

Numbering code					
Course title <English>	工業数学 A 1 Applied Mathematics A1	Affiliated department, Job title,Name	Graduate School of Informatics Associate Professor.SHIBAYAMA MITSURU		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Thu.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Complex analysis, traditionally known as the theory of functions of a complex variable, is the branch of mathematical analysis that investigates functions of complex numbers. Students will study the foundation and apply it to compute some integral.					
[Course Goals]					
To understand properties of complex functions with a skill for evaluation of integrals appearing in applied mathematics and physics.					
[Course Schedule and Contents]					
1. Complex function 2. Holomorphic functions 3. Elementary functions 4. Integrals in the complex plane 5. Cauchy's integral theorem 6. Power series 7. Taylor series 8. Isolated singularities 9. Laurent series 10. Multivalued functions 11. Analytic continuation 12. Residue 13. Integrals including trigonometric functions 14. Application to improper integral 15. Point at infinity and Riemann sphere					
[Class requirement]					
Calculus, Linear algebra					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluation depends mainly on marks of examination, but marks of exercises are taken into account when needed.					
Continue to 工業数学 A 1 (2)					

Numbering code					
Course title <English>	工業数学 F 1 (機材工不原 : 学番奇数) Applied Mathematics for Engineering F1	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor.NISHIKAWA MASAAKI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Introduction to complex analysis and some applications]					
The objective is to explain the fundamentals of complex analysis, considering the application to engineering and science. The differential and integral calculus of complex functions, the relevant basic ideas, and the applications are introduced.					
[Course Goals]					
Understanding the basics of complex analysis and obtaining ability to practice it					
[Course Schedule and Contents]					
Definition of complex and complex plane, 1time, Differential of complex functions and Cauchy-Riemann relation, 2times, Concept and examples of regular functions, 2times, Line integral of complex functions, 1time, Cauchy's theorem and integral formula, 2times, Taylor and Laurent series, 2times, Singular points and residue theorem, 2times, Application to definite integral, 1time, Concept of conformal mapping, other topics, 1time, Confirmation of learning achievement, 1time, Feedback, 1time,					
[Class requirement]					
Fundamentals of differential and integral calculus					
[Method, Point of view, and Attainment levels of Evaluation]					
【 Evaluation method 】 Evaluation will be mainly based on regular examination. In some cases, evaluation for homework (short reports: about four times) will be also considered. (In these cases, the ratio of the evaluations for regular examination and homework is about 9:1.) 【 Evaluation standard 】 Evaluation will be based on class registration guideline.					
[Textbook]					
A. Fujimoto 『 Outline of complex analysis (Fukuso-kaisekigaku Gaisetsu) 』 (Baifukan) ISBN:978-4563005719 (in Japanese, published in 1990.)					
Continue to 工業数学 F 1 (機材工不原 : 学番奇数) (2)					

工業数学 A 1 (2)	
[Textbook]	
Not used	
[Reference books, etc.]	
(Reference books) Lars V. Ahlfors 『 Complex Analysis 』 (McGraw-Hill Education) ISBN:978-0070006577	
(Related URLs) (KULASIS)	
[Regarding studies out of class (preparation and review)]	
Students need to solve exercises.	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

工業数学 F 1 (機材工不原 : 学番奇数) (2)	
[Reference books, etc.]	
(Reference books) To be referred to during the course	
[Regarding studies out of class (preparation and review)]	
Homework (short reports) for the problems stated in the textbooks will be assigned.	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	工業数学 F 1 (機材工 学番偶数) Applied Mathematics for Engineering F1	Affiliated department, Job title,Name	Part-time Lecturer,		
Target year	End year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Introduction to complex analysis and some applications					
[Course Goals]					
Understanding the basics of complex analysis and obtaining ability to practice it					
[Course Schedule and Contents]					
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection.\\ Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks.\\ Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance.\\ Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
Fundamentals of differential and integral calculus					
[Method, Point of view, and Attainment levels of Evaluation]					
Regular examination and Reports					
[Textbook]					
To be referred to during the course (Nishikawa), Not used (Murakami)					
[Reference books, etc.]					
(Reference books)					
To be referred to during the course					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

工業数学 A 2 (2)					
[Textbook]					
quotIntroduction of Numerical Analysisquot (in Japanese) by T. Yamamoto, SAIENSU-SHA isbn {} { 4781910386}					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	工業数学 A 2 Applied Mathematics A2	Affiliated department, Job title,Name	Graduate School of Informatics Professor,NAKAMURA YOSHIMASA Graduate School of Informatics Associate Professor,TSUJIMOTO.SATOSHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
quotNumerical Analysisquot 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. *There is a possibility to replace Course Topics. Detail will be announced at the first class.					
[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 Schedule and Contents]					
matrix eigenvalue problem,6times,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 amp conquer method with the Householder transformations for preprocessing, Sturm theorem matrix singular value decomposition,1time,computation of matrix singular value decomposition iterative methods for nonlinear equations,3times,the principle of contractive mapping and the Newton method both of one and multi variables, and convergence acceleration algorithms interpolation methods ,2times,the Lagrange interpolation formula and the Hermitian interpolation formula by polynomials, and the spline functions numerical integration methods,2times,Newton-Cotes numerical integration formula,and the Gauss type numerical integration formula confirmation for student assessment,1time,confirmation for each student assessment ,1time,					
[Class requirement]					
Linear Algebra A, Linear Algebra B, Numerical Analysis					
[Method, Point of view, and Attainment levels of Evaluation]					
mainly evaluated by examination score, but reports of exercises will be taken into account in a case.					
Continue to 工業数学 A 2 (2)					

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Numbering code					
Course title <English>	工業数学 F 2 (機 : 学番奇数) Applied Mathematics for Engineering F2	Affiliated department, Job title,Name	Graduate School of Informatics Professor,KANOU MANABU Graduate School of Informatics Professor,OOTSUKA TOSHIYUKI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Fourier analysis and its application will be described. The major part consists of Fourier series, Fourier transform, and Laplace transform.					
[Course Goals]					
The goal is to understand the basics and applications of Fourier analysis.					
[Course Schedule and Contents]					
Preliminaries,1time,The goal and outline of this class are presented. Then, basic knowledge necessary to learn Fourier analysis is briefly reviewed. Fourier series,1time,Fourier series expansion of periodic functions is described. Complex Fourier series,1time,Complex Fourier series, its differential and integral, and spectrum are described. Characteristics of Fourier series,1time,Characteristics of Fourier series are described. Fourier transform,1time,In order to cope with aperiodic functions, Fourier transform is described. Characteristics and applications of Fourier transform is explained together with the Parseval#039s equation and its applications. Linear systems,1time,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,1time,A summary of Fourier series and Fourier transform is provided, and an examination will be given. Parseval#039s equality and its applications,1time,Parseval#039s equality, the WienerdashKhinchin theorem, and the relationship between impulse responses and cross-correlation functions in linear systems are described. Introduction to partial differential equations,1time,Basic notions of partial differential equations are described. Solutions of the wave equation and their physical interpretations,1time,The wave equation, one of important partial differential equations, is solved and physical interpretations of its solutions are discussed. Fourier series for solving the wave equation,1time,Another expressions of solutions to the wave equation are derived in the form of Fourier series expansions. Introduction to Laplace transform ,1time,Laplace transform and its characteristics are described aiming at solving ordinary differential equations. Laplace transform for solving ordinary differential equations,1time,Ordinary differential equations are solved by applying Laplace transform and its inverse transform. Discrete Fourier transform and fast Fourier transform ,1time,Discrete Fourier transform for analyzing sampled data is described. Evaluation of achievement,1time,The achievements are evaluated.					
Continue to 工業数学 F 2 (機 : 学番奇数) (2)					

工業数学 F 2 (機 : 学番奇数) (2)	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
The regular examination, assignments, and attitude in the class will be taken into account.	
[Textbook]	
Shinichi Ohishi: Fourier Analysis, Iwanami-Shoten isbn{} {9784000077767}	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code			
Course title <English>	工業数学 F 2 (材) Applied Mathematics for Engineering F2	Affiliated department, Job title, Name	Graduate School of Engineering Associate Professor, ICHII TAKASHI Graduate School of Engineering Associate Professor, YUGE KORETAKA
Target year	3rd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Tue.2	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
Fourier analysis, Laplace transform, Linear Algebra and their applications.			
[Course Goals]			
The final goal of this course is to understand basics of Fourier series expansion, Fourier transform, Laplace transform and Linear Algebra, 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 Schedule and Contents]			
Fourier analysis, Laplace transform, Linear Algebra and their applications, 15times. 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 Algebra (3-4 weeks)\ - Vector space\ - Map and matrix\ Applications of Fourier transform and Laplace transform (1-2 weeks)			
[Class requirement]			
Prerequisite subjects: complex numbers and basic calculus.			
[Method, Point of view, and Attainment levels of Evaluation]			
The grading is made based on the regular examination.			
[Textbook]			
Lecture notes are distributed at the class.			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

