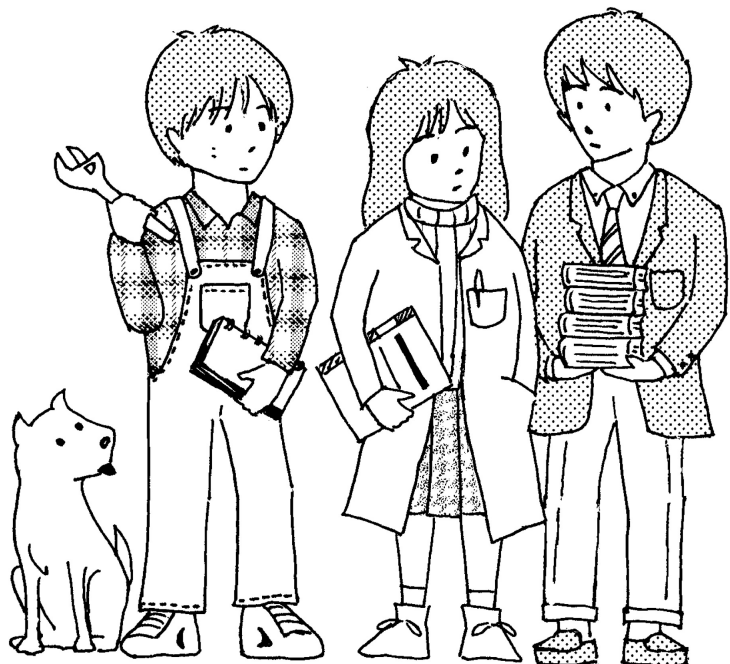# SYLLABUS 2016

[C] Engineering Science

Kyoto University, Faculty of Engineering

[C] Engineering Science

Engineering Science

51240

Internship

Code   51240   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Exercise   Language   Japanese   Instructor   ,

Course Description   The aim of the internship is experiencing on-site activities involved production, manufacturing, development, designing and research of industrial goods at a factory or a research laboratory of Japanese leading companies. On-site learning of the importance of teamwork and production processes in manufacturing is also the aim.

Grading   Credits (2) are approved based on the summary report and presentation about the internship activities.

Course Goals   The goal of the internship is to master a general method of thinking and methodology at Mechanical Engineering. Furthermore, by learning the relationship between a human and machines at an industry, motivate oneself to study and think about one's career development.

Course Topics

Theme	Class number of times	Description
		As a general rule, the internship should meet the above purpose. The duration should be not less than two weeks. Thus, the following cases are not approved as an internship; a short internship such as a week, a company tour, a company explanation meeting and so on. Longer term more than two weeks and an overseas internship such as IAESTE can be acceptable.
		Based on recruitment from companies. You can find them at company's web sites and/or the instruction section of the Engineering Science office (Butsuri Kyoumu).

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   Pre-registration at the instruction section of the Engineering Science office (Butsuri Kyoumu) is required.

Internship

Code   51241   Course Year   3rd year   Term   Class day & Period   Location   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

51570

Design Practice and Experiments for Applied Energy Science 1

Code 51570   Course Year 3rd year   Term   Class day & Period   Location   Credits 3   Restriction

Lecture Form(s)   Language Japanese   Instructor ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	6	
	6	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design Practice and Experiments for Applied Energy Science 2

Code 51590   Course Year 3rd year   Term   Class day & Period   Location   Credits 3   Restriction

Lecture Form(s)   Language Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	6	
	6	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Energy chemistry 1

Code   51390   Course Year   3rd year   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
	2	
	3	
	2	
	3	
	2	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Energy chemistry 2

Code   51400   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

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

Course Description   The lecturer teaches fundamental matters in inorganic chemistry related to energy conversion and storage. In particular, Redox reactions, analytical methods, molecular geometries, and coordination chemistry as well as electrochemical energy conversion devices will be lectured.

Grading   Evaluation will be based on attendance, assignments (every week), and final examination.

Course Goals   Understanding fundamental matters on energy conversion and utilization related inorganic chemistry as well as their relations to daily life and state-of-the-art researches

Course Topics

Theme	Class number of times	Description
Oxidation and Reduction	3	reduction potential, redox stability, diagrammatic presentation of potential data, chemical extraction of the elements
Physical techniques in inorganic chemistry	2	diffraction methods, absorption spectroscopy, resonance techniques, chemical analysis, magnetometry, electrochemical techniques, computational techniques
Molecular geometry	2	an introduction to symmetry analysis, applications of symmetry, the symmetries of molecular orbitals and molecules, representations
Coordination compounds	3	structures of coordination compounds, ligands and nomenclature, isomerism and chirality
Group 1, 2, and 13 elements	2	hydrogen, alkali metal, alkali earth metal, boron, and aluminum compounds, topics related to energy chemistry (hydrogen energy system, secondary batteries)
Group 14, 15, and 16 elements	2	carbon, silicon, nitrogen, and chalcogen compounds, topics related to energy chemistry (carbonaceous materials, solar cells, energy resources)
Exercises and comments	1	Exercises and comments on the topics in this lecture

Textbook   Shriver & Atkins' Inorganic Chemistry (4th Ed.) which is used in Energy Chemistry 1.

Textbook(supplemental)

Prerequisite(s)   Students are supposed to understand the lecture "Energy Chemistry 1".

Web Sites

Additional Information   Assignments are given every week to support understanding of the lecture.

Thermochemistry for Energy and Materials Science 1

Code   51180   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Language   Japanese   Instructor   Hirato, Hasegawa,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51190

Thermochemistry for Energy and Materials Science 2

Code 51190   Course Year 3rd year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Language Japanese   Instructor Hirato, Hasegawa,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Energy Conversion

Code   50230   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Shioji (Grad. School of Energy Science) Nakabe (Grad. School of Engineering)

Course Description   Various energy sources and energy conversion systems will be outlined. Also, basic matters on energy conversion processes and thermodynamics treatments for the effective use of energy will be lectured.

Grading   Achievement will be synthetically evaluated from attendance, report and final examination.

Course Goals   From this class, fundamental issues related to energy conversion engineering are learned, as well as a target is put in the current situation of energy resources, latest technologies of energy conservation and new energy system, environmental measures are comprehensible.

Course Topics

Theme	Class number of times		Description
Energy source and energy conversion system	3	4	* Energy resources
	3	4	
	3	4	
	3	4	

Textbook   Nothing. Print material is properly distributed.

Textbook(supplemental)   It will be introduced, if necessary.

Prerequisite(s)   Knowledge of thermodynamics is required.

Web Sites

Additional Information

50231

Energy Conversion

Code　50231　Course Year　3rd year　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
	2	
	4	
	2	
	3	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Elecronics

Code 53000 Course Year 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
	2	
	5	
	2	
	5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50130

Applied Electromagnetism

Code　50130　Course Year　3rd year　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
	2　3	
	3　4	
	2　4	
	3　5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Nuclear Physics

Code 51140 Course Year 4th year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Miyadera, Ogure,

Course Description

Grading examination

Course Goals

Course Topics

Theme	Class number of times	Description
Properties of nuclei	2	
Mass formula of nuclei	2	
Structure of nuclei	6	
Alpha decays and fission	2	
Beta decays	2	
Confirmation of achievement in study	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Particle Accelerators

Code   51150   Course Year   3rd year   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
	2	
	2	
	3	
	2	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise on Mechanical System Engineering

Code 51310   Course Year 3rd year   Term   Class day & Period   Location   Credits 1   Restriction

Lecture Form(s) Seminar   Language Japanese   Instructor ,,

Course Description   This seminar provides exercise on various topics in mechanical engineering. Students should register in advance (in July).

Grading   Depends on topics.

Course Goals

Course Topics

Theme	Class number of times	Description
		About 20 topics will be proposed.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51690

Seminar on Mechanical System Engineering

Code 51690   Course Year 3rd year   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

Mechanical and System Engineering Laboratory 1

Code   50560   Course Year   3rd year   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
	1	
	2	
	2	
	2	
	2	
	2	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50570

Mechanical and System Engineering Laboratory 2

Code   50570   Course Year   3rd year   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
	1	
	2	
	2	
	2	
	2	
	2	
	2	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanical and System Engineering Laboratory 3

Code   50580   Course Year   3rd year   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
	1	
	14	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50610

Exercise for Machine Shop Practice

Code   50610   Course Year   2nd year   Term   Class day & Period   Location   Credits   1

Restriction   No Restriction   Lecture Form(s)   Language   Japanese

Instructor   Nakabe, Matsubara, Nishiwaki, Kouno and guest lecturers

Course Description   This course consists of two parts: machine shop training and special lectures by visiting lecturers. The machine shop training will be offered for a week in August or September (during summer break). Students will learn the operation of various machine tools, e.g. a lathe, a milling machine, and a drilling machine, to make a stirling engine, whose performance will be tested at the end of the course. Hands-on training of disassembly and re-assembly of a commercial diesel engine (or a gasoline engine) will be also offered to learn actual engine mechanism.

The seminar series will be offered in the 2nd semester. Professional engineers from various companies will be invited to give a lecture on real-world experience on production design, manufacturing, or management.

Grading   For the credit, students are in principle required to participate in all the classes, and to submit all the reports.

Course Goals   To experience turning, milling and drilling operations and other basic machining operations. To obtain basic knowledge and experience on machine tools, cutting tools, measurement, and machining accuracy by hands-on training.

Course Topics

Theme	Class number of times	Description
Lectures on principle of engines	1	Students will learn basic knowledge on the priciple of a stirling engine and a diesel (gasoline) engine.
Lectures on machine tools	1	Students will learn basic knowledge on machine tools that they will use in machine shop training.
Machine shop training (making a stirling engine)	4	Turning operation for cylindrical parts (2 classes), milling and drilling operations (2 classes), assembly and evaluation (1 class). A group of two students will make one stirling engine.
Disassembly of an engine	1	Assebly and disassembly of a commercial diesel (or gasoline) engine.
Lectures on safety	1	A special lecture on safety issues in manufacturing process and product design by a visiting lecturer.
Special seminars	7	Special seminars by visiting lecturers. Lectures may be subject to change each year. Examples of past lectures: "To future Edison -- save the world by good idea and engineering," "Development of compressors to meet market's needs -- role of mechanical engineers," "Japanese machine tools for the world's manufacturing - key technologies," "Engineer's life in companies."
Factory tour	1	One-day trip to a factory in Kansai area.

Textbook   A textbook will be handed out in class.

Textbook(supplemental)   None.

Prerequisite(s)   None.

Web Sites   None.

