   Course Year   Master Course   Term   1st term   Class day & Period   Location   A2-308

Credits   4   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biomolecular Function Chemistry

Code   10D448   Course Year   Master and Doctor Course   Term   (not held; biennially)

Class day & Period   Mon 2nd   Location   A2-304   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1	
	3	
	4	
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biomechanics

Code   10V003   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Wed 4th

Location   Credits   2   Restriction   Lecture Form(s)   Language   Japanese   Instructor   Taiji Adachi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D450

Biomolecular Dynamics

Code   10D450   Course Year   Master and Doctor Course   Term   2nd term   Class day & Period   Thu 3rd

Location   C3-Lecture Room 2   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	2	
	2	
	2	
	3	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Robotics

Code   10B407   Course Year   Master Course   Term   2nd term   Class day & Period   Mon 2nd

Location   C3-Lecture Room 5   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Fumitoshi Matsuno

Course Description   Understanding of intelligent behaviors of living things is very interesting. And realization of their intelligent motion by a robot is also attractive for mechanical engineering. In this lecture, we consider basic understanding of beautiful human skill "manipulation" on the point of view of dynamics and control. First modeling methodologies for a rigid multibody system and a general dynamic model of a manipulator are provided. Next, a typical nonlinear control law is introduced and some problems for applying the controller are shown. Based on nature of the dynamics of the manipulator, a very simple and robust controller can be derived by designing energy of the system. This lecture provides modeling methodologies and controller design strategies of the rigid multibody system and we analyze a beautiful human skill of the manipulation.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10D413

Molecular Materials

Code   10D413   Course Year   Master and Doctor Course   Term   (not held; biennially)

Class day & Period   Wed 2nd   Location   A2-304   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   K. Tanaka and A. Ito

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	3	
	12	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Special Topics in Transport Phenomena

Code   10E001   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Thu 4th

Location   A2-305   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   R.Yamamoto

Course Description   Theoretical approaches on momentum, heat, and mass transports will be discussed. For example, problems of non-steady transport such as transient behavior, hydrodynamics of complex fluids such as polymeric liquids will be treated.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Polymeric Liquids	6	
Higher Dimensional Problems (Flow)	3	
Heat Transfar in Fluids	3	
Higher Dimensional Problems (Heat Transfar))	2	
Understanding Check	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Green and Sustainable Chemistry

Code   10S202   Course Year   Master and Doctor Course   Term   1st term   Class day & Period   Mon 2nd

Location   A2-303   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   K.Ohe,Y.Tsuji,T.Kakiuchi

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics and Dynamics, Fundamental

Code 10X601 Course Year Term Class day & Period Location Credits Restriction

Lecture Form(s) Language Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X602

Continuum Mechanics(Integrated Medical Engineering)

Code   10X602   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Medical Electronics

Code   10X603   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X604

Basic Material Chemistry

Code   10X604   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Molecular Analysis of Life

Code   10X605   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Image Processing Basics

Code   10X606   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Biopharmaceutics

Code   10X607   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X608

Human Anatomy

Code   10X608   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physiology(Integrated Medical Engineering)

Code   10X609   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Medical Chemistry

Code 10X610 Course Year   Term 2nd term Class day & Period   Location   Credits 2 Restriction

Lecture Form(s)   Language Japanese   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Geriatrics, Gerontology, and Aging Science

Code 10X611 Course Year Term Class day & Period Location Credits Restriction

Lecture Form(s) Language Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X612

Stem cell biology

Code   10X612   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Medical Ethics

Code   10X613   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X614

Introduction to numerical simulation

Code   10X614   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Health Economics

Code　10X615　Course Year　Term　Class day & Period　Location　Credits　Restriction

Lecture Form(s)　Language　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X616

Intellectual Property & Global Standardization

Code   10X616   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Medical Engineering for Society I

Code   10X631   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Medical Engineering for Society II

Code   10X632   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

debate I

debate

Code 10X641　Course Year　　Term 2nd term　Class day & Period　　Location　　Credits 1　Restriction

Lecture Form(s)　　Language　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X661

Internship in Foreign Countries

Code   10X661   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Internship (industrial and public parties)

Code 10X662 Course Year Term Class day & Period Location Credits Restriction

Lecture Form(s) Language Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X681

Integrated Medical Engineering Seminar A

(

Code   10X681   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Integrated Medical Engineering Seminar B

(

| Code | 10X682 | Course Year | Term | Class day & Period | Location | Credits | Restriction |

Lecture Form(s)　　　Language　　　Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

| Code | 10X682 | Course Year | Term | Class day & Period | Location | Credits | Restriction |

10X683

Special Seminar A on Integrated Medical Engineering
A

Code   10X683   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code   10X683   Course Year   Term   Class day & Period   Location   Credits   Restriction

Special Seminar B on Integrated Medical Engineering

B

Code   10X684   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

10X685

Special Seminar C on Integrated Medical Engineering
C

Code   10X685   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Special Seminar D on Integrated Medical Engineering

D

Code   10X686   Course Year   Term   Class day & Period   Location   Credits   Restriction

Lecture Form(s)   Language   Instructor

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

2013

[A] Common Subjects of Graduate School of Engineering

[B] Master's Program

[C] Advanced Engineering Course Program

[D] Interdisciplinary Engineering Course Program

http://www.t.kyoto-u.ac.jp/syllabus-gs/

(KULINE)

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