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Numbering code			
Course title <English>	工業数学 F 2 (機 : 学番偶数) Applied Mathematics for Engineering F2	Affiliated department, Job title, Name	Graduate School of Engineering Senior Lecturer, SENAMI MASATO
Target year	3rd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Tue.2	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
, 2times, , 2times, , 2times, , 2times, , 3times, , 3times, , 1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

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Numbering code			
Course title <English>	工業数学 F 2 (工ネ原) Applied Mathematics for Engineering F2	Affiliated department, Job title, Name	Graduate School of Energy Science Professor, KISHIMOTO YASUAKI Graduate School of Energy Science Assistant Professor, IMADERA KENJI
Target year	3rd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Fri.4	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
, 9 times, , 2 times, , 3 times,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

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Numbering code					
Course title <English>	工業数学 A 3 Applied Mathematics A3	Affiliated department, Job title,Name	Graduate School of Informatics Professor.YAGASAKI KAZUYUKI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Fourier analysis originated in Fourier's work on thermal conduction and now becomes very important not only in mathematics but also in engineering, including applications in measurement technology. This course provides its theories and applications along with Laplace analysis closely related to it.					
[Course Goals]					
To understand the fundamental theories of Fourier and Laplace analysis and develop an ability to apply them to concrete problems.					
[Course Schedule and Contents]					
Fourier series, 2-3 times, The definition of Fourier series expansions are given and their fundamental properties such as computation of Fourier coefficients and convergence of Fourier series are discussed. Properties and applications of Fourier series, 3-4 times, Several properties of Fourier series and their applications to differential and difference equations and signal processing are discussed. One-dimensional Fourier transform, 3-4 times, The definition of one-dimensional Fourier transforms is given, and their fundamental properties such as the inversion formula and applications to partial differential equations are discussed. Multi-dimensional Fourier transform, 2-3 times, The definition of multi-dimensional Fourier transforms is given, and their fundamental properties and applications to partial differential equations are discussed. Laplace transforms, 2-3 times, Properties of Laplace transforms and their applications to differential equations are discussed. Summary and learning achievement evaluation, 1 time, A summary and supplements of this course are given and the learning achievement of students is evaluated.					
[Class requirement]					
Calculus, Linear Algebra and Differential Equations					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluation depends mainly on marks of examination, but marks of exercises and homework are taken into account when needed.					
[Textbook]					
S. Nakamura: Fourier analysis, Asakura shoten isbn{}{9784254115741}					
[Reference books, etc.]					
(Reference books) H.Fukawa: Mathematics of control and vibration, KORONA-SHA ibid{}{TW86010572}					
Continue to 工業数学 A 3 (2)					

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Numbering code					
Course title <English>	工業数学 F 3 (機原) Applied Mathematics for Engineering F3	Affiliated department, Job title,Name	Graduate School of Engineering Professor.INOUE YASUHIRO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Introduction to special functions and mathematical methods for the physical sciences.					
[Course Goals]					
Understanding special functions and mathematical methods for the physical sciences, and developing problem solving skills.					
[Course Schedule and Contents]					
Orthogonal function, 2 times, Orthogonal polynomials, 2 times, Confluent hypergeometric function, 1 time, Gamma and Beta functions, 2 times, Bessel function, 2 times, Generalized function, 2 times, Green's function, 1 time, Partial differential equations for physical sciences, 2 times, Short Exam and Discussion, 1 time,					
[Class requirement]					
Theories of complex function and differential equation					
[Method, Point of view, and Attainment levels of Evaluation]					
The course grade will be based on homework (30%) and quizzes (70%).					
[Textbook]					
[Reference books, etc.]					
(Reference books) Mathematical Methods for Physicists, George B. Arfken and Hans J. Weber (Academic Press) isbn{}{9780123846549}					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.					

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工業数学 A 3 (2)					

[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	工業力学 A (機・宇) Engineering Mechanics A	Affiliated department, Job title,Name	Graduate School of Informatics Associate Professor,NISHIHARA OSAMU Graduate School of Engineering Professor.HANAZAKI HIDESHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.4times, .1time, .3times, .2times, .4times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	工業力学A (エネ) Engineering Mechanics A		Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor.KINOSHITA KATSUYUKI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
, 4 times, , 3 times, , 2 times, , 2 times, , 2 times, , 2 times,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

工学倫理(2)	

<p>medicines and food productions. Associated with it, problems of their safety and ethics are arising, which should be addressed by our societies. In this class, the recent progress in biology-related techniques, and problems we have and will have in near future are described. (M. Shirakawa: Industrial Chemistry)</p> <p>Patents and ethics (Part 1). (6/6) 1time. This course will teach the students about 1) patent systems which protect inventions and research results and 2) ethical issues in patents. The first class, in preparation for the next subject of patent ethics, introduces Japan ' s patent system with comparisons to the patent systems in the world ' s major countries and international framework. (M. Nakagawa: Electrical and Electronics Engineering)</p> <p>Patents and ethics (Part 2). (6/13) 1time. Students, equipped with the basic knowledge of patent systems by the previous lecture, will get familiar with actual case studies on ethical and legal issues in patents. (M. Nakagawa: Electrical and Electronics Engineering)</p> <p>Ethics required for advanced science. (6/27) 1time. Engineers and researchers are at the forefront of preventing harm caused by advanced chemistry. Think about social roles and ethics required by engineers and researchers through relationships between chemical substances and environmental problems, efforts to avoid hazards of nanomaterials. (K. Miura: Industrial Chemistry)</p> <p>Ethics in press release. (7/4) 1time. Press Release is an essential process for introducing the research to our society through various medias. In this lecture, issues related to Press Release in University are addressed and discussed. (K. Umeno: Informatics and Mathematical Science)</p> <p>Failure accidents and inspection/maintenance (7/11) 1time. On the occasions of failure accidents of vehicles and plants, the appropriateness of inspection/maintenance of their structures is often questioned. Some actual failure accidents are reviewed to discuss the importance of inspection/maintenance together with the relation to engineering ethics. (S. Biwa: Engineering Science)</p> <p>Ethics in nuclear engineering. (7/18) 1time. Discussion on engineering ethics in the TEPCO accident from view point of Tsunami evaluation by the Japanese government. (I. Takagi: Engineering Science)</p> <p>Ethical issues on sound design. (7/25) 1 time. Every working things consuming energy emits acoustic sound. Even a small sound energy affect human as noise and may create annoyance and health problems. Sound problems of various things are introduced in the lecture. Ethical issues, which shall be considered during design and operation environment, will be discussed. (Y. Takano: Architecture)</p>	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
Class participation and reports.	
[Textbook]	
Lecture materials will be distributed.	
[Reference books, etc.]	
<p>(Reference books)</p> <p>♯ Omnibus Engineering Ethics ♯ (Kyoritsu Shuppan Co., Ltd.) ISBN:978-4320071964</p> <p>♯ Practical Engineering Ethics - A Short Course, New Edition ♯ (Kagaku-Dojin Publishing Company,INC) ISBN:9784759811551</p> <p>♯ Engineering Ethics (Revised Edition) ♯ (CORONA PUBLISHING CO.,LTD.) ISBN:978-4-339-07798-8</p> <p>♯ World of Engineering Ethics (3rd Edition) ♯ (Morikita Publishing Co., Ltd.) ISBN:978-4-627-97303-9</p>	

Continue to 工学倫理(3)	

Numbering code					
Course title <English>	工学倫理 Engineering Ethics		Affiliated department, Job title,Name	Graduate School of Energy Science Professor.TAKUDA HIROHIKO Graduate School of Engineering Professor.ATOMI HARUYUKI Graduate School of Engineering Senior Lecturer.KANEKO KENTAROU	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Modern ethics based on engineering aspect are becoming essential to present engineers and scientists. Instructors from various faculties give lectures about ethics in their research fields.					
[Course Goals]					
The goal of this class is to understand engineering ethics, and to develop the ability to judge by yourself when you encounter ethical issues.					
[Course Schedule and Contents]					
Significance to learn engineering ethics. (4/11) 1time. As an introduction to this course, the meaning of engineering ethics and the significance to learning it are explained. Examples are shown in building engineering area on daily disastrous accidents and fire event. The significances of engineering ethics to those examples are discussed. (K. Harada: Architecture)					
Geotechnical engineering and engineering ethics. (4/18) 1 time. Geotechnical Engineering is indispensable in discussing the underground public use, slope stability, geo-sequestration of byproduct for the energy generating. Introducing some examples of natural disasters and construction accidents, geotechnical engineering and engineering ethics will be discussed. (K. Kishida: Global Engineering)					
Engineering ethics as an applied ethics. (4/25) 1 time. In this lecture, I will show the basic Idea of Engineering Ethics by comparing with the other fields of Applied Ethics. And show its unique character in the age of information technology. (M. Mizutani: Graduate School of Letters)					
Ethical theories for engineering ethics. (5/2) 1 time. This lecture focus on various ideas in ethics (utilitarianism, deontology, virtue ethics, professional ethics etc.) which will be useful for thinking about particular ethical problems in engineering ethics. (T. Iseda: Graduate School of Letters)					
Art-view concept for engineering. (5/9) 1time. Concept of "quality of life" is required for human related engineering. Some practical examples in medical-care and welfare fields will be introduced, and problem of the QOL-evaluation will be discussed from both function-optimizing view point and art view point. (N. Tomita: Engineering Science)					
Ethics of biotechnology and stem cell research. (5/16) 1time. With the rapid development of genome editing technology and stem cell engineering, editing of the human genome that goes beyond generations has become possible, at least technically. In this lecture, I will introduce these latest technologies and think about ethical problems accompanying technological development. (G. Eiraku: Industrial Chemistry)					
Research and engineering ethics. (5/23) 1time. It is said that He that will do no ill, must do nothing that belongs thereto. The sense of ethics necessary to whom conducts research and engineering work in society is discussed in terms of the importance of equitability and fair evaluation to anyone involved in each area of research or engineering. (H. Mikada: Global Engineering)					
Ethics in biomedical engineering. (5/30) 1time. Recent dramatic progress in biology-related techniques, such as reproductive medicine, genome editing, and clone-animal techniques, is causing revolutions in the fields of					
----- Continue to 工学倫理(2)					