Additional Information   The class overview will be presented in a guidance class for 2nd year students in Undergraduate Course Program of Mechanical and Systems Engineering in April. Detailed schedule will be given then.

Please be aware -- a large part of this class will be offered during the summer break.

A class guidance will be given typically in July. Its announcement will be posted in the 1st floor of the building of Dept. of Engineering Science. All the students who want to take this class must come to this guidance.

Exercise of Machine Design 1

Code 50590   Course Year 3rd year   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
	4	
	3	
	-	
	21	
	21	
	21	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50600

Exercise of Machine Design 2

Code 50600   Course Year 3rd year   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
	14	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Design and Manufacturing Processes

Code   51270   Course Year   2nd year   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	
	4	
	5	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50450

Gasdynamics

Code 50450   Course Year 3rd year   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
	2	
	2	
	2	
	2	
	1	
	3	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Metallic Materials

Code   50690   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Nobuhiro Tsuji,

Course Description

Grading   Attendance, exercises, home-works and exam.

Course Goals

Course Topics

Theme	Class number of times	Description
Outline of Lecture	1	
Microstructure Evolution in Cast Alloys	2	
Deformation, Recovery, Recrystallization and Grain Growth	3	
	3	
Heat Treatment in Steels	5	
Summary	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.tsujilab.mtl.kyoto-u.ac.jp/01TsujiLab/Education/StructMetalMater/

Additional Information

50470

Aerodynamics

Code　50470　Course Year　3rd year　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
	2	
	2	
	1	
	3	
	3	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mathematics for Computation

Code 50030   Course Year 2nd year   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
	2	
	2	
	3	
	4	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50090

Scientific Measurement

Code 50090 Course Year 2nd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese

Instructor Osamu Tabata, Ryuji Yokokawa, Katsuyuki Kinoshita, Toshiyuki Tsuchiya, Masao Miyake,

Course Description Basics of scientific insturmentaion is covered.

Grading Examination. Reports are considered also.

Course Goals Understanding of the basics of scientific instrumentation in engineering physics.

Course Topics

Theme	Class number of times	Description
Units and Standards	2	Units and Standards
Measurement uncertainity and its evaluation	3	Measurement uncertainty and its evaluation
Data processing and statistical analysis	3	Data processing and statistical analysis
Electrical and tempeature measurement	2	Electrical and tempeature measurement
Radiation and material measurement	2	Radiation and material measurement
Mechanical measurement	2	Mechanical measurement
level of attainment	1	level of attainment

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Xray Diffraction

Code   52330   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Faculty of Engineering, Professor, Matsubara Eiichiro

Course Description   Structural analyses by X-ray diffraction method will be given. In the lecture, the properties of X-rays, X-ray diffraction phenomena, crystallography, and diffraction by powder samples will be lectured.

Grading   The course will be graded by the scores of about 5 mini tests during classes (40%) and a final test (60%).

Course Goals   Students will learn the crystal structure analyses by X-rays through the course works of X-ray properties, crystalline structures, diffraction conditions, and reciprocal lattices.

Course Topics

Theme	Class number of times	Description
Basic properties of x-rays	2-3	1.X-rays 2.Continuous x-rays 3.Characteristic x-rays 4.X-ray absorption 5.X-ray filter 6.Generation of x-rays
Crystallography	2-3	1.One dimensional crystal symmetry 2.7 crystal systems and 14 Bravais' lattices 3. Practical examples of crystals 4. Body-centered cubic, face-centered cubic and hexagonal close-packed lattices 6. Crystalline structures of several compounds
Description of crystal planes and directions	1-2	1. Description of lattice planes and directions 2. Stereo projection
Diffraction by crystals	2	1. Diffraction by crystalline lattice 2. Bragg conditions and scattering angle 3. Calculation of structure factors
Diffraction by a powder sample	2	1. Principle of diffractometer 2. X-ray diffraction by powder sample
Structural analyses of cubic systems	2	1. Determination of a lattice parameter in cubic systems 2. Determination of Bravais' lattice in cubic systems
Reciprocal lattice and diffraction condition	2-3	1. Definition of reciprocal lattices 2. Reciprocal lattice and real lattice 3. Reciprocal lattice and diffraction condition

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Science

Physics of Crystal Properties and Imperfections

Code   50350   Course Year   3rd year   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
Introduction to dislocations	1	
Basics of elasticity theory	5	
Properties of dislocations	2	
	2	
	5	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Nuclear Engineering Laboratory 1

Code 51580   Course Year 3rd year   Term   Class day & Period   Location   Credits 3   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	
	2	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51600

Nuclear Engineering Laboratory 2

Code 51600   Course Year 3rd year   Term   Class day & Period   Location   Credits 3   Restriction

Lecture Form(s)   Language Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Nuclear Engineering 1

Code   51500   Course Year   2nd year   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
	7	
	7	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51510

Introduction to Nuclear Engineering

Code   51510   Course Year   2nd year   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	
	9	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Atomic Physics

Code 50140   Course Year 2nd year   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	
	2	
	2	
	3	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Basic Nuclear Reactor Exercise and Experiments

Code 51070   Course Year 4th year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Language   Japanese   Instructor   ,

Course Description   Basic reactor physics experiments using Kyoto University Critical Assembly (KUCA) which is a small and low power reactor are carried out. Guidance and lectures before experiments are perfomed at Yoshida main campus, and experiments are perfomed at Research Reactor Institute (Osaka Kumatori-cho).

Grading   reports before and after experiments

Course Goals   Understanding nuclear characteristics and safety system of nuclear reactor through reactor physics experiments

Course Topics

Theme	Class number of times	Description
Guidance	6	Guidance and lectures for experiments are performed at Yoshida main campus.
Experiment	1	Experiments are performed at Research Reactor Institute (Kumatori-cho, Osaka) for 1 week. 1) guidance 2) criticality approach experiment 3) control rod caribration experiment 4) neutron flux measurement experiment 5) operation of nuclear reactor

Textbook   Download from Web site (Japanese, English and Korean versions are available)

Textbook(supplemental)

Prerequisite(s)   Basic knowledge about reactor physic

Web Sites

Additional Information   1) Registration to workers for radioactive material treatment is required before experiment.
2) English course for this experiment is opened.

Nuclear Reactor Physics

Code   52030   Course Year   3rd year   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	
	4	
	3	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

20500

Applied Mathematics A1

A1

Code 20500   Course Year 2nd year   Term   Class day & Period   Location   Credits 2

Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor mitsuru shibayama

Course Description   Complex analysis

Grading   Grade depends mainly on marks of examination, but marks of exercises are added.

Course Goals   To understand properties of holmorphic functions and to compute integrals appearing in applied mathematics and physics

Course Topics

Theme	Class number of times	Description
Complex plane and complex-valued function	2	Complex number and complex plane are introduced. Complex-valued functions are introduced and trigonometric functions are represented as complex-valued functions.
Power series	2-3	Property of functions which are represented by power series
Derivative and integral of complex-valued functions	4	Derivative and integral of holomorphic functions are discussed.
Cauchy's integral theorem	3	The Laurent series of holomorphic functions are discussed. Computation of residue and residue theorem are explained.
Some computation of improper integrals	2-3	Computation of improper integral via Cauchy's integral theorem is explained.
Review and Summary	1	For review, the teacher distributes the answer of the exam.

Textbook

Textbook(supplemental)   M. Jimbo, Introduction to complex function, Iwanami shoten (Japanese)

Prerequisite(s)   Calculus, Linear algebra

Solve problems which the teacher gives.

Web Sites   KULASIS

Additional Information

Applied Mathematics A2

A2

Code   20600   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Nakamura Yoshimasa, Tsujimoto Satoshi

Course Description   "Numerical Analysis" is prerequisite to this course. In this course matrix eigenvalue problem and singular value decomposition, iteration methods for nonlinear equations, interpolation methods by polynomials, and numerical integration methods are explained which are important especially in data science and information processing.

Grading   mainly evaluated by examination score, but reports of exercises will be taken into account in a case.

Course Goals   Understanding both the theory and practical methods for applications through general-purpose softwares and/or programs by each student is a goal of this course.

Course Topics

Theme	Class number of times	Description
matrix eigenvalue problem	6	computation of matrix eigenvalues and eigenvectors by the Jacobi method, Gershgorin theorem, the power method and the inverse iteration, the QR method and the divide & conquer method with the Householder transformations for preprocessing, Sturm theorem
matrix singular value decomposition	1	computation of matrix singular value decomposition
iterative methods for nonlinear equations	3	the principle of contractive mapping and the Newton method both of one and multi variables, and convergence acceleration algorithms
interpolation methods	2	the Lagrange interpolation formula and the Hermitian interpolation formula by polynomials, and the spline functions
numerical integration methods	2	Newton-Cotes numerical integration formula,and the Gauss type numerical integration formula
confirmation for student assessment	1	confirmation for each student assessment

Textbook   "Introduction of Numerical Analysis" (in Japanese) by T. Yamamoto, SAIENSU-SHA

Textbook(supplemental)

Prerequisite(s)   Linear algebra A, Linear Algebra B, Numerical Analysis

Web Sites

Additional Information

20700

Applied Mathematics A3

A3

Code 20700   Course Year 3rd year   Term   Class day & Period   Location   Credits 2

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

Course Description   The theory of Fourier analysis

Grading   Evaluation depends mainly on marks of examination, but marks of exercises are taken into account when needed.

Course Goals   To understand fundamental theory of Fourier and Laplace analysis with a skill for evaluation of specific examples and applications in applied mathematics and physics.

Course Topics

Theme	Class number of times	Description
Fourier series	2-3	Introduction of the Fourier series for periodic functions. Best approximation property and the convergence of this series are shown. Discrete Fourier transform is also discussed.
Applications of Fourier series	3-4	Application of Fourier series to differential equations
Fourier transform	3-4	Introduction of the Fourier transform for L^2 functions. Invertibility of this transform and the convolution theorem are shown.
	2-3	
Applications of Fourier transform related	2-3	Application of Fourier series to differential equations. The relationship with Fourier transform and Laplace transform.
Summary and assessment	1	Summary and supplement of this course. Measure the progress of students in acquiring knowledge and skills.