工学倫理(3)	

[Regarding studies out of class (preparation and review)]	
The assignment of the report will be given for each lesson.	
(Others (office hour, etc.))	
The class order is subject to change.	
*Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	工学序論 Introduction to Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,MATSUMOTO RIYOUSUKE Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU Graduate School of Engineering Senior Lecturer,ASHIDA RIYUICHI		
Target year	1st year students or above	Number of credits	1	Course offered year/period	2019/Intensive, First semester
Day/period	Intensive	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
1~2times, 6times,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

G L セミナー I (企業調査研究) (2)					
[Reference books, etc.]					
(Reference books)					
(Related URLs)					
http://www.glc.t.kyoto-u.ac.jp/ugrad					
[Regarding studies out of class (preparation and review)]					
Investigating companies in advance. Analyzing the result from hands-on training. Preparing presentation.					
(Others (office hour, etc.))					
How to register will be announced later. Students who want to join this course is requested to attend the first class. Students are prohibited to skip hands-on training. Evaluation will be based on presentation.					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	G L セミナー I (企業調査研究) Global Leadership Seminar I	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,YOROZU KAZUAKI Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO		
Target year	2nd year students or above	Number of credits	1	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
The purpose of this course is to study about how worldwide leading company, institute, etc. make proposals and find solutions for expanding their own technologies to the international market. Throughout hands-on training on their laboratory, students investigate the methodology of team organization, proposal, market prediction and conception ability by group works. After the investigation, students are expected to improve their comprehension and explanation capability. As extended exercise subject of this course, the Global Leadership Seminar II is opened in the second semester.					
[Course Goals]					
The goal of this course is to improve student's comprehension and explanation capability for processes of proposal and expansion on the international market investigating worldwide leading companies by group work.					
[Course Schedule and Contents]					
Week 1, Guidance Week 2-13, Hands-on training Week 14, Pre-presentation Week 15, Final presentation					
[Class requirement]					
How to register will be announced later. Students who want to join this course is requested to attend the first class.					
[Method, Point of view, and Attainment levels of Evaluation]					
Students are prohibited to skip hands-on training. Evaluation will be based on presentation.					
[Textbook]					
Not used					
Continue to G L セミナー I (企業調査研究) (2)					

Numbering code					
Course title <English>	工学部国際インターンシップ 1 Faculty of Engineering International Internship 1	Affiliated department, Job title,Name	Approved		
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Seminar	Language	Japanese and English
[Outline and Purpose of the Course]					
Acquisition of international skills with the training of foreign language through the internship programs hosted by the University, the Faculty of Engineering, or the undergraduate school the applicant belongs to.					
[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 Schedule and Contents]					
Overseas Internship,1time,The contents to be acquired should be described in the brochure of each internship program. Final Presentation,1time,A presentation by the student is required followed by discussion among participants.					
[Class requirement]					
Described in the application booklet for each internship program. The registrant is requested to have enough language skills for the participation.					
[Method, Point of view, and Attainment levels of Evaluation]					
Merit rating is done based on the presentation or reports after each internship program. Each Department responsible to identify if the credit earned by this subject to be included as mandatory ones or not. If the credit is not included in the undergraduate school in which the participant belongs to, the credit is granted by the Global Leadership Education Center as an 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.					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student is enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	G L セミナー I I (課題解決演習) Global Leadership Seminar II		Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,MAEDA MASAHIRO Graduate School of Engineering Senior Lecturer,KANEKO KENTAROU	
Target year	2nd year students or above	Number of credits	1	Course offered year/period	2019/Intensive, Second semester
Day/period	Intensive	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
This course is a small-group workshop program where students are supposed to extract or set up challenges by themselves aiming at creating new social values. In concrete, abilities of planning and problem-solving are trained through group works in residential training and skills of presentation and communication are enhanced through oral presentations regarding contents of the proposal at each step of the process from a preliminary draft to its completion.					
[Course Goals]					
Ability of planning, from extraction or setting up challenges to proposal of solutions aiming at creating new social values, is trained through group works.					
[Course Schedule and Contents]					
Orientation,1time,A brief overview and a schedule of the course are explained and working groups are organized. Lectures,2times,Lectures by experts are given. Group works,3times,Setting up challenges, extraction of problems, collecting information, and group works are done. Residential training,7times,Through intensive group works based on discussion, a proposal for solving problems is planned, a draft report is made, and a few presentations are made. Preliminary review meeting,1time,A preliminary review meeting is held and discussions are made. Report meeting,1time,Final presentations are made and reports are submitted.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
It is required to join the residential training. A report meeting is held and comprehensive evaluation concerning abilities in group discussion to extract or set up challenges and to propose solutions for achieving a goal is made through presentation of the proposal as well as a submitted report.					
[Textbook]					
Will be indicated as necessary.					
----- Continue to G L セミナー I I (課題解決演習) (2)					

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Numbering code					
Course title <English>	工学部国際インターンシップ2 Faculty of Engineering International Internship 2		Affiliated department, Job title,Name	Approved	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Intensive, year-round
Day/period	Intensive	Class style	Seminar	Language	Japanese and English
[Outline and Purpose of the Course]					
Acquisition of international skills with the training of foreign language through the participation to the international internship programs held by the Faculty of Engineering or its subsidiary bodies.					
[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 Schedule and Contents]					
Overseas Internship,1time,The contents to be acquired should be described in the brochure of each internship program. Final Presentation,1time,A presentation by the student is required followed by discussion among participants.					
[Class requirement]					
Described in the application booklet for each internship program. The registrant is requested to have enough language skills for the participation.					
[Method, Point of view, and Attainment levels of Evaluation]					
Merit rating is done based on the presentation or reports after each internship program. Each Department responsible to identify if the credit earned by this subject to be included as mandatory ones or not. If the credit is not included in the undergraduate school in which the participant belongs to, the credit is granted by the Global Leadership Education Center as a optional credit. The number of credits, either 1 or 2, will be determined depending on the contents and the duration of the program that the participant has participated in.					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
It is required for students to check if the internship program to participate in could be evaluated as part of mandatory credits or not and could earn how many credits before the participation to the undergraduate school or educational program the student in enrolled. If the credit could not be treated as mandatory ones, get in touch with the Global Leadership Engineering Education Center.					
*Please visit KULASIS to find out about office hours.					

G L セミナー I I (課題解決演習) (2)					
[Reference books, etc.]					
(Reference books) Will be indicated as necessary.					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
Course open period: October to January How to register the course will be instructed. *It depends on divisions which students belong to whether the earned credits are admitted as credits required for graduation. Please refer to the syllabus of your division. *Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	計算機数学 (原) Mathematics for Computation		Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TAISHI KOBAYASHI	
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course deals with numerical calculation method by computer. The goal is to acquire a series of processing methods such as planning processing method, program creation, analysis of results by learning the programming language.					
[Course Goals]					
The goal is to acquire a series of processing methods such as planning processing method, program creation, analysis of results.					
[Course Schedule and Contents]					
(1) Orientation and terminal operation, 2 class Login method of the terminal of the satellite exercise room, how to operate the editor, etc. (2) Learn the mechanism of numerical calculation, 2 classes Understanding the principle of numerical calculation, representation of numbers, errors accompanying calculation. (3) Basic programming, 3 classes Acquisition of essential items for programming such as input / output, branch, repeat, variable, array, subprogram and function three times. \ task: sum-difference product quotient, sum of sequence, prime number (4) Applicative programming, 4 classes Roots of the equation (dichotomy, Newton's method), numerical integration (Simpson method), simultaneous linear equation (Gauss elimination method), eigenvalue (Jacobi method), differential equation (Runge-Kutta method) Acquire the basic idea of calculation method and do actual programming. (5) Constructive programming, 3 classes Acquire about several development problems and solutions, and work on issues. (6) Confirmation of learning attainment, 1 class Post explanation and review of examination questions to KULASIS.					
[Class requirement]					
Recommend to take basic information processing and basic information processing exercises.					
[Method, Point of view, and Attainment levels of Evaluation]					
[Grading method] Grade is based on reports (30%) and one written examination (70%). [Grading criterion] Must score 60 or above out of 100 on the reports and written examination 60 or above: pass 59 or below: fail					
----- Continue to 計算機数学 (原) (2)					

計算機数学 (原) (2)	

[Textbook]	
Not used	
[Reference books, etc.]	
(Reference books)	
戸川隼人 『演習と応用 FORTRAN77』 (サイエンス社) ISBN:4781905110 堀之内他 『ANSI Cによる数値計算法入門 (第2版)』 (森北出版) ISBN:4627093829	
[Regarding studies out of class (preparation and review)]	
As needed, practice exercises will be conducted in class, so please review after class.	
(Others (office hour, etc.))	
Lecture is given in Japanese.	
*Please visit KULASIS to find out about office hours.	

Numbering code			
Course title <English>	計算機数学 (材) Mathematics for Computation	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,OKUDA HIROSHI
Target year	2nd year students or above	Number of credits	2
Course offered year/period		2019/First semester	
Day/period	Tue.1	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
.2times, .2times, .3times, .4times, .3times, .1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

Numbering code			
Course title <English>	計算機数学 (エネ) Mathematics for Computation	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,HACHIYA KAN Graduate School of Energy Science Associate Professor,Jun HAYASHI
Target year	2nd year students or above	Number of credits	2
Course offered year/period		2019/First semester	
Day/period	Tue.1	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
To acquire the ability of basic computational programing and learn the basic mathematics underlying the computational programing.			
[Course Goals]			
To acquire the ability of basic computational programing and learn the basic mathematics underlying the computational programing.			
[Course Schedule and Contents]			
Orientation and Practice of terminal operation, 2times, Lecture on adjust login system of satellite lecture room; Lecture on the procedure to build up the computational environment Basics of the numerical computational language, 2times, Lecture on the basics of the numerical computation, 3times, Input/Output; Subroutine; etc.// Exercise of the arithmetic operations, Sequences, etc. Basic programing, 4times, Lecture on the basics of approximations of roots of the real-valued function (Newton's method), numerical integration (Simpson Method); Simultaneous equation (Gaussian elimination), etc. Advanced programing, 3times, Lecture on the procedure to built a structure of the complicated issues// Exercise of advanced programming. Summary and confirmation, 1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
Comprehensive evaluation of attendance, exercises and examination.			
[Textbook]			
Not used			
[Reference books, etc.]			
(Reference books)			
Introduced during class			
[Regarding studies out of class (preparation and review)]			
Learn the basics of FORTRAN and C. Try to understand the exercises in each lecture.			
(Others (office hour, etc.))			
Check KULASIS/Office Hours			
*Please visit KULASIS to find out about office hours.			

Numbering code			
Course title <English>	計算機数学 (機 : 7・9・11組) Mathematics for Computation	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TATSUMI KAZUYA
Target year	2nd year students or above	Number of credits	2
Course offered year/period		2019/First semester	
Day/period	Thu.2	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
This course focuses on the mathematical and numerical methods for numerical computation. We will learn the mathematical methods to solve mathematical and physical problems by using computers. We will study the programming language and practice programming to learn and experience the process of how to use a program to solve problems, write programs, and analyze the results, and also understand the accuracy and characteristics of the numerical methods.			
[Course Goals]			
Understand and learn the basic knowledge, method and skill of mathematical solution for computation, planning the numerical method, programming, and analyze the results.			
[Course Schedule and Contents]			
Mathematics for numerical simulation (3) Learn the principle of computation and the mathematical method, and understand the error appearing in the computation. Orientation and operating the terminal (1) Access to the computer in the satellite seminar room and how to use the editor, and compile and run a program. Basic programming (2) Learn the basic statements and structure of programming (input, output, loop, parameters, array, sub routine, function, etc.) Applied and practical problems (5) We will learn the fundamental method and programming of various numerical methods: solution of equation (Bisection method, Newton's method), numerical integration (Simpson's method), simultaneous equation (Gaussian elimination), differential equation (Runge-Kutta method), data analysis (least-square method). Advanced programming (3) Learn the mathematical method and programming for advanced problems including physical phenomena. Confirmation of learning attainment. (1)			
Continue to 計算機数学 (機 : 7・9・11組) (2)			

Numbering code	
Course title <English>	材料力学 1 (機字: 学番奇数) Mechanics of Materials 1
Affiliated department, Job title, Name	Graduate School of Engineering Professor.HOUJIYOU MASAKI
Target year	2nd year students or above
Number of credits	2
Course offered year/period	2019/First semester
Day/period	Wed.1
Class style	Lecture
Language	Japanese
[Outline and Purpose of the Course]	
[Course Goals]	
[Course Schedule and Contents]	
,1time, ,1time, ,2times, ,1time, ,4times, ,1time, ,4times, ,1time,	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
The order of classes listed above and their timing may differ depending on the year. *Please visit KULASIS to find out about office hours.	

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Numbering code	
Course title <English>	材料力学 1 (機字: 学番偶数) Mechanics of Materials 1
Affiliated department, Job title, Name	Graduate School of Engineering Professor.KITAMURA TAKAYUKI Professor.HIRAKATA HIROYUKI
Target year	2nd year students or above
Number of credits	2
Course offered year/period	2019/First semester
Day/period	Wed.1
Class style	Lecture
Language	Japanese
[Outline and Purpose of the Course]	
[Course Goals]	
[Course Schedule and Contents]	
,1time, ,1time, ,2times, ,1time, ,4times, ,1time, ,4times, ,1time,	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code	
Course title <English>	計算機数学 (機: 8・10・12組) Mathematics for Computation
Affiliated department, Job title, Name	Graduate School of Engineering Professor.MATSUBARA ATSUSHI Graduate School of Engineering Associate Professor.KOUNO DAISUKE Graduate School of Informatics Associate Professor.SAKURAMA KAZUNORI
Target year	2nd year students or above
Number of credits	2
Course offered year/period	2019/First semester
Day/period	Mon.2
Class style	Lecture
Language	Japanese
[Outline and Purpose of the Course]	
[Course Goals]	
[Course Schedule and Contents]	
,2times, ,2times, ,3times, ,4times, ,3times, ,1time,	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code	
Course title <English>	材料力学 1 (機字: 学番偶数) Mechanics of Materials 1
Affiliated department, Job title, Name	Graduate School of Engineering Professor.KITAMURA TAKAYUKI Graduate School of Engineering Professor.HIRAKATA HIROYUKI
Target year	2nd year students or above
Number of credits	2
Course offered year/period	2019/First semester
Day/period	Wed.1
Class style	Lecture
Language	Japanese
[Outline and Purpose of the Course]	
[Course Goals]	
[Course Schedule and Contents]	
0	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	材料力学1 (材工ネ原 : 学番奇数) Mechanics of Materials 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,IMATANI SHIYOUJI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Concepts of Mechanics of Materials,2times, Subjects on Simple Stress States,3times, Strain Energy,2times, Bending of Beams,5times, Complex beams,2times, ,1time,					
[Class requirement]					
Fundamentals of Mathematics and Physics					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
ISBN:4-563-03465-7 (Zairyō Rikigaku no Kiso, Shibata, Ohtani, Komai, Inoue, Baifukan) isbn{ } {4563034657}					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料力学2 (機 : 7,8,9,10組) Mechanics of Materials 2	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NISHIKAWA MASAAKI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[Course Goals]					
The emphasis is to understand the fundamental concepts and methods for the stress/strain analysis of various structures or structural members, by advancing the basic principles given in Mechanics of Materials 1.					
[Course Schedule and Contents]					
Beam bending,2times,Beam bending; Castigliano's theorem Advanced problems of beams,3times,Statically indeterminate beams; continuous beams; curved beams Basics of elasticity ,4times,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,2times,Torsion of circular bars; coil springs; Combination of bending and torsion Axially symmetric problems,1time,Buckling of column; instability; effect of support conditions; buckling design Axially symmetric problems and bending of plates,2times,Circular cylinders; spherical shells; rotating circular plates; Cylindrical bending, bending rigidity; Assessment,1time,Academic achievement assessment Feedback,1time					
* The order and the hours (weights) for each item are possibly subject to change.					
[Class requirement]					
Mechanics of Materials 1, and other subjects such as calculus, linear algebra, mechanics of particles and rigid bodies.					
[Method, Point of view, and Attainment levels of Evaluation]					
[Evaluation method] Evaluation is based on the mid-term and the final examinations, possibly with considerations of short reports (about three times). (In the cases where the evaluation for short reports are considered, the ratio of the evaluations for regular examination and short reports is about 9:1.) [Evaluation standard] Evaluation is based on class registration guideline.					
----- Continue to 材料力学2 (機 : 7,8,9,10組) (2)					

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Numbering code					
Course title <English>	材料力学1 (材工ネ原 : 学番偶数) Mechanics of Materials 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HOSHIDE TOSHIIKO		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,2times, ,3times, ,2times, ,5times, ,2times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