Textbook   S. Nakamura: Fourier analysis, Asakura shoten

Textbook(supplemental)   H.Fukawa:Mathematics of control and vibration, KORONA-SHA

Prerequisite(s)   Calculus, Linear algebra

Web Sites   http://www-is.amp.i.kyoto-u.ac.jp/lab/tujimoto/amathA3/

Additional Information

Applied Mathematics for Engineering F1

Code   20550   Course Year   2nd year   Term   2nd term   Class day & Period   Tue 3rd

Location   313 (Sunagawa), 315 (Fukuyama)   Credits   2   Restriction   No Restriction   Lecture Form(s)   Lecture

Language   Japanese   Instructor   Sunagawa (20550), Fukuyama (20551),

Course Description   Introduction to complex analysis and some applications

Grading   Regular examination. Also, reports and so on could be considered (Abe), Regular examination and Reports (Fukuyama)

Course Goals   Understanding the basics of complex analysis and obtaining ability to practice it

Course Topics

Theme	Class number of times	Description
Definition of complex and complex plane	1	
Differential of complex functions and Cauchy-Riemann relation	2	
Concept of regular functions	1	
Concept of conformal mapping	1	
Line integral of complex functions	1	
Cauchy's theorem and integral formula	2	
Taylor and Laurent series	1	
Singular points and residue theorem	2	
Application to definite integral	2	
Analytic continuation and expression of functions	1	
Confirmation of learning achievement	1	

Textbook   Not used

Textbook(supplemental)   To be referred to during the course

Prerequisite(s)   Fundamentals of differential and integral calculus

Web Sites

Additional Information

20650

Applied Mathematics for Engineering F2

Code   20650   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Kano, Otsuka,

Course Description   Fourier analysis and its application will be described. The major part consists of Fourier series, Fourier transform, and Laplace transform.

Grading   The regular examination, assignments, and attitude in the class will be taken into account.

Course Goals   The goal is to understand the basics and applications of Fourier analysis.

Course Topics

Theme	Class number of times	Description
Preliminaries	1	The goal and outline of this class are presented. Then, basic knowledge necessary to learn Fourier analysis is briefly reviewed.
Fourier series	1	Fourier series expansion of periodic functions is described.
Complex Fourier series	1	Complex Fourier series, its differential and integral, and spectrum are described.
Characteristics of Fourier series	1	Characteristics of Fourier series are described.
Fourier transform	1	In order to cope with aperiodic functions, Fourier transform is described. Characteristics and applications of Fourier transform is explained together with the Parseval's equation and its applications.
Linear systems	1	Linear systems is described. Solutions of linear differential equations are given by using Fourier series expansion. In addition, impulse responses and transfer functions of linear systems are explained.
Summary of the first half	1	A summary of Fourier series and Fourier transform is provided, and an examination will be given.
Auto-/Cross-correlation function	1	Parseval's equality, the Wiener − Khinchin theorem, and the relationship between impulse responses and cross-correlation functions in linear systems are described.
Partial differential equations	3	Applications to partial differential equations are described.
Laplace transform	2	Laplace transform and its characteristics are described along with an application of solving ordinary differential equations.
Discrete Fourier transform	1	Discrete Fourier transform for analyzing sampled data is described.
Evaluation of achievement	1	The achievements are evaluated.

Textbook   Shinichi Ohishi: Fourier Analysis, Iwanami-Shoten

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Applied Mathematics for Engineering F2

Code   20651   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor Tachibana, Senami

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

20652

Applied Mathematics for Engineering F2

Code   20652   Course Year   3rd year   Term   Class day & Period   Location   Credits   2   Restriction   No Restriction
Lecture Form(s)   Lecture   Language   Japanese   Instructor   Akira Sakai,

Course Description   Fourier analysis, Laplace transform and their applications.

Grading   Each lecture accompanies a half-hour exercise with two problems. The grading is made based on the total score earned in these exercises plus the result of regular examination.

Course Goals   The final goal of this course is to understand basics of Fourier series expansion, Fourier transform, and Laplace transform, and to learn to make full use of these mathematical tools in analyzing various physical phenomena and solving relevant differential equations. Particular emphasis is placed not on pursuing mathematical rigor but on developing skills to perceive different physical aspects of these tools and select the most appropriate one in practical problem solving.

Course Topics

Theme	Class number of times	Description
Fourier analysis, Laplace transform and their applications	15	Complex numbers and complex analysis (1-2 weeks) -complex numbers and complex functions -complex integrals, residue theorem, and their applications Delta function (1 week) Fourier series expansion (2-3 weeks) -periodic functions and their Fourier series expansion -complex Fourier series expansion -applications of Fourier series Fourier transform (2-3 weeks) -basics of Fourier transform -convolution and correlation function -applications of Fourier transform -linear response system Laplace transform and its applications (2 weeks) -basics of Laplace transform -applications of Laplace transform to linear systems Linear differential equations (1 week) -solving linear differential equations using Fourier transform -solving linear differential equations using Laplace transform Thermal conduction/diffusion equation (2 weeks) -thermal conduction/diffusion equation in an infinite/semi-infinite interval -thermal conduction/diffusion equation in a finite interval -thermal conduction/diffusion equation with time-dependent boundary conditions Wave equation (1 week) -wave equation in an infinite/semi-infinite interval -wave equation in a finite interval -equation of forced oscillation
Exercise		Each lecture accompanies a half-hour exercise with two problems. Sample answers and comments on the students' answers on each exercise will be shown in print and circulated in the next lecture.

Textbook   Lecture notes are distributed at the class.

Textbook(supplemental)

Prerequisite(s)   Prerequisite subjects: complex numbers and basic calculus.

Web Sites   Lectures notes in a PDF format can be accessed through KULASIS.

Additional Information   Inquiries through email are anytime accepted.

Applied Mathematics for Engineering F2

Code   20653   Course Year   3rd year   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

Applied Mathematics for Engineering F3

Code   20750   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Yasuhiro Inoue Associate Professor Institute for Frontier Medical Sciences

Course Description   Introduction to special functions and mathematical methods for the physical sciences.

Grading   The course grade will be based on homework(30%) and quizzes(70%).

Course Goals   Understanding special functions and mathematical methods for the physical sciences, and developing problem solving skills.

Course Topics

Theme	Class number of times	Description
Orthogonal function	2	
Orthogonal polynominals	2	
Confluent hypergeometric function	1	
Gamma and Beta functions	2	
Bessel function	2	
Generalized function	2	
Green's function	1	
Partial differential equations for physical sciences	2	
Short Exam and Discussion	1	

Textbook

Textbook(supplemental)   Mathematical Methods for Physicists, George B. Arfken and Hans J. Weber (Academic Press)

Prerequisite(s)   Theories of complex function and differential equation

Web Sites

Additional Information

Engineering Mechanics A

A

Code   20800   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor Nishihara, Hanazaki,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

20802

Engineering Mechanics A

A

Code   20802   Course Year   3rd year   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

Flight Dynamics of Aerospace Vehicle

Code 50490   Course Year 3rd year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s) Lecture   Language Japanese   Instructor   Kei Senda, Shinya Aoi

Course Description   Flight dynamics of aerospace vehicles.

Grading   Evaluation depends on marks of examination and exercises.

Course Goals   To understand analytical mechanics through flight dynamics of aerospace vehicles.

Course Topics

Theme	Class number of times	Description
Analytical mechanics	7	introduction, coordinates, principle of virtual work, d'Alembert's principle, potential, Lagrange equation of motion, conservation law, Lagrange multiplier, Euler-Lagrange equation
Rigid body kinematics	3	Euler angles, angular rate, pseudo coordinates
Rigid body dynamics	3	kineteic energy of rigid body, linear and angular momentum, inertia tensor, Euler equation of motion
Dynamics of space vehicle	2	topics of attitude dynamics of space vehicles
Achievement confirmation	1	achievement confirmation to check up level of understanding

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. (Iwanami Shoten)

Prerequisite(s)   Foundation of mechanics and mathematics

Web Sites

Additional Information

51450

Engineering Exercise in Aeronautics and Astronautics

Code 51450   Course Year 4th year   Term   Class day & Period   Location   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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Laboratory in Aeronautics and Astronautics 1
1

Code 50660   Course Year 3rd year   Term   Class day & Period   Location   Credits 1   Restriction

Lecture Form(s)   Language Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Laboratory in Aeronautics and Astronautics 2

2

Code 50670 Course Year 3rd year Term Class day & Period Location Credits 1 Restriction

Lecture Form(s) Language Japanese Instructor ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	4	
	3	
	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Structural Properties of Materials

Code   51290   Course Year   3rd year   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
	2-3	
	4-5	
	3-4	
	3-4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

52000

Introduction to Polymer Materials

Code   52000   Course Year   3rd year   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	
	3	
	4	
	4	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Electronic structure of solids and band theory

Code   51210   Course Year   3rd year   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
Band Theory for Solids	4	
Fermi surface of metals	3	
Electronic structure of semiconductors	4	
Electronic structure of surfaces and interfaces	3	
Recent topics in solid state physics and surface science	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physics of Solids

Code   50710   Course Year   4th year   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
Crystal structure	1	
Diffraction of waves by crystals	3~4	
Vibrations of crystals	3~4	
Thermal properties of crystals	2	
Electronic dtructures of crystals	3~4	
Assessment of achievement	1	

Textbook

Textbook(supplemental)   "Introduction to solid state physics" by Charles Kittel

Prerequisite(s)

Web Sites

Additional Information

Condensed Matter Physics

Code   51470   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   H. Nakamura and Y. Tabata

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Review of electromagnetism	2	Maxwell's equations and electromagnetic wave, vector potential, Hamiltonian for charged particle in electromagnetic field, etc.
Optical properties of matter	3	optical constants, electromagnetic wave in solid, Lorentz model, Drude model, band structure and optical response, Kramers-Kronig relation, etc.
Magnetism	6	magnetic moment, atomic magnetism, single-ion magnetism, paramagnetism, ferromagnetism, antiferromagnetism, molecular field, metallic magnetism, magnetic anisotropy, magnetization process, etc.
Superconductivity	3	Meisner effect, type-1 and type-2 superconductivity, London equation, flux quantization, origin of superconductivity, Josephson effect, SQUID, etc.
Assessment	1	Assessment

Textbook   None

Textbook(supplemental)   S. Blundel, Magnetism in Condensed Matter (Oxford Master Series in Physics) Oxford University Press
C. Kittel, Introduction to Solid State Physics, Wiley

Prerequisite(s)

Web Sites

Additional Information

Solid State Physics

Code   50120   Course Year   2nd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   H. Nakamura

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Crystal and lattice. Diffraction by crystal, Bonding energy of crystal	2	
Phonon	2	
Introduction to statistical mechanics, Specific heat of solid	3	
Introduction to quantum mechanics	3	
Free electron model. Thermal and transport properties of metal	3	
Electrons in periodic potential	1	
Assessment	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics of Solids

Code   50510   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   S. Biwa, Prof., Graduate School of Engineering

Course Description   While the methods of stress-strain analysis for elementary structural members are the main topics in "Mechanics of Materials" courses, more general physical laws of the mechanical behavior of solids are dealt with in this course. Namely, fundamental principles of solid mechanics such as three-dimensional expressions of stress and strain, equilibrium equations, Hooke's law and its thermodynamic background are treated together with mathematical analysis of static deformations in elastic bodies.

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

Course Goals   This course aims to establish the understanding of three-dimensional and rigorous expressions of stress and strain and fundamentals of deformation analysis of solids and structures. It is also the aim of this course to re-examine the value of approximate theories given in "Mechanics of Materials" courses from a rigorous viewpoint.

Course Topics

Theme	Class number of times	Description
Vectors and tensors	1	Components of vectors and stresses; Basis vecotrs; Kronecker's delta; Alternating symbol; Summation convention
Stress	2	Stress vector and stress tensor components; Cauchy's relation; Transformation of stress components; Equilibrium equations; Symmetry of stress; Principal stresses and stress invariants
Strain	2	Mathematical expressions of deformation; Green-Lagrange strain; Infinitesimal strain; Transformation of strain components; Principal strains
Thermodynamics of elastic solids	1	Thermodynamics of elastic bodies; Hooke's law; Voigt expression of the stress-strain relation
Fundamental equations of elasticity	2	Navier's equations; Plane stress and plane strain; Compatibility relation for strain
Theoretical analysis of elastic deformations	3	Airy's stress function; Biharmonic equation; Stress function in polar coordinates; Two-dimensional elastostatic problems; Stress concentration around a circular hole
Applications of elasticity	2	Anisotropic elastic property of composite materials; In-plane elastic property of laminated plates
Energy principles	2	Principle of virtual work; Principle of complementary virtual work; Principle of stationary potential energy

Textbook   Textbooks are not assigned. The lecture is given in a "blackboard" style.

Textbook(supplemental)   T. Inoue, "Fundamentals of elasticity" (Nikkan Kogyo)

is a good reference. Other references are

T. Kunio, "Fundamentals of Solid Mechanics" (Baihu-kan) ;

S. Kobayashi and K. Kondo, "Elasticity" (Baihu-kan) ;

(all in Japanese) .

For references written in English, students are advised to contact the instructor directly.

Prerequisite(s)   The enrolling students are expected to have knowledge in "Mechanics of Materials" courses. Good understanding of calculus, linear algebra and vector analysis is preferable.

Reports will be assigned to review the lectures.

Web Sites

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

Fundamentals of Materials Science I

Code   51350   Course Year   2nd year   Term   Class day & Period   Location   Credits   2

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

Course Description

Grading   A end-term examination will be a main part of grading determination. Attendance and daily reports may be considered in grading determination.

Course Goals

Course Topics

Theme	Class number of times	Description
Structure of solids	1	
Lattice defects	1	
Diffusion in solids	5	
Deformation of crystalline materials	2	
Plastic deformation of single crystals of metallic materials	2	
Plastic deformation of polycrystalline metals	2	
Deformation twinning and creep deformation	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   A part of themes will be added or omitted depending on a number of classes in the term.

Fundamentals of Materials Science II

Code   51360   Course Year   2nd year   Term   Class day & Period   Location   Credits   2

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

Course Description   This lecture focuses on symmetry, tensor and elastodynamics that are of importance for materials science.

Grading   Grading is due to the term-end examination. The record of attendance may be taken into account.

Course Goals   To understand the role of symmetry, tensor and elastodynamics on materials science.

Course Topics

Theme	Class number of times	Description
Vector and tensor	4-5	Fundamentals of vector and tensor
Symmetry in molecules and crystals	4-5	Fundamentals of symmetry in molecules and crystals
Elastodynamics	4-5	Fundamentals of elastodynamics

Textbook   Handouts will be given in lectures.

Textbook(supplemental)

Prerequisite(s)   Fundamentals of thermodynamics

Web Sites

Additional Information

Materials Science Laboratory and Exercise 1

Code   50620   Course Year   3rd year   Term   Class day & Period   Location   Credits   3

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

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	6	
	6	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Materials Science Laboratory and Exercise 2

Code   50630   Course Year   3rd year   Term   Class day & Period   Location   Credits   3

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

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	6	
	6	
	6	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50080

Fundamentals of Materials 1

Code   50080   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Naohide TOMITA,

Course Description   Introductory class to teach fundamentals for Material Science.

Grading   reports and a test

Course Goals

Course Topics

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

Textbook   isbn:4901381008 be sold at   http://www.jsms.jp/index.html)

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Materials 1

Code   50082   Course Year   2nd year   Term   Class day & Period

Location   Engineering Science Depts Bldg.-312   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   ,

Course Description   Introduction to materials science and metallurgy for beginners

Grading   Regular examination of paper test

Course Goals   Learning of basic knowledge of materials science

Course Topics

Theme	Class number of times	Description
Structure of Materials	2	electron configuration, bonding and structure in crystalline materials, density and thermal expansion
Phase Equilibrium	3	phase equilibrium diagram, solid solution, solidification, eutectic and eutectoid transformation
Mechanical Propterties	3	elastic and plastic deformation, stress-strain curve, fractography, creep, ductile-brittle transition
Heat Treatment	2	quenching and tempering, martensitic transformation, annealing, normalizing, diffusion, continuous cooling transformation diagram
Functional Properties	3	thermal conductivity, specific heat, electrical conductivity, electron conduction, absorption and reflection of light
Resource and Recycle	1	crustal abundance, recoverable reserves, urban mines, recycling rate, life cycle assessment
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51540

Fundamentals of Materials 2

Code   51540   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Instructor   Okumura,

Course Description

Grading

Course Goals

Course Topics

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

Textbook   Text book can be bought at the society of material science, Japan at Hyakumanben near Kyoto university. http://www.jsms.jp/

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Code　51610　　Course Year　4th year　　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
	2	
	2	
	3	
	1　2	
	1　2	
	1　2	
	1　2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physics of Strength of Materials

Code   50700   Course Year   3rd year   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
	2	
	3	
	1	
	7	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Microstructure of Materials 1

Code   51670   Course Year   3rd year   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	
	3	
	4	
	2	
	1	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Science

Fundamentals of Microstructure of Materials 2

Code 51680   Course Year 3rd year   Term   Class day & Period   Location   Credits 2

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

Course Description   Crystal growth and solidification of metallic alloys Development of microstructure, on the basis of thermodynamics and kinetics

Grading   Examination, record of attendance

Course Goals   To undersand microstructure development systematically with knowledge of thermodynamics and kinetics

Course Topics

Theme	Class number of times	Description
Fundamentals	2	
Nucleation	1	
Interface (atomic scale)	1	
Interface morphology	2-3	
Dendritic growth	1-2	
Eutectic growth	1	
non-equilibrium solidification	1	
Phase & microstructure selection, phase diagram	3	
Exam	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Electrochemistry for Materials Processing

Code   51020   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Kuniaki MURASE, Kazuhiro FUKAMI

Course Description   This course serves the fundamentals related to solution chemistry of electrolytes and electrode reactions, which become the basis of wet processing such as electrolytic refining, electrowinning, corrosion, anticorrosion, and functional electrodeposition.

Grading   (1) Class participation, (2) take-home assignments (approx. 30% in (1) and (2)), and (3) exams (approx. 70%). Students will sign a roll sheet every class. Supplementary examination to bail out low-performing students will not be given for any reason.

Course Goals   In this course students learn basic technical terms and basic concepts of physical chemistry, which are necessary to study materials science and engineering from the viewpoints of solution chemistry and electrochemistry, to take subsequent advanced courses on materials science and engineering.

Course Topics

Theme	Class number of times	Description
Solution chemistry of electrolytes	4	Acid-base and redox reactions; The difference between them.
Introduction of electrode potential	3	Electrode surface; Electrode potential; Nernst's equation.
Electrode reactions	3	Kinetics of electrode reactions; Fundamentals of Electrochemical apparatus, batteies and corrosion
Polarization curves	2	Current density vs. potential curves; Polarization curves; Overpotential; Polarizable and non-polarizable interfaces; Diffusion-limitations.
Transfer of ions	2	Ion transfer in aqueous electrolytes; Diffusion potential and liquid junction potential.
Self-assessment of achievement	1	Review of the course contents.

Textbook   A course booklet will be given out at the first lecture.

Textbook(supplemental)

Prerequisite(s)   Knowledge given in Thermodynamics of Materials 2 (by Prof. Uda) is preferable.

Web Sites

Additional Information

51340

Statistical Physics of Materials

Code   51340   Course Year   2nd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Yoshikazu Tabata , Koretaka Yuge

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
First law of thermodynamics	1	
Second law of thermodynamics	1	
Thermodynamic functions	3	
Irreversible process	1	
Concept of statistical thermodynamics	2	
Basic of classical statistical thermodynamics	5	
Quantum statistical thermodynamics	1	
Check of acquisition	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermodynamics of Materials 1

Code 51630 Course Year 2nd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Hiroyuki Sugimura,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Engineering Science

Thermodynamics of Materials 2

Code 51640 Course Year 2nd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Tetsuya Uda,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Fundamental of thermodynamics	4	Internal energy,enthalpy,heat capacity
		Entropy and second law
		Direction of system change
Chemical potential	3	Extensive and intensive variable,chemical potential
		Composition-dG diagram and chemical potential
		Phase rule,phase equilibria
		Ideal solution,Henrian standard state, activity
Phase diagrams	1	Relationship between phase diagram and Gibbs energy
		Invariant reaction in binary systems
Thermodynamcis for electrode and ion	2	Electrode potential, electromotive force
		Standard state for ion, Standard hydrogen electrode
Chemical potential diagrams	3	Chemical potential diagrams for ternary systems
		Electrode potential-pH diagram

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Physical Chemistry of Materials

Code   50360   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Ikuji Takagi, Takayuki Sasaki, Taishi Kobayashi

Course Description   Lecture on phisicochemical processes concerning fission and fusion reactors, such as of isotope enrichment, non-stoichiometry of uranium dioxide, diffusion and permeation of tritium, neutron activation and irradiation effects.

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1	General statement of nuclear materials and fuel cycle processes.
Isotope enrichment	2	Isotope effect in kinetic theory of gas, typical examples of gaseous diffusion method and centrifugal separation method.
Nuclear fuels	4	Elementary chemical thermodynamics, production process of nuclear fuels, non-stoichiometry of uranium dioxide, burnup effect on oxygen potential
Fission reactor materials	3	General statement of fission reactor materials, irradiation damage, stress-corrosion cracking, degradation by oxidation and hydriding.
Fusion reactor materials	4	General statement of fusion reactor materials, neutron activation, effect of high-heat load, tritium breeding, inventory and leakage.
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50361

Physical Chemistry of Materials

Code   50361   Course Year   3rd year   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
	2	
	6	
	3	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Materials Processing

Code   51220   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Akira Sakai, Hiroyuki Sugimura,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Analytical Sciences

Code   51200   Course Year   3rd year   Term   2nd term   Class day & Period   Wed 1st

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

Lecture Form(s)   Lecture   Language   Japanese   Instructor   Jun Kawai, Koretaka Yuge

Course Description   Quantum spectrochemistry, which is a basis of spectrochemical analysis, will be lectured. Various kinds of spectrometries which are used in materials analysis will also be explained.