材料力学2 (機 : 7,8,9,10組) (2)					

[Textbook]					
T. Shibata et al. 『Fundamentals of Strength of Materials (Zairyō-Rikigaku no Kiso) a (Baifu-kan) ISBN: 4563034657					
[Reference books, etc.]					
(Reference books) To be referred to during the course					
[Regarding studies out of class (preparation and review)]					
It is highly recommended to make the preparation and review with the specified textbook. Homework (short reports: about three times) will be assigned.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code							
Course title <English>	材料力学 2 (機: 11,12組、宇) Mechanics of Materials 2	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,HAYASHI TAKAHIRO	Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/Second semester	Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]							
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.							
[Course Goals]							
The emphasis is to understand the fundamental concepts and methods for the stress/strain analysis of various structures or structural members, by advancing the basic principles given in Mechanics of Materials 1.							
[Course Schedule and Contents]							
Week 1,2. Deflection of beams Week 3-5. Complex beam problem Week 6-9. Basic theory of Elasticity Week 10,11. Tortion Week 12. Buckling Week 13,14. Axisymmetric problem, Deflection of plates Week 15. Examination							
[Class requirement]							
Mechanics of Materials 1, and other subjects such as calculus, linear algebra, mechanics of particles and rigid bodies.							
[Method, Point of view, and Attainment levels of Evaluation]							
Grading is based on the mid-term and the final examinations, possibly with considerations of class-room tests or reports.							
[Textbook]							
T. Shibata et al. 『Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso)』a (Baifu-kan) ISBN: 4563034657 Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso) (T. Shibata et al.), Baifu-kan isbn{ } { 4563034657}.							
[Reference books, etc.]							
(Reference books) Introduced during class							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.)) The order and the hours (weights) for each item are possibly subject to change.							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	熱力学 2 (機字: 学番奇数) Thermodynamics 2	Affiliated department, Job title,Name	Graduate School of Engineering Professor,NAKABE KAZUYOSHI Graduate School of Engineering Associate Professor,TATSUMI KAZUYA	Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/Second semester	Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
,1time, ,2times, ,2times, ,6times, ,2times, ,1time, ,1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	材料力学 2 (材工ネ原) Mechanics of Materials 2	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,KINOSHITA KATSUYUKI	Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/Second semester	Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
,3times, ,2times, ,4times, ,4times, ,1time, ,1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	熱力学 2 (機字: 学番偶数) Thermodynamics 2	Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOSHIDA HIDEO Graduate School of Engineering Associate Professor,IWAI HIROSHI	Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/Second semester	Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
0							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.							

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Numbering code					
Course title <English>	熱力学2 (工ネ原) Thermodynamics 2	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,ISHIYAMA TAKUJI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,2 ~ 3times, ,2 ~ 3times, ,3times, ,2times, ,2times, ,2times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

材料基礎学1 (機宇:学番奇数)(2)					

[Regarding studies out of class (preparation and review)]					
Read the textbooks before each class, and ascertain the knowledge after the class.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	材料基礎学1 (機宇:学番奇数) Fundamentals of Materials 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TOMITA NAOHIDE		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Introductory class to teach fundamentals for Material Science.					
[Course Goals]					
[Course Schedule and Contents]					
Bonding and structure of materials: Crystal structure, defects in crystals, structure and properties of polymers etc.: 3times					
Plastic deformation and fracture: Crystal defect and fracture etc.: 3times					
Phase diagram: The phase rule, binary system diagram, ternary phase diagram etc. :2times					
Solidification and phase transformation, deposition etc.: 2times					
Processing: Hot and cold processing, recrystallization etc. 1-2times					
Steel: Steel processing, material, heat treatment, transformation etc.: 2-3times					
feedback lesson: 0-1 time					
Confirmation of learning achievement: by reports and a test					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
reports and a test					
[Textbook]					
isbn:4901381008 be sold at 日本材料学会事務所 (http://www.jsms.jp/index.html)					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Continue to 材料基礎学1 (機宇:学番奇数)(2)					

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Numbering code					
Course title <English>	材料基礎学1 (機宇:学番偶数) Fundamentals of Materials 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HIRAKATA HIROYUKI Graduate School of Engineering Associate Professor,SHIMADA TAKAHIRO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Introductory class to teach fundamentals for Material Science.					
[Course Goals]					
[Course Schedule and Contents]					
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection.					
Intrusion Detection by Signature-Based IDS,5times.Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks.					
Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
reports and a test					
[Textbook]					
isbn:4901381008 be sold at 日本材料学会事務所 (http://www.jsms.jp/index.html)					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料基礎学 1 (工ネ原) Fundamentals of Materials 1	Affiliated department, Job title, Name	Graduate School of Engineering Professor, TAKAGI IKUJI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
In this course, we discuss the properties that are important in selecting and using materials, as well as basic information for understanding these properties, focusing on metal.					
[Course Goals]					
The goal of the course is for students to acquire the basic knowledge they need to pursue further studies in materials science and gain the ability to investigate appropriate materials in experimentation and design.					
[Course Schedule and Contents]					
(1) Structure of matter, 4 classes: Explain the size of the atoms that are the basis of matter and their electron configuration, types of bonds between atoms, the positions of electrons in solid matter, density and thermal expansion, and so on.					
(2) Production of materials, 3 classes: Explain redox and the coagulation of melts, phase equilibrium of materials comprised of two or more chemical elements, and other information concerning the composition of materials.					
(3) Mechanical properties, 2 classes: Explain properties related to the structural materials used to support loads such as elastic deformation and plastic deformation, yield strength, creep, and so on.					
(4) Change in properties, 2 classes: Explain factors behind the change in the mechanical properties of materials such as addition of chemical elements, annealing, normalizing, quenching, and so on, as well as the reasons for these factors.					
(5) Functions of materials, 2 classes: Explain the main functional properties of materials such as conduction of heat and electricity, specific heat, penetration of light, magnetism, and so on.					
(6) Resources and recycling, 1 class: Discuss information concerning sustainable development such as abundance and reserves of chemical elements, recycling of materials, and so on.					
(7) Confirmation of learning attainment, 1 class: Post explanation and review of examination questions on KULASIS.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Grading method] Grade is based on one written examination.					
[Evaluation standard] Must score at least 60 out of 100 on the written examination 60 or above: pass 59 or below: fail					
----- Continue to 材料基礎学 1 (工ネ原) (2)					

材料基礎学 1 (工ネ原) (2)					
[Textbook]					
In addition, printouts will be distributed in class.					
[Reference books, etc.]					
(Reference books) Introduced during class					
[Regarding studies out of class (preparation and review)]					
Practice problems and their solutions will be discussed in class, so please review after class.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	計測学 (機工ネ原: 学番奇数) Scientific Measurement	Affiliated department, Job title, Name	Graduate School of Engineering Professor, TABATA OSAMU Graduate School of Engineering Associate Professor, TSUCHIYA TOSHIYUKI Graduate School of Engineering Associate Professor, YOKOKAWA RYUUII Graduate School of Energy Science Associate Professor, KINOSHITA KATSUYUKI Graduate School of Energy Science Associate Professor, MIYAKE MASAO		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Basics of scientific instrumentation is covered.					
[Course Goals]					
Understanding of the basics of scientific instrumentation in engineering physics.					
[Course Schedule and Contents]					
Units and Standards, 2times, Units and Standards Measurement uncertainty and its evaluation, 3times, Measurement uncertainty and its evaluation Data processing and statistical analysis, 3times, Data processing and statistical analysis Electrical and temperature measurement, 2times, Electrical and temperature measurement Radiation and material measurement, 2times, Radiation and material measurement Mechanical measurement, 2times, Mechanical measurement level of attainment, 1time, level of attainment					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Examination. Reports are considered also.					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	計測学 (機工ネ原: 学番偶数) Scientific Measurement	Affiliated department, Job title, Name	Graduate School of Engineering Professor, TABATA OSAMU Graduate School of Engineering Associate Professor, TSUCHIYA TOSHIYUKI Graduate School of Engineering Associate Professor, YOKOKAWA RYUUII Graduate School of Energy Science Associate Professor, KINOSHITA KATSUYUKI Graduate School of Energy Science Associate Professor, MIYAKE MASAO		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Basics of scientific instrumentation is covered.					
[Course Goals]					
Understanding of the basics of scientific instrumentation in engineering physics.					
[Course Schedule and Contents]					
Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class. \\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, 5times, Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Examination. Reports are considered also.					
[Textbook]					
----- Continue to 計測学 (機工ネ原: 学番偶数) (2)					

計測学 (機工ネ原:学番偶数) (2)
[Reference books, etc.] (Reference books)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

固体物理学 (材工ネ原宇) (2)
[Regarding studies out of class (preparation and review)] Knowledge on quantum mechanics and statistical mechanics is highly helpful.
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