Grading   Checked only by exam.

Course Goals   The goal of the course is to obtain knowledges about quantum chemistry, interaction between photons and electrons, spin, principles of spectrometers, quantum mechanical calculations related to spectroscopy, and so forth, which are necessary for spectrochemical analysis.

Course Topics

Theme	Class number of times	Description
1. Quantization	1	Bragg diffraction equation deduced from Bohr-Sommerferd quantization. Compton scattering equation explained from both wave and particle views.
2. Principle of least action	2	Refraction of electron beam. Phase velocity and group velocity. Spin and helicity of photon. Polarization of light. Inertial mass and gravitational mass of photon and its relation to Maessbauer spectroscopy. Zeeman effect.
3. Matrix mechanics	1	Scheroedinger equation. Matrix mechanics. Role of harmonic oscillator in atomic spectra.
4. Perturbation theory	2	Time independent perturbation theory applied to ionic crystal.
5. Optical transition	2	Blackbody radiation. Time dependent perturbation. Tsallis entropy. Electric dipole transition.
6. Harmonic oscillator	1	Harmonic oscillator. WKB approximation. Field quantization.
7. Electron spectroscopy	1	Photoelectron spectroscopy of transition metal compounds. Configuration interaction.
8. Symmetry	1	Symmetry of molecules. Group theory. Projection operator.
9. Interaction between electrons and photons	2	IR and Smekal-Raman spectroscopy.
10. Angular momentum and spin	1	Angular momentum and spin. Spin-orbital interaction.
11. Check of achievement	1	

Textbook   J. Kawai, "Quantum Spectrochemistry", 2nd Edition, AGNE Gijutsu Center, Tokyo (2015).(ISBN:9784901496759)

Textbook(supplemental)

Prerequisite(s)

Web Sites   http://www.process.mtl.kyoto-u.ac.jp/

Additional Information

Mechanics of Materials 1

Code   50040   Course Year   2nd year   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
	1	
	1	
	2	
	1	
	4	
	1	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics of Materials 1

Code   50041   Course Year   2nd year   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
	1	
	1	
	2	
	1	
	4	
	1	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics of Materials 1

Code 50042   Course Year 2nd year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Lecture   Language Japanese   Instructor   Imatani(50042), Hoshide(50043),

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
Concepts of Mechanics of Materials	2	
Subjects on Simple Stress States	3	
Strain Energy	2	
Bending of Beams	5	
Complex beams	2	
	1	

Textbook   ISBN:4-563-03465-7

(Zairyo Rikigaku no Kiso, Shibata, Ohtani, Komai, Inoue, Baifukan)

Textbook(supplemental)

Prerequisite(s)   Fundamentals of Mathematics and Physics

Web Sites

Additional Information

50043

Mechanics of Materials 1

Code 50043   Course Year 2nd year   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
	2	
	3	
	2	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanics of Materials 2

Code 50050   Course Year 2nd year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   M. Nishikawa (50050), Hayashi (50051),

Course Description   The simplified one-dimensional treatments lectured in Mechanics of Materials 1 are extended to include more complex two- or three-dimensional problems. Analytical methods for the deformation and the stresses in various structural members are lectured including the combined stress states.

Grading   Grading is based on the mid-term and the final examinations, possibly with considerations of class-room tests or reports.

Course Goals   The emphasis is to understand the fundamental concepts and methods for the stress/strain analysis of various structures or struictural members, by advancing the basic principles given in Mechanics of Materials 1.

Course Topics

Theme	Class number of times	Description
Beam bending	2	Beam bending; Castigliano's theorem
Advanced problems of beams	3	Statically indeterminate beams; continuous beams; curved beams
Basics of elasticity	4	Combined stress states; Mohr's stress and strain circles; equilibrium equations; displacement-strain relations; stress-strain relations; plane stress or strain states; relation between elastic constants
Torsion	2	Torsion of circular bars; coil springs; Combination of bending and torsion
Axially symmetric problems	1	Buckling of column; instability; effect of support conditions; buckling design
Axially symmetric problems and bending of plates	2	Circular cylinders; spherical shells; rotating circular plates; Cylindrical bending, bending rigidity;
Assessment	1	Academic achievement assessment

Textbook   Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso) (T. Shibata et al.), Baifu-kan .

Textbook(supplemental)

Prerequisite(s)   Mechanics of Materials 1, and other subjects such as calculus, linear algebra, mechanics of particles and rigid bodies.

Web Sites

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

Mechanics of Materials 2

Code 50051   Course Year 2nd year   Term   Class day & Period   Location   Credits 2   Restriction

Lecture Form(s)   Lecture   Language Japanese   Instructor

Course Description   The simplified one-dimensional treatments lectured in Mechanics of Materials 1 are extended to include more complex two- or three-dimensional problems. Analytical methods for the deformation and the stresses in various structural members are lectured including the combined stress states.

Grading   Grading is based on the mid-term and the final examinations, possibly with considerations of class-room tests or reports.

Course Goals   The emphasis is to understand the fundamental concepts and methods for the stress/strain analysis of various structures or struictural members, by advancing the basic principles given in Mechanics of Materials 1.

Course Topics

Theme	Class number of times	Description
Beam bending	2	Beam bending; Castigliano's theorem
Advanced problems of beams	3	Statically indeterminate beams; continuous beams; curved beams
Basics of elasticity	4	Combined stress states; Mohr's stress and strain circles; equilibrium equations; displacement-strain relations; stress-strain relations; plane stress or strain states; relation between elastic constants
Torsion	2	Torsion of circular bars; coil springs; Combination of bending and torsion
Axially symmetric problems	1	Buckling of column; instability; effect of support conditions; buckling design
Axially symmetric problems and bending of plates	2	Circular cylinders; spherical shells; rotating circular plates; Cylindrical bending, bending rigidity;
Assessment	1	Academic achievement assessment

Textbook   Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso) (T. Shibata et al.), Baifu-kan .

Textbook(supplemental)

Prerequisite(s)   Mechanics of Materials 1, and other subjects such as calculus, linear algebra, mechanics of particles and rigid bodies.

Web Sites

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

Mechanics of Materials 2

Code   50052   Course Year   2nd year   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
	3	
	2	
	4	
	4	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51281

Systems Engineering

Code   51281   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Graduate School of Energy Science, Professor, M. Shioji

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Vibration Engineering

Code 50240   Course Year 3rd year   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
	3	
	3	
	1	
	4	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50241

Vibration Engineering

Code   50241   Course Year   3rd year   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	
	2	
	2	
	3	
	3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Aerospace Propulsion

Code 50480 Course Year 3rd year 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
Propulsion Fundamentals	1	
	3	
Ionized Gases	1	
Electromagnetics	2	
Equation of Ionized Gases	1	
Atomic and Molecular Collisions	2	
Diffusion and Transport of Ionized Gases	1	
Ionized Gases near Solid Surfaces	2	
Electric Propulsion	1	
	1	

Textbook

Textbook(supplemental) R.W. Humble, G.N. Henry, and W.J. Larson, Space Propulsion Analysis and Design (McGraw-Hill, New York, 1995)

G.P. Sutton and O. Biblarz, Rocket Propulsion Elements, 7th ed. (Wiley, New York, 2001) ;

M. Mitchner and Ch.H. Kruger, Jr., Partially Ionized Gases (Wiley, New York, 1973) ;

F.F. Chen, Introduction to Plasma Physics and Controlled Fusion, Vol. 1, Plasma Physics, 2nd ed. (Plenum, New York, 1984) ;

L.M. Biberman, V.S. Vorobev, and I.T. Yakubov, Kinetics of Nonequilibrium Low-Temperature Plasmas (Consultants Bureau, New York, 1987) ;

R.O. Dendy ed., Plasma Physics: An Introductory Course (Cambridge University Press, London, 1993) ;

M.A. Lieberman and A.J. Lichtenberg, Principles of Plasma Discharges and Materials Processing (Wiley, New York, 1994) .

Prerequisite(s) Fluid Dynamics, Gas Dynamics, Thermodynamics, Electromagnetics

Web Sites

Additional Information

90252

Numerical Analysis

Code   90252   Course Year   3rd year   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	
	6	
	3	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Analysis in Mathematical Sciences

Code   91180   Course Year   4th year   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	
	4	
	2	
	2	
	2	
	2	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50250

Control Engineering 1

Code   50250   Course Year   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	
	3	
	2	
	2-3	
	3	
	2-3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Control Engineering 1

Code 50251 Course Year   Term   Class day & Period   Location   Credits 2

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

Course Description   Control Engineering provides a methodology of controlling various systems including mechanical ones in a systematic way. Its major part consists of both Classical Control Theory and Modern Control Theory. This class describes the fundamentals of Classical Control Theory.

Grading   Scores of quizzes, reports and the regular examination are taken into account.

Course Goals   The course goal is to understand the basic concepts of Classical Control Theory such as transfer functions, frequency responses and stability.

Course Topics

Theme	Class number of times	Description
Introduction	1	The basic idea of Control Engineering such as the purpose and methods of control is described through various real world examples.
Representation of dynamical systems	2-3	Mathematical description of systems is developed first. Then, the concept of Transfer functions is introduced based on Laplace Transform, and Block diagram representation is shown.
Responses of dynamical systems	3	Time responses of linear systems are shown. Stability of systems and Stability tests are described.
Properties of feedback systems	2-3	Basic properties such as steady state characteristics of feedback control systems and Root Locus are explained.
Frequency responses	3-4	The concept of Frequency responses, Bode diagrams, Vector locus are introduced. The stability test of feedback systems based on the frequency responses is explained.
Design of control systems	2	Basic components of classical controller design methods such as Phase lead, Phase Lag, and PID compensation are described.

Textbook   T. Sugie, M. Fujita: Introduction of Feedback Control. Corona Publishing Co. Ltd.

Textbook(supplemental)   none

Prerequisite(s)   Elementary knowledge of Laplace Transform is required.

Web Sites   none

Additional Information   Some parts of the above contents may be skipped/added depending on the course schedule of the year.