Numbering code	
Course title <English> 固体物理学 (材工ネ原宇) Solid State Physics	Affiliated department, Job title, Name Graduate School of Engineering Professor, NAKAMURA HIROYUKI
Target year 2nd year students or above	Number of credits 2 Course offered year/period 2019/Second semester
Day/period Thu.1	Class style Lecture Language Japanese
[Outline and Purpose of the Course] Introduction to microscopic solid state physics	
[Course Goals] Gateway to atomic and electronic theories for materials	
[Course Schedule and Contents] Crystal and lattice, Diffraction by crystal, Bonding energy of crystal, 2times, Lattice and crystal structure, Miller indices, Bragg's law, vanishing rule and structure factor, repulsion and attraction between atoms, various atomic bonding Phonon, 2times, Sound wave in elastic body, dispersion relation, Brillouin zone, acoustic mode and optical mode, phonon Introduction to statistical mechanics, Specific heat of solid, 3times, Introduction to statistical mechanics, Boltzman distribution, entropy, state sum and free energy, Einstein model for specific heat of solid, Debye model for specific heat of solid, thermal expansion of solid Introduction to quantum mechanics, 3times, Introduction to quantum mechanics, Shrodinger equation, free electron/harmonic oscillator/hydrogen atom, physical quantities and operators Free electron model. Thermal and transport properties of metal, 3times, Density of states, Fermi-Dirac distribution, electron specific heat, resistivity of metals, Hall effect, thermal conductivity of metals Electrons in periodic potential, 1time, Effects of periodic potential, energy bands, metal/semiconductor/insulator Assessment, 1time, Assessment	
[Class requirement] None	
[Method, Point of view, and Attainment levels of Evaluation] Evaluation will be based on a final examination.	
[Textbook] M. Shiga 『Introduction to Solid State Physics for Materials Scientists』 (Uchidarokakuho) ISBN: 9784753655526 (in Japanese)	
[Reference books, etc.] (Reference books) C. Kittel 『Introduction to Solid State Physics』 (Wiley) ISBN:9780471415268	
Continue to 固体物理学 (材工ネ原宇) (2)	

Numbering code	
Course title <English> 応用電磁気学 (機宇:学番奇数) Applied Electromagnetism	Affiliated department, Job title, Name Graduate School of Engineering Associate Professor, SHIKAMA TAIICHI
Target year 3rd year students or above	Number of credits 2 Course offered year/period 2019/First semester
Day/period Tue.1	Class style Lecture Language Japanese
[Outline and Purpose of the Course]	
[Course Goals]	
[Course Schedule and Contents] .2?3times, .3?4times, .2?4times, .3?5times, .1time,	
[Class requirement] None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.] (Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	応用電磁気学 (機字:学番偶数) Applied Electromagnetism	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUZUKI MOTOFUMI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection.					
Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks.					
Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance.					
Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code		U-ENG25 25014 LJ57	U-ENG25 25014 LJ75	U-ENG25 25014 LJ52
Course title <English>	原子物理学 (材工ネ原宇) Atomic Physics	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Associate Professor,MAJIMA TAKUYA	
Target year	2nd year students or above	Number of credits	2	Course offered year/period
Day/period	Fri.3	Class style	Lecture	Language
[Outline and Purpose of the Course]				
量子力学の発見につながる物理現象の概説を行う。次に、原子や分子などの微視的世界における様々な現象とそこから導かれる諸法則について、具体的な例を交えながらわかりやすく概観し、量子力学への入門とする。				
[Course Goals]				
古典物理学では記述できない現象を理解する。また原子や分子に関連する微視的世界における諸法則を理解し、量子力学へ向けた基礎知識を習得することを目標とする。				
[Course Schedule and Contents]				
原子論,1回,自然哲学的原子論,化学的原子論,原子と原子核,原子核の構造と素粒子,現在の素粒子像				
気体分子運動論,2回,化学反応的原子論,気体分子運動論の基本仮定,気体の圧力と温度,物質の比熱,分子のエネルギーと速度の分布則				
熱輻射とエネルギー量子,2回,熱輻射の諸性質, Stefan-Boltzmannの法則, Wienの変位則, 古典論的輻射公式 (Rayleigh-Jeans, Wien), Planckの輻射公式とエネルギー量子				
光子と電子,2回,電子とその粒子的諸性質,電子の発見,ベータ粒子,光子:光の粒子性,光電効果,コンプトン効果				
原子模型,2回,電子と原子構造,長岡の原子模型とThomsonの原子模型, Rutherfordの原子模型(原子核の発見), Bohrの原子模型(原子構造への量子論的アプローチ) \\ 量子条件,電子の波動性				
シュレディンガー方程式,3回,波動と波束,ド・ブロイ波の性質,不確定性関係, Schrödinger方程式(量子力学)				
シュレディンガー方程式の解,2回, Schrödinger方程式の解,ポテンシャル障壁の反射と透過,量子トンネル効果,弦の振動とポテンシャル箱の中の粒子,水素原子				
学習到達度の確認,1回,これまでの学習について到達度の確認を行う。				
[Class requirement]				
古典力学,電磁気学,熱力学				
[Method, Point of view, and Attainment levels of Evaluation]				
成績評価は試験による。素点で評価する。				

Continue to 原子物理学 (材工ネ原宇) (2)				

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Numbering code					
Course title <English>	応用電磁気学 (工ネ原) Applied Electromagnetism	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,SAITOU MANABU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection.					
Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks.					
Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance.					
Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

原子物理学 (材工ネ原宇) (2)	

[Textbook]	
Not used	
[Reference books, etc.]	
(Reference books)	
原子物理学(菊池, 共立出版) isbn{}{4320030478}, 原子物理学 (シュボルスキー, 東京図書) isbn{}{4489001452}など	
[Regarding studies out of class (preparation and review)]	
講義に関連した啓蒙書などを読み、歴史の中で生まれた物理学を理解することが望ましい。	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	量子物理学 2 (機) Quantum Physics 2		Affiliated department, Job title,Name	Graduate School of Engineering Professor,HASUO MASAHIRO	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,3times, ,3times, ,1?2times, ,1?2times, ,2times, ,3times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

量子物理学 2 (材原宇) 情報 (2)					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books)					
Modern Quantum Mechanics (J.J.Sakurai) isbn{}{9780805382914} isbn{}{9781292024103} Lectures on Quantum Theory (C.J. Isham) isbn{}{1860940013}					
[Regarding studies out of class (preparation and review)]					
Solve a distributed problem set.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	量子物理学 2 (材原宇) 情報 Quantum Physics 2		Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MIYADERA TAKAYUKI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Quantum theory is an astonishing theory. It describes perfectly a lot of phenomena inspite of its peculiar mathematical formulation. An important purpose of this course is to understand the formulation and to become capable to manipulate it.					
[Course Goals]					
To understand the fundamental structure of quantum theory. To be able to calculate some properties of quantum mechanical particle in three dimensional space.					
[Course Schedule and Contents]					
1. Fundamental framework 2. Angular momentum (1) 3. Angular momentum (2) generator of space rotation 4. Eigenvalue of Angular momentum operator. SU(2) and SO(3) 5. Spin 6. Central potential 7. Hydrogen atom 8. perturbation theory (1) 9. perturbation theory (2) 10. Heisenberg equation 11. Interaction picture 12. Bell's inequality 13. Mixed state 14. Many particle and Qunatum field 15. Learning achievement evaluation					
[Class requirement]					
Quantum Physics 1					
[Method, Point of view, and Attainment levels of Evaluation]					
exam					
Continue to 量子物理学 2 (材原宇) 情報 (2)					

Numbering code					
Course title <English>	連続体力学 (工ネ) Continuum Mechanics		Affiliated department, Job title,Name	Graduate School of Energy Science Professor,IMATANI SHIYOUJI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Basic assumptions,1 times, Vectors and tensors,2times, Fundamental laws,2 times, Constitutive framework,3times, Potential theories,2times, Wave motions,2times, Stabilities,2times, Examination,1 times,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title -<English>	連続体力学 (機) Continuum Mechanics	Affiliated department, Job title, Name	Institute for Frontier Life and Medical Sciences Professor, ADACHI TAIJI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This lecture provides an introduction to the theory of continuum mechanics for its application to the fields of bioengineering and biomedical engineering.					
[Course Goals]					
Students will be able to understand tensor analysis and continuum mechanics, and to apply them in modeling of living tissues and cells.					
[Course Schedule and Contents]					
1) Introduction to continuum mechanics					
2) Mathematical preliminaries Matrix algebra, Index notation, Summation convention, Eigenvalues and eigenvectors					
2 , 3) Vectors and tensors Cartesian tensors, Scalar and vector products, Dyadic product, Coordinate transformation, Invariants, Nabla operator, Divergence theorem					
4 , 5) Kinematics Bodies and configurations, Displacement, Strain tensor, Compatibility, Material time derivative					
6 , 7) Stress and equilibrium Force and stress, Stress tensor, Traction, Cauchy stress, Principal stresses, Equation of equilibrium					
8 , 9) Conservation Laws and governing equations Mass conservation, Linear and angular momentum, The first law of thermodynamics for continua					
10 , 11) Constitutive models Constitutive equations, Stress-strain relationship, Linear elasticity, Newtonian viscous fluids, Material symmetry, Biological tissues					
12 , 13) Boundary value problems Differential equations with a set of boundary conditions, Navier-Stokes equation, Navier's equation					
14 , 15) Summary Application of continuum mechanics to the analyses of biological tissues, Introduction to biomechanics					
----- Continue to 連続体力学 (機) (2)					

Numbering code					
Course title -<English>	エネルギー変換工学 (機エネ) Energy Conversion	Affiliated department, Job title, Name	Graduate School of Engineering Professor, NAKABE KAZUYOSHI Graduate School of Energy Science Professor, ISHIYAMA TAKUJI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
Energy source and energy conversion system, 3?4times, * Energy resources .3?4times, .3?4times, .3?4times,					
[Class requirement]					
Knowledge of thermodynamics is required.					
[Method, Point of view, and Attainment levels of Evaluation]					
Achievement will be synthetically evaluated from attendance, report and final examination.					
[Textbook]					
Nothing. Print material is properly distributed.					
[Reference books, etc.]					
(Reference books) It will be introduced, if necessary.					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

連続体力学 (機) (2)					

[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Exam 100 (+ Reports max 10)					
[Textbook]					
Instructed during class					
[Reference books, etc.]					
(Reference books) Introduced during class					
[Regarding studies out of class (preparation and review)]					
.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title -<English>	エネルギー変換工学 (原) Energy Conversion	Affiliated department, Job title, Name	Graduate School of Engineering Senior Lecturer, KAWARA ZENSAKU Graduate School of Engineering Professor, YOKOMINE TAKEHIKO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.2times, .4times, .2times, .3times, .3times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code		Course title <English>		Affiliated department, Job title,Name	Course offered year/period	
		制動工学 (機) Vibration Engineering		Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Professor,KOMORI MASAHARU Graduate School of Engineering Professor,MATSUBARA ATSUSHI	2019/Second semester	
Target year	3rd year students or above	Number of credits	2			
Day/period	Wed.1	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
.3times, .3times, .1time, .4times, .3times, .1time,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code		Course title <English>		Affiliated department, Job title,Name	Course offered year/period	
		制御工学 1 (機工ネ原 : 学番奇数) Control Engineering 1		Graduate School of Engineering Professor,MATSUNO FUMITOSHI Graduate School of Engineering Senior Lecturer,FUKUSHIMA HIROAKI	2019/First semester	
Target year	3rd year students or above	Number of credits	2			
Day/period	Thu.1	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
.1time, .3times, .2times, .2-3times, .3times, .2-3times, .1time,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code		Course title <English>		Affiliated department, Job title,Name	Course offered year/period	
		制動工学 (字) Vibration Engineering		Graduate School of Engineering Senior Lecturer,AOI SHINYA Graduate School of Engineering Professor,SENDA KEI	2019/Second semester	
Target year	2nd year students or above	Number of credits	2			
Day/period	Wed.1	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
.1time, .2times, .2times, .2times, .3times, .3times,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code		Course title <English>		Affiliated department, Job title,Name	Course offered year/period	
		制御工学 1 (機工ネ原 : 学番偶数) Control Engineering 1		Graduate School of Informatics Professor,OOTSUKA TOSHIYUKI Graduate School of Informatics Associate Professor,SAKURAMA KAZUNORI	2019/First semester	
Target year	3rd year students or above	Number of credits	2			
Day/period	Thu.1	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
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.						
[Course Goals]						
The course goal is to understand the basic concepts of Classical Control Theory such as transfer functions, frequency responses and stability.						
[Course Schedule and Contents]						
Introduction,1time,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,2-3times,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,3times,Time responses of linear systems are shown. Stability of systems and Stability tests are described. Properties of feedback systems,2-3times,Basic properties such as steady state characteristics of feedback control systems and Root Locus are explained. Frequency responses,3-4times,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,2times,Basic components of classical controller design methods such as Phase lead, Phase Lag, and PID compensation are described.						
[Class requirement]						
Elementary knowledge of Laplace Transform is required.						
[Method, Point of view, and Attainment levels of Evaluation]						
Scores of quizzes, reports and the regular examination are taken into account.						
[Textbook]						
T. Sugie, M. Fujita: Introduction of Feedback Control. Corona Publishing Co. Ltd. isbn{ }{9784339033038}						
[Reference books, etc.]						
(Reference books)						
T. Sugie, H. Kajiwara: Exercises in System Control Engineering. Corona Publishing Co. Ltd. isbn{ }{9784339033069}						
Continue to 制御工学 1 (機工ネ原 : 学番偶数) (2)						

制御工学 1 (機工ネ原 : 学番偶数) (2)	

(Related URLs)	
(none)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
Some parts of the above contents may be skipped/added depending on the course schedule of the year.	
*Please visit KULASIS to find out about office hours.	

制御工学 1 (宇) (2)	

[Textbook]	
T. Sugie and M. Fujita 『Introduction to feedback control』 (Corona Publisher) ISBN:4339033030 (in Japanese)	
[Reference books, etc.]	
(Reference books) Introduced during class	
[Regarding studies out of class (preparation and review)]	
To read through textbooks as the lecture progresses. Also, review the parts of the textbook instructed according to the achievement level of the assignments.	
(Others (office hour, etc.))	
Feedback on lecture understanding is made from time to time according to the degree of achievement of the assignments.	
*Please visit KULASIS to find out about office hours.	

Numbering code			
Course title <English>	制御工学 1 (宇) Control Engineering 1	Affiliated department, Job title, Name	Graduate School of Engineering Associate Professor, MARUTA ICHIROU
Target year	3rd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Mon.3	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
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.			
[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 Schedule and Contents]			
1. Introduction History and background of control engineering 2-5. Dynamical systems and transfer functions Basic knowledge on dynamical systems, ordinary differential equations, transfer functions and block diagrams 6-8. Transit response and stability Stability of dynamical systems, transit response, steady response and Routh-Hurwitz stability criteria 9-10. Frequency response Basic knowledge on frequency response using Bode plots and vector locus 11-13. Characteristic of feedback control systems Performance criteria of feedback control systems using Nyquist's stability criteria and the root locus method. 14-15. Design of feedback control system, How to design feedback control system using phase-lead compensation, phase-lead-lag compensation and PID control			
[Class requirement]			
Complex function theory, Ordinary differential equation theory			
[Method, Point of view, and Attainment levels of Evaluation]			
Evaluation will be based on the final examination which determines the degree of comprehension of the basic concepts and the design theory of feedback systems. Also, the reports and assignments will be added up to one third of the points lost in the final examination.			

Continue to 制御工学 1 (宇) (2)			

Numbering code			
Course title <English>	制御工学 2 (機) Control Engineering 2	Affiliated department, Job title, Name	Graduate School of Engineering Professor, MATSUNO FUMITOSHI Graduate School of Engineering Senior Lecturer, FUKUSHIMA HIROAKI
Target year	3rd year students or above	Number of credits	2
Course offered year/period	2019/Second semester		
Day/period	Wed.3	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,1time, ,2times, ,2times, ,2times, ,2times, ,1time, ,2times, ,2times, ,2times, ,1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

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Numbering code							
Course title <English>	制御工学 2 (宇) Control Engineering 2			Affiliated department, Job title,Name	Graduate School of Engineering Professor,FUJIMOTO KENJI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Mon.3	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
This course treats modern control theory based on state-space models of dynamical systems. It includes modeling, analysis and synthesis methods of feedback control systems.							
[Course Goals]							
Students will learn state-space equations, stability analysis, feedback controller synthesis and observer design.							
[Course Schedule and Contents]							
The basic schedule of the course is as follows.							
<ol style="list-style-type: none"> 1. Introductions 2. Ordinary differential equations and state-space equations 3. Eigenvalues, eigenvectors and systems 4. Solutions of state-space equations 5. Stability 6. Transfer functions and realization theory 7. Controllability 8. Observability 9. Coordinate transformation and canonical decomposition 10. Controllability canonical form 11. Observability canonical form 12. State feedback control 13. State observers and output feedback control 14. Optimal control and Kalman filters 15. Summary 							
[Class requirement]							
Students are required to take basic knowledge of linear algebra and differential equation theory. It is also preferable to take Control Engineering 1.							
[Method, Point of view, and Attainment levels of Evaluation]							
The points will be evaluated based on the score of the paper test. The report assignment and attendance point may add auxiliary points. The goal of this course is to understand the outline of the modern control and to acquire the ability to design the control system.							
[Textbook]							
Not used							
----- Continue to 制御工学 2 (宇) (2)							

Numbering code							
Course title <English>	生産工学 (機) Production Engineering			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,IZUI KAZUHIRO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Wed.2	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
This course deals with how to construct and operate a manufacturing system of a mechanical product.							
[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 Schedule and Contents]							
<p>Introduction,1time,The overall concept of a manufacturing system is given.</p> <p>Industrial Economics,2times,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.</p> <p>Production amp Operations Management,2times,Demand forecasting, production planning, inventory management, MRP, JIT, etc. are covered.</p> <p>.3times,</p> <p>Production Scheduling,2times,Basic approaches for single machine scheduling, flow shop scheduling, job shop scheduling, and project scheduling are introduced.</p> <p>Plant Layout amp Line Balancing,2times,Basic approaches for plant layout and line balancing are introduced.</p> <p>Industrial Engineering,2times,After introducing the principles of motion economy, the approaches for process analysis, human-machine analysis, Therblig analysis, standard time setting, etc. are addressed.</p> <p>.1time,</p>							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
The regular examination, in-class examinations and reports are taken into account.							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
Homework problems are assigned.							
(Others (office hour, etc.))							
The topics covered may be modified from the plan according to the actual schedule.							
*Please visit KULASIS to find out about office hours.							