Control Engineering 1

Code   50252   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Kenji Fujimoto,

Course Description   Control engineering consists of theory and methodology to design control systems. It includes the classical control theory to design feedback control systems based on transfer functions and frequency response.

Grading   The evaluation is based on repots (40%) and exam (60%).

Course Goals   The goal of this course is to understand the classical control theory and the related methodologies to design feedback control systems based on transfer functions and frequency response.

Course Topics

Theme	Class number of times	Description
Introduction	1	History and background of control engineering
Dynamical systems and transfer functions	4	Basic knowledge on dynamical systems, ordinary differential equations, transfer functions and block diagrams
Transit response and stability	3	Stability of dynamical systems, transit response, steady response and Routh-Hurwitz stability criteria
Frequency response	2	Basic knowledge on frequency response using Bode plots and vector locus
Characteristic of feedback control systems	3	Performance criteria of feedback control systems using Nyquist's stability criteria and the root locus method.
Design of feedback control system	2	How to design feedback control system using phase-lead compensation, phase-lead-lag compensation and PID control

Textbook   T. Sugie and M. Fujita: Introduction to feedback control (in Japanese), Corona Publisher,

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Control Engineering 2

Code　50270　Course Year　3rd year　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	
	2	
	1	
	2	
	2	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50300

Production Engineering

Code   50300   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

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

Course Description   This course deals with how to construct and operate a manufacturing system of a mechanical product.

Grading   The regular examination, in-class examinations and reports are taken into account.

Course Goals   The goal is to understand the concept of a manufacturing system, and to become able to handle related basic decision-making problems.

Course Topics

Theme	Class number of times	Description
Introduction	1	The overall concept of a manufacturing system is given.
Industrial Economics	2	After introducing the concept of the manufacturing cost and cash flow, how to make decisions using the concept (for example, the DCF method for investment decisions) is addressed.
Production & Operations Management	2	Demand forecasting, production planning, inventory management, MRP, JIT, etc. are covered.
	3	
Production Scheduling	2	Basic approaches for single machine scheduling, flow shop scheduling, job shop scheduling, and project scheduling are introduced.
Plant Layout & Line Blancing	2	Basic approaches for plant layout and line balancing are introduced.
Industrial Engineering	2	After introducing the principles of motion economy, the approaches for process analysis, human-machine analysis, Therblig analysis, standard time setting, etc. are addressed.
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   The topics covered may be modified from the plan according to the actual schedule.

Precision Machining

Code 50990 Course Year 4th year 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
	2	
	3	
	3	
	2	
	1	
	2	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanical Design 1

Code   51550   Course Year   3rd year   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
	3	
	3	
	3	
	2	
	2	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Mechanical Design 2

Code   51560   Course Year   3rd year   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
	5	
	3	
	2	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Intelligent Systems Engineering

Code   51710   Course Year   4th year   Term   1st term   Class day & Period   Wed 2nd

Location   Engineering Science Depts Bldg.-314   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	
	2-3	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Neutron Physics and Engineering

Code   51410   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Seiji Tasaki,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

60630

Fundamentals of Circuit Theory

Code   60630   Course Year   1st year   Term   Class day & Period   Location   Credits   2

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

Course Description   The course introduces the fundamentals of the electric circuit. Topics covered include: resitive elemnts and networks; independent sources; switches and dynamics of first- and second-order networks; phasor analysis; 2-port circuits.

Grading   Reports and examinations

Course Goals   Students are expected to learn the transient analysis by differential equation and steady state analysis by phasor.

Course Topics

Theme	Class number of times	Description
DC circuit	3	We introduce Kirchhoff's current law and Kirchhoff's voltage law, Ohm's law and independent sources.
Differential equation of circuit	5	We introduce inductors and capacitors and explain the differential equation of circuit.
AC circuit	4	We introduce phasor and explain the steady state analysis.
two-port circuit	2	We extend one-port elements to two-port circuits.
academic achievement test	1	The level of understanding on this lecture will be confirmed.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Heat transfer

Code   51530   Course Year   3rd year   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	
	2-3	
	1-2	
	4	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Statistical Thermodynamics

Code   50730   Course Year   4th year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Mitsuhiro Matsumoto,

Course Description   Statistical mechanics provides a firm foundation for thermodynamics. I'll give a standard course of statistical mechanics through several basic examples in various fields of science and engineering, including quantum mechanics, solid state physics, heat transfer engineering, and information technology.

Grading   - Written examination
- Paper assignment

Course Goals   - Understanding the relation between macroscopic variables and microscopic states.
- Scientific view of various phenomena in science and engineering based on statistics.

Course Topics

Theme	Class number of times	Description
Concepts of statistica physics	3	- Thermodynamics vs. statistical mechanics - Review of basic statistics - Counting microscopic states
Ensembles and various types of free energy	4	- Microcanonical ensemble: Boltzmann's definition of entropy - Canonical ensemble: temperature, Boltzmann distribution, partition function, and free energy - Various statistical ensemble
Quantal vs. classical	4	- Introduction to many-body quantum mechanics - Fermi-Dirac distribution: free electron model - Bose-Einstein distribution: photons and phonons - Classical limit: ideal gas and real gas
Advanced topics	3	- Introduction to solid state physics: band theory and basic model of semiconductor devices - Intdoduction to information theory: Shannon's entropy, transinformation - Introduction to transport phenomena: kinetic theory of gases, mass and energy diffusion
Examination	1	

Textbook   Lecture notes will be provided.

Textbook(supplemental)

Prerequisite(s)   Basic knowledge of thermodynamics, calculus, statistics, analytical mechanics, and quantum physics will be useful.

Web Sites   http://www.mitsuhiromatsumoto.mech.kyoto-u.ac.jp/

Additional Information

Statistical Thermodynamics

Code   50731   Course Year   3rd year   Term   Class day & Period   Location   Credits   2
Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Hirato, Horii,
Course Description   In this lecture, fundamental ideas of Statistical Thermodynamics which is effective to microscopic understanding of macroscopic systems and some typical applications to condensed matter physics are presentaed.
Grading   Situation of voluntary submission of some reports and score of exam are totally evaluated.
Course Goals   The goals of this lecture are both to understand fundamental idead of Statistical Thermodynamics and to study typical applications to condensed matter physics.
Course Topics

Theme	Class number of times	Description
Outlines	1	Basic ideas of Statistical Thermodynamics, thermal equilibrium, fundamentals of Statistics, means of measuremnts, ergodic theory.
Themodynamic functions	1	Thermodynamic laws, thermodynamic functions, Legendre transform, Maxwell relations, Gibbs-Helmholtz equation, thermodynamic variation, phase equilibrium.
Ideal systems	4	Phase space of movement, Liouville's theorem, micro canonical ensemble,Partition function, relation between Helmholtz free energy and Partition function,Principle of Boltzmann, simple applications of microcanonical ensamble (ideal gas, elastic of gum)
	1	
Canonical ensemble	2	Distribution with the maximum probability, Partition function, the 3rd law of thermodynamics, Gibbs's paradox, grand canonical ensamble.
Quantum statistics	2	Grad canonical ensamble of quatum statistics, Fermion and Boson, Bose-Einstein statistics, Fermi-Dirac statistics,ideal Fermi gas, electron specific heat, ideal Bose gas, Bose-Einstein condensation.
Typical applications	4	Systems with two levels, Schottly type specific heat, Statistics of photons, Planck's equation, one dimansional harmonic oscillation, Einstein model and specific heat of solid states.
Evaluation od goals	1	Understanging of typical applications of statistic themodynamics and submission of homeworks.

Textbook   The textbook is not appointed. Writing on the blackboard is performed in every lecture.
Textbook(supplemental)

   N.

   W.   L.   H.

Prerequisite(s)   Students are roughly expected to have mastered basics of mathematics, dynamics, elementary quantum mechanics, thermodynamics and statistics.

Web Sites
Additional Information   2nd year students may undestand this lecture if they catch on basics of physics.

51300

Statistical Mechanics

Code   51300   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Seiji Tasaki,

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

Heat and Mass Transfer

Code   50370   Course Year   3rd year   Term   1st term   Class day & Period   Mon 2nd

Location   Engineering Science Depts Bldg.-313   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   Jun Kawai, Koretaka Yuge

Course Description   The fundamentals of transport phenomena for the engineers and/or researchers related to physical engineering are given.

Grading   Assignment and written examination

Course Goals   To be able to apply the fundamental equations of thermal and mass transport studied in the class to real phenomena.

Course Topics

Theme	Class number of times	Description
Momentum transport	2	Newton's law of viscosity, Equation of continuity
Non-steady mass transport	2	Systems with more than one variables, Energy equation
Heat conduction	1	Fourier's law, Steady heat conduction
Energy transport	1	Non-steady heat conduction, heat transfer, thermal radiation
Mass transport	1	Fick's law, mass transport in solidand in laminar flow
Complex transport phenomena	1	Non-isothermal mixing, mass transfer coefficient, heat and mass transport across an interface
	2	
	2	
	1	
	1	
Achievement check	1	Learning how to solve the problems through practical exercises.

Textbook   :   (2005)

Textbook(supplemental)

Prerequisite(s)

Web Sites   (50370) http://www.process.mtl.kyoto-u.ac.jp/

Additional Information

50371

Heat and Mass Transfer

Code   50371   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Instructor   T. Sagawa/H. Okumura,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermodynamics and Statistical Mechanics

Code   50460   Course Year   3rd year   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

51620

Thermodynamics 1

Code 51620   Course Year 2nd year   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
	1	
	5	
	2	
	2	
	4	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermodynamics 1

Code 51621   Course Year 2nd year   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
	1	
	5	
	2	
	2	
	4	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51622

Thermodynamics 1

Code   51622   Course Year   2nd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   K. Ishihara,

Course Description   Fundamentals of thermodynamics are given.

Grading   Written examination

Course Goals   To understand the idea of the first and second laws of thermodynamics and to calculate the state quantities at the changes in state.

Course Topics

Theme	Class number of times	Description
Introduction to thermodynamics	1	History of thermodynamics, introduction of variables and units using in thermodynamics
The first law of thermodynamics	3	Definition of heat, Quasi-static process, specific heat, enthalpy, ideal gas are shown.
The second law of thermodynamics	2	Reversible and irreversible process, Ideal cycle, Carnot cycle by ideal gas, introduction of entropy
Thermal engine	3	Free expansion/compression of gas, Otto cycle, Brayton cycle, Carnot cycle are explained.
Free energy	3	Free energy, Maxwell equations, Joule-Thompson's experiment
Phase transformation	2	Phase, first order phase transformation, metastable equilibrium, critical point, second order phase transportation
Achievement check	1	Leaning how to solve equations In the practical exercises.

Textbook

Textbook(supplemental)   Thermodynamics and statistical mechanics (A. Harajima, Baifukan) (in Japanese).

Prerequisite(s)   The fundamental calculas

Web Sites

Additional Information

Thermodynamics 2

Code 50070   Course Year 2nd year   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
	1	
	2	
	2	
	6	
	2	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50071

Thermodynamics 2

Code 50071   Course Year 2nd year   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
	1	
	2	
	2	
	6	
	2	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Thermodynamics 2

Code 50072   Course Year 2nd year   Term   Class day & Period   Location   Credits 2

Restriction   No Restriction   Lecture Form(s) Lecture   Language Japanese

Instructor   Graduate School of Energy Science, Professor, M. SHioji

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50870

Quality Control

Code   50870   Course Year   4th year   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
Introduction	1	
Statistics and hypothesis testing	2	
Statistical process control	2	
Design of experiments	2	
Analysis of variance	2	
Application of design of experiments	2	
Reliability	4	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Materials Science

Code 51330 Course Year 2nd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Kuniaki MURASE

Course Description Based primarily on the solid-state chemistry, this course serves the outline of notation (descriptive method) and analytical techniques for solid substances, which become the basis of materials science and materials engineering.

Grading (1) Class participation, (2) take-home assignments (approx. 50% in total), and (3) exams (approx. 50 %). Students will sign a roll sheet every class. Ten written take-home assignments are due throughout the semester. Supplementary examination to bail out low-performing students will not be given for any reason.

Course Goals Basic knowledges of physics, chemistry, mathematics, etc. are requires to learn materials science and materials engineering. In this course students learn basic technical terms and develop fundamental concepts of solid-state materials chemistry, to take subsequent advanced courses on materials science and materials engineering.

Course Topics

Theme	Class number of times	Description
Substances and materials	1	Three states of matter; Amorphous and glasses; Liquid crystal; Materials structures and properties in our surrounding living environment.
Fundamentals of crystal structures	3	Close packing and holes; Crystal structure of metals; Point symmetry and space symmetry; Lattice and unit structure; Crystal system and Bravais lattice; Depiction of lattice plane and lattice direction; Fractional coordinates.
Fundamentals of chemical bond theory	2	Electronic configuration and shielding; Size of atoms and ions; Covalency and ionicity; Definition of electronegativity.
Inorganic solid-state materials	3	Structure of important ionic crystals; Stoichiometry and lattice defects; Ionic conduction and solid electrolytes; Crystal field and optical properties of d-block elements.
Fundamentals of diffraction crystallography	5	Generation and properties of X-ray; Fundamentals of X-ray scattering and diffraction (Bragg condition, structure factor, extinction rule); Powder X-ray diffractometry; Laue method
Self-assessment of achievement	1	Review of the course contents

Textbook No textbook is required for this course. A course booklet will be given out at the first lecture.

Textbook(supplemental) B. D. Cullity and S.R. Stock, Elements of X-Ray Diffraction (3rd ed.), Prentice Hall, 2001 (ISBN 978-0201610918)

L. Smart and E. Moore, Solid State Chemistry: An Introduction (3rd ed.), Nelson Thornes, 2005 (ISBN 978 -0748775163)

A. R. West, Solid State Chemistry and Its Applications (2nd ed.), Wiley, 2014 (ISBN 978-1119942948)

Prerequisite(s) Knowledge of physics and chemistry for the entrance examination of Kyoto University.

Web Sites Not available

Additional Information Not available

English for Engineering Science

Code   51250   Course Year   Term   Class day & Period   Location   Credits   2   Restriction

Lecture Form(s)   Language   English   Instructor   J. Goodman,

Course Description   This class will expose you to a variety of scientific and engineering topics, in English, and motivate you to improve your ability to communicate effectively. We will focus on current as well as historical examples of engineered products and scientific discoveries, and examine the benefits and problems that technological advances create. You will explore subjects that are personally interesting to you and try to clarify your goals as future scientists and engineers. Classes consist of short presentations that each of you (or I) gives, followed by open discussion and debate in English. You can use multimedia (computer files, whiteboard, etc.) in your presentations if you want to. We will also examine how these mini-presentations were successful and how they might be improved. The most important step you can take now is to actively increase your English vocabulary. The more words you know and enjoy using, the better you can understand what you read and experience, and the better you can communicate. Get a good dictionary app for your smartphone and/or computer, one that has an "export history" function, and use it often.

Grading   This course is graded on a pass/fail basis. If you have more than three unexcused absences during the term, you will probably fail the course.

Course Goals

Course Topics

Theme	Class number of times	Description
Group seminar	15	Small groups are organized. Classes will be given by a native English speaker.

Textbook   The class instructor will arrange its contents.

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   - Applicants should attend the guidance.

- The number of registrants for each class is limited (10-15).

- Cancellation is not allowed after classes start.

English for Engineering Science

Code   51251   Course Year   4th year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Language   English   Instructor   James L. de Witt,

Course Description   This course will provide opportunity for practice in oral communication in a variety of fields with emphasis on engineering and sciences. The instructor will provide guidance on supplementary materials for each topic. Students will be expected to prepare materials for discussion related to the topic each week.

Grading   Attendance, preparedness, and daily participation will be considered in grade determination. A daily in-class grade based on 0, 1, 2, or 3 points will be given as follows:
0-absent
1-not participating and/or not prepared
2-normal, expected level of participation and preparedness
3-extra participation and preparedness
One in-class grade point will be subtracted for tardiness, speaking too much Japanese in class, breaking basic rules, etc. for each day with incidence.
Demerits: Each 30 minutes of absenteeism will count as 1 demerit. A total of 15 demerits (absent from > 30% of in-class time) will be cause for failure.

Course Goals   Emphasis will be on developing skills for oral communication with other scientists and engineers, as well as with laymen. Topics will be discussed at both levels, to develop dual awareness of the importance of speaking in accurate technical terms with logical organization for peers, and in simple but clear terms for laymen.

Course Topics

Theme	Class number of times	Description
English for Engineering Science	15	The instructor will provide guidance on supplementary materials for each topic. Students will be expected to prepare materials for discussion related to the topic each week. Students will be encouraged to actively participate in discussions of weekly topics, primarily in small groups or pairs, but also singly to the class, and in light debate. Ample opportunity for practice in description, argumentation, asking questions, and other aspects of discussion will be provided. Students will develop vocabulary naturally through preparation and discussion, with guidance from the instructor.

Textbook   You can download a weekly plan of "English for Engineering Science" at http://www.ms.t.kyoto-u.ac.jp/ja/oncampus/kyomu.

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information   There are two classes on Friday. The classes will give the same contents.

English for Engineering Science

Code   51252   Course Year   4th year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Language   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

English for Engineering Science

Code   51253   Course Year   4th year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   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

Exercise on Engineering Science 1

Code   50540   Course Year   3rd year   Term   Class day & Period   Location   Credits   1

Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	9	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise on Engineering Science 1

Code 50541   Course Year 3rd year   Term   Class day & Period   Location   Credits 1   Restriction

Lecture Form(s)   Language   Japanese   Instructor   Miyadera, Ogure,

Course Description

Grading   exercises and reports

Course Goals

Course Topics

Theme	Class number of times	Description
Linear algebra	5	
Linear differential equations	5	
Laplace transform	4	
Confirmation of achievement in study	1	

Textbook   Prints are distributed in the class.

Textbook(supplemental)

Prerequisite(s)   differential and integral, linear algebra

Web Sites

Additional Information

Exercise on Engineering Science 1

Code   50542   Course Year   3rd year   Term   Class day & Period   Location   Credits   1

Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	5 6	
	5 6	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise on Engineering Science 2

Code   50550   Course Year   3rd year   Term   Class day & Period   Location   Credits   1

Restriction   No Restriction   Lecture Form(s)   Seminar   Language   Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise on Engineering Science 2

Code 50551   Course Year 3rd year   Term   Class day & Period   Location   Credits 1

Restriction No Restriction   Lecture Form(s) Seminar   Language Japanese   Instructor ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	4	
	5	
	5	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Exercise on Engineering Science 2

Code 50552   Course Year 3rd year   Term   Class day & Period   Location   Credits 1

Restriction No Restriction   Lecture Form(s) Seminar   Language Japanese   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51100

Introduction to Engineering Science A

Code 51100   Course Year 1st year   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
	10	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Engineering Science B

Code 51110   Course Year 1st year   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
	1	
	5	
	4	
	4	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50400

Plasma Physics

Code   50400   Course Year   3rd year   Term   Class day & Period   Tue 2nd

Location   Engineering Science Depts Bldg.-101   Credits   2   Restriction   No Restriction

Lecture Form(s)   Lecture   Language   Japanese   Instructor   Atsushi Fukuyama, Sadayoshi Murakami

Course Description   Fundamental properties of plasma as a universal state of high-temperature matters, basic equation describing plasma, magnetohydrodynamics, plasma waves and transport phenomena are explained.

Grading   semester-end examination and reports

Course Goals   to understand basic properties of plasmas and learn fundamental method of analysis

Course Topics

Theme	Class number of times	Description
What is a plasma?	2	
Motion of charged particles	2	
Coulomb collision	1	
Basic equations	2	
Equilibrium and stability	1	
Plasma waves	2	
Wave-particle interaction	1	
Transport phenomena	1	
Gas discharge	1	
Nuclear fusion	1	
Confirmation of achievement	1	

Textbook   Hand out will be distributed

Textbook(supplemental)

Prerequisite(s)   Basic knowledges of electromagnetism, statistical physics, fluid dynamics and atomic physics are expected.

Web Sites

Additional Information

Radiochemistry

Code 51160 Course Year 3rd year 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	
	1	
	2	
	4	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51440

Microfabrication

Code   51440   Course Year   4th year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese

Instructor   Ryuji Yokokawa, Toshiyuki Tsuchiya

Course Description   This course covers microfabrication technology for MEMS as well as semiconducors.

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fabrication and analysis of micromaterials

Code 51700   Course Year 4th year   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
	1	
	1	
	1	
	1	
	1	
	3	
	3	
	1	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51520

Fluid Flow and Heat Transfer

Code   51520   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

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

Course Description   This lecture provides the following subjects: thermal radiation, steady and unsteady heat conduction, laminar and turbulent convective heat transfer, phase change phenomena (boiling and condensation). The main goals are to understand the basic theory of fluid dynamics, thermodynamics, heat transfer and their allocation through the understandings of the mechanisms of heat transfer; especially thermal hydraulics in a nuclear reactor as a typical energy conversion system will be discussed including a safety engineering point of view.

Grading   Evaluation based on the written examination, but it is also rating a student's class performance.

Course Goals   In order to understand the relation between heat and fluid based on the basic theory of fluid dynamics, thermodynamics, heat transfer and their allocation. It is very important to

Course Topics

Theme	Class number of times	Description
	1.0	
	1.0	
	2.0	
	4.0	
	1.0	
	5.0	
	.0	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fluid Dynamics1

Code 51420   Course Year 2nd year   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
	1	
	2	
	4	
	5	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51430

Fluid Dynamics

Code 51430   Course Year 3rd year   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
	2	
	4	
	2	
	3	
	1	
	2	

Textbook

Textbook(supplemental)   G. K. Batchelor, An Introduction to Fluid Dynamics (Cambridge University Press, 1967).

Prerequisite(s)   Fluid Dynamics 1

Web Sites

Additional Information

Fluid Dynamics

Code 51431   Course Year 3rd year   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
	2	
	3	
	3	
	6	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

51090

Quantum Radiation Detection

Code 51090 Course Year 3rd year Term   Class day & Period   Location   Credits 2

Restriction No Restriction   Lecture Form(s) Lecture   Language Japanese   Instructor Tsuchida Hidetsugu,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Fundamentals of Atomic Interactions in Matter

Code   50410   Course Year   3rd year   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
	2	
	2	
	4	
	3	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Solid State Physics

Code   51480   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Matsuo and Seki,

Course Description   Gain working understanding of periodicity in solids and how this periodicity and bonding governs solid properties, such as electrically magnetically and mechanically. To describe how quantum mechanics defines solid state properties on a microscopic and macroscopic scale.

Grading   Coursework will be evaluated with attendance and report on subjects.

Course Goals   To further develop the understanding of interactions between solid state and phonons, electrons and particles on a microscopic scale.

Course Topics

Theme	Class number of times	Description
Introduction		Revision of ccrystal type and structure
Free electron model	3	Wave function theory of one dimensional lattice, energy state and Fermi surface
Band structure	3	Bloch's theory, Brillouin zone, Laue law, diffraction and structural factor
Defects and dislocations	2	Vacancy, diffusion, color center
Optical property	2	Kramers-Kronig relation, Drude theory, electron gas, Plasmon
Semiconductor	1	Band gap, electrons and holes, Homogeneous semiconductor, doping
Junction theory	1	p-n junctions, metal-semiconductor junction, hetero-junction
Final examination and report	2	Evaluation will be given by the contents of the reports and quizzes of the subjects leaned in this course.

Textbook

Textbook(supplemental)   C. Kittel, Introduction to Solid State Physics 8th edition (Wiley)

Prerequisite(s)

Web Sites

Additional Information

Quantum Physics 1

Code   50180   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

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

Course Description

Grading   examination and homework

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1~2	
Fundamentals of quantum mechanics	4	
Particles motion in one dimension	2~3	
Harmonic oscillator	2~3	
Atomic structure	4	
Assessment of achievement	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50181

Quantum Physics 1

Code   50181   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

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

Course Description

Grading   examination and homework

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction	1~2	
Fundamentals of quantum mechanics	4	
Particles motion in one dimension	2~3	
Harmonic oscillator	2~3	
Atomic structure	4	
Assessment of achievement	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Physics 1

Code 50182 Course Year 3rd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Miyadera,

Course Description

Grading examination

Course Goals

Course Topics

Theme	Class number of times	Description
Introduction		
Fundamental framework of quantum theory	4	
Quantization	3	
Particle motion in one dimension	3	
Harmonic oscillator	2	
WKB approximation		
Particle motion in three dimensions (2)	1	
Confirmation of achievement in study		

Textbook

Textbook(supplemental) Modern Quantum Mechanics (J.J.Sakurai)
Lectures on Quantum Theory (C.J. Isham)

Prerequisite(s) Classical mechanics, Linear algebra

Web Sites

Additional Information

Engineering Science

Quantum Physics 2

Code   50190   Course Year   4th year   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
	3	
	3	
	1 2	
	1 2	
	2	
	3	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Quantum Physics 2

Code   50192   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Miyadera,,

Course Description

Grading   examination

Course Goals

Course Topics

Theme	Class number of times	Description
Fundamental framework of quantum mechanics	2	
Angular momentum	3	
Central potential	2	
Perturbation theory (stationary method)	2	
Perturbation theory (interaction picture)	2	
Many particle system	2	
Recent developments	1	
Confirmation of achievement in study		

Textbook

Textbook(supplemental)   Modern Quantum Mechanics (J.J.Sakurai)
Lectures on Quantum Theory (C.J. Isham)

Prerequisite(s)   Quantum Physics 1

Web Sites

Additional Information

51650

Electronic Structures of Inorganic Materials 1

Code   51650   Course Year   3rd year   Term   Class day & Period   Location   Credits   2

Restriction   No Restriction   Lecture Form(s)   Lecture   Language   Japanese   Instructor   Isao TANAKA,

Course Description   Electron theory is essential for fundamental understanding of the relationship among properties, crystal structure and chemical composition in wide variety of inorganic crystals. This course provides an introduction to the basic electron theory to be used to describe the electronic structures of inorganic materials in general.

Grading   Final exam.
Some quiz-sheets are distributed at the lecture whose answers should be submitted on site. Their scores may count as a portion of the cumulative grade.

Course Goals   This course provides an introduction to the basic electron theory to be used to describe the electronic structures of inorganic materials in general.

Course Topics

Theme	Class number of times	Description
Introduction to quantum theory	3	Description of electrons, Schroedinger equation
Electronic structures of isolated atoms	3	hydrogen-like atoms, quantum numbers, many-electron atoms, self-consistent method, electron spin
Electronic structure of simple molecules	3	molecular orbital method, homo/hetero nuclear diatomic molecules, chemical bondings
Electronic structures of crystals	4	electronic structure of monoatomic crystals and binary compounds, 1D chain of hydrogen atoms, Bloch theorem, band calculations
Application to materials science	1	Density functional theory calculations and their application to materials science
Assessment of mastery of the course content	1	Assessment of mastery of the course content

Textbook   A textbook is delivered at the lecture room

Textbook(supplemental)

Prerequisite(s)   N/A

Web Sites   http://cms.mtl.kyoto-u.ac.jp/tanaka.html

Password to access the lecture slides is shown at the lecture.

Additional Information

Electronic Structures of Inorganic Materials 2

Code 51660 Course Year 3rd year Term Class day & Period Location Credits 2

Restriction No Restriction Lecture Form(s) Lecture Language Japanese Instructor Atsuto Seko

Course Description It is important to understand the electronic structure of materials because of its determinantal impacts on material functions. This lecture gives the fundamentals of electronic structure calculations based on quantum chemistry and band theory. The relationship between the electronic structure of inorganic materials and their functions is also discussed.

Grading Evaluations are made based on the examination. The results of quizzes and reports may be considered.

Course Goals Learning the fundamentals of quantum chemistry and band theory, and their applications to the issues in materials science.

Course Topics

Theme	Class number of times	Description
Electronic structure theory for materials science	1	The roles of electronic structure theory in materials research and development.
Fundamentals of electronic structure theory	2	The characteristics and physical meanings of wavefunctions, total energy, and one-electron energy.
Theory, approximations, and methods in quantum chemistry (1)	4	Variational method and perturbation method.
Theory, approximations, and methods in quantum chemistry (2)	3	Hartree and Hartree-Fock approximations in quantum chemistry.
Electronic band structure calculation	2	Density functional theory, pseudopotential and basis set in electronic band structure calculation.
Electronic structure and chemical bonding of molecules and solids	2	The electronic structure and chemical bonding of molecules and solids.
Assessment of mastery of the course content	1	The mastery of the course content is assessed.

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

50200

Continuum Mechanics

Code　50200　Course Year　3rd year　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	
	3	
	2	
	2	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Continuum Mechanics

Code   50201   Course Year   3rd year   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	
	2	
	2	
	2	
	2	
	2	
	2	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

21050

Engineering Ethics

Code 21050 Course Year 4th year Term Class day & Period Thu 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	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

Introduction to Engineering

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

Restriction   No Restriction   Lecture Form(s)   Language   Instructor   ,

Course Description

Grading

Course Goals

Course Topics

Theme	Class number of times	Description
	1~2	
	6	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

22210

Engineering and Economy(in English)

Code   22210   Course Year   Term   Class day & Period   Location   Credits   2   Restriction   Lecture Form(s)

Language   English   Instructor   ,

Course Description   The purpose of this course is to teach economy from an engineer viewpoint. The course especially contains such economic topics which engineer can use to solve practical engineering economy problems. The course is consisted of lectures and additional exercises, of which the student should complete five (5) written short reports and five (5) 60 minutes laboratory session attendances. The laboratory sessions are held weekly after the lecture, and consist of interactive group work tasks. Laboratory sessions are held weekly from 18 to 19 o'clock.// The course is aimed for both Japanese and Foreign nationals.// The course starts on October 4th.

Grading   Test, reports, laboratory performance.

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

Course Topics

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

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

Textbook(supplemental)

Prerequisite(s)   Note:

    -Interactive lessons (discussion), Small group working method
    -This course is held in English.

Web Sites   None

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

Global Leadership Seminar I

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

Lecture Form(s) Language Japanese Instructor ,

Course Description

Grading

Course Goals

Course Topics

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

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

25010

Global Leadership Seminar II

Code 25010 Course Year 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
	1	
	2	
	1	
	3	
	7	
	1	
	1	

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

International Internship of Faculty of Engineering I

Code   24020   Course Year   Term   Class day & Period   Location   Credits   1   Restriction

Lecture Form(s)   Exercise   Language   English, et al.

Instructor   Faculty of Engineering, Professor, Hitoshi Mikada and the related faculty members

Course Description   Acquisition of international skills with the training of foreign language through the to internship programs hosted by the University, the Faculty of Engineering, or the Departments in the Department.

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

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

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

25020

International Internship of Faculty of Engineering 2

Code   25020   Course Year   Term   Class day & Period   Location   Credits   2   Restriction

Lecture Form(s)   Exercise   Language   English, et al.

Instructor   Faculty of Engineering, Profesor, Hitoshi Mikada, and the related faculty members

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

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

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

Course Topics

Theme	Class number of times	Description

Textbook

Textbook(supplemental)

Prerequisite(s)

Web Sites

Additional Information

2016

Common Subjects of Faculty of Engineering

[A] Global Engineering

[B] Architecture

[C] Engineering Science

[D] Electrical and Electronic Engineering

[E] Informatics and Mathematical Science

[F] Industrial Chemistry

`http://www.t.kyoto-u.ac.jp/syllabus-s/`

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