制御工学 2 (宇) (2)							
[Reference books, etc.]							
(Reference books)							
Introduced during class							
[Regarding studies out of class (preparation and review)]							
We will give a report for each unit. Review is necessary after every lecture.							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	結晶物性学 (材工ネ) Physics of Crystal Properties and Imperfections			Affiliated department, Job title,Name	Graduate School of Engineering Professor,INUI HARUYUKI Graduate School of Engineering Associate Professor,KISHIDA KIYOUSUKE		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Fri.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
Dislocations are the most important lattice defects that strongly affect various properties, especially mechanical properties of crystalline materials. In this course, fundamental properties of dislocations as well as basics of elasticity will be lectured.							
[Course Goals]							
This class aims to help students to acquire fundamental understandings of dislocations and also to acquire ways to understand mechanical properties of crystalline materials based on dislocation theory.							
[Course Schedule and Contents]							
<ol style="list-style-type: none"> (1) Introduction to dislocations [1 week]: (2) Basics of elasticity theory [5 weeks] (3) Elastic properties of dislocations [2 weeks] (4) Motion of dislocations [2 weeks] (5) Force on dislocations [4 weeks] (6) Feedback [1 weeks] 							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
Evaluation will be based on one (or two) written examination(s). Attendance and daily reports may be considered in grading determination.							
[Textbook]							
Hand out materials will be provided during the lecture.							
[Reference books, etc.]							
(Reference books)							
鈴木秀次 『転位論入門』 (アグネ) ISBN:4750702315 J.P. Hirth and J. Lothe 『Theory of Dislocations』 (McGraw-Hill) ISBN:TY86299777 J.P. Hirth and J. Lothe 『Theory of Dislocations, 2nd ed.』 (Wiley) ISBN:047109125 幸田成康 『金属物理学序論』 (コロナ) ISBN:9784339042870 柴田俊忍 (ほか)共著 『材料力学の基礎』 (培風館) ISBN:4563034657							
[Regarding studies out of class (preparation and review)]							
To review contents covered in the previous lecture.							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code					
Course title <English>	材料物理化学(原) Physical Chemistry of Materials	Affiliated department, Job title,Name	Graduate School of Engineering Professor.TAKAGI IKUJI Graduate School of Engineering Associate Professor.TAISHI KOBAYASHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course deals with physicochemical information on nuclear energy materials such as production of fuel and soundness of materials, examining their principles and practical examples.					
[Course Goals]					
The goal of the course is to study fission reactors and nuclear fusion reactors in terms of physical chemistry, for instance thermodynamics, reaction velocity, and mass transfer.					
[Course Schedule and Contents]					
(1) Overview of nuclear energy materials, 1 class Provide an overview of nuclear energy materials and the various steps of the nuclear fuel cycle (mining and refinement of nuclear fuel resources, production and burning of nuclear fuel, storage and reprocessing of spent fuel, treatment and disposal of radioactive waste).					
(2) Isotope separation and concentration, 2 classes Explain the principles (gaseous diffusion process, centrifugal separation process) and methods (separative work units, enrichment cascade) of isotopes such as uranium.					
(3) Reaction kinetics, 2 classes Provide an overview of thermodynamics and reaction kinetics and explain order of reaction and rate constant determination methods, along with the influence of temperature.					
(4) Soundness of atomic reactor materials, 2 classes Outline the structure of atomic reactors from the perspectives of materials and cross-sections and explain the influence of radiation injury and corrosion on the soundness of materials, as well as the causes of and strategies for dealing with these phenomena.					
(5) Nuclear fusion reactor fuel and materials, 3 classes Explain the structure of nuclear fusion reactors from the perspectives of materials and cross-sections and explain the production and permeation leakage of the hydrogen isotopes that fuel nuclear fusion reactors, as well as the radioactivation of structural material.					
(6) Materials and radiation, 2 classes Discuss the radiation effect as a problem common to all nuclear energy materials and explain the influence of material properties and radiation.					
(7) Oxides and atomic fuel, 2 classes Explain the behavior of atomic fuel and fission products in reactors using oxygen potential and phase diagrams.					
(8) Confirmation of learning attainment, 1 class Post explanation and review of examination questions to KULASIS.					
Continue to 材料物理化学(原)(2)					

Numbering code					
Course title <English>	材料物理化学(工ネ) Physical Chemistry of Materials	Affiliated department, Job title,Name	Graduate School of Energy Science Professor.HIRATOU TETSUJI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course discusses physical chemistry in relation to materials and raw materials processing. To do so, lectures focus on thermodynamics, solution chemistry, electrochemistry, the sciences that serve as the basis for material production, functional materials processes, recycling, corrosion and corrosion protection, etc.					
[Course Goals]					
From this course, students will become able to do the following: 1. Thermodynamically estimate aqueous solution reactions (acid-base reaction, oxygen reduction reaction) utilizing the free energy of ion formation. 2. Depict log a-pH diagrams and phase-pH diagrams. 3. Read log a-pH diagrams and phase-pH diagrams. 4. Express simple reaction rate equations in differential and integral form, and determine the reaction rate constant from experiment results. 5. Determine activation energy in relation to reaction rate temperature dependence from an Arrhenius plot. 6. Consider electrode kinetics using the Butler-Volmer equation. 7. Consider corrosion in light of equilibrium theory (Potential-pH diagram). 8. Consider corrosion in light of kinetic theory (Evans diagram, mixed potential model).					
[Course Schedule and Contents]					
Fundamentals of chemical thermodynamics (2 classes) Confirmation is made of the basic items of Gibbs energy, chemical potential and activity, etc., all of which will serve as the foundation for this course.					
Equilibrium theory of aqueous solution reactions (6 classes) Lectures discuss acid-base reactions, oxidation-reduction reactions, and equilibrium electrochemistry, which serve as the foundation for materials processes using aqueous solutions and for corrosion and corrosion prevention.					
Reaction rate fundamentals (3 classes) Explanation is made of chemical reaction rate, dynamic electrochemistry, and solid surface processes, which serve as the foundation for materials processes using aqueous solutions and for corrosion and corrosion prevention.					
Corrosion (3 classes) Lectures will discuss equilibrium theory and kinetics of metal corrosion.					
Feedback class (1 class) Via questions and answer using the study support service (PandA), students will gain a deeper understanding of the contents of this course.					
Continue to 材料物理化学(工ネ)(2)					

材料物理化学(原)(2)	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Grading method] Grade is based on one written examination.	
[Grading criterion] Must score 60 or above out of 100 on the written examination 60 or above: pass 59 or below: fail	
[Textbook]	
No additional. Materials will be distributed in class.	
[Reference books, etc.]	
(Reference books) M. Benedict, T. H. Pigford and H. W. Levi 『Nuclear Chemical Engineering, 2nd Ed.』 (McGraw-Hill) ISBN:0070045313 Atkins 『アトキンス物理化学 第10版』 (東京化学同人) ISBN:9784807909087	
[Regarding studies out of class (preparation and review)]	
As needed, practice exercises will be conducted in class, so please review after class.	
(Others (office hour, etc.))	
Lecture is given in Japanese.	
*Please visit KULASIS to find out about office hours.	

材料物理化学(工ネ)(2)	
[Class requirement]	
Students are recommended to have finished the course Energy and Material Thermochemistry I.	
[Method, Point of view, and Attainment levels of Evaluation]	
Grading will be performed in principle using scores on regular tests. Consideration may also be given to exercises, quizzes, and reports assigned in classes.	
[Textbook]	
Materials will be distributed during class or using the student support service (PandA).	
[Reference books, etc.]	
(Reference books) 『アトキンス物理化学』 (東京化学同人)	
[Regarding studies out of class (preparation and review)]	
Notification will be made via the study support service (PandA). For each week 's class, class contents and quiz answers will be posted on the study support service (PandA). Students are requested to review and gain a sufficient understanding of these before each next class period.	
(Others (office hour, etc.))	
Problem-solving type assignments will be designated as necessary using practice exercises as well as the study support service (PandA). Please note also that a portion of course contents may be omitted, or additional content may be added, depending on the progress of the course during each specific academic year.	
*Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	熱及び物質移動 (材) Heat and Mass Transfer		Affiliated department, Job title,Name	Graduate School of Engineering Professor,KAWAI JIYUN	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
The fundamentals of transport phenomena for the engineers and/or researchers related to physical engineering are given.					
[Course Goals]					
To be able to apply the fundamental equations of thermal and mass transport studied in the class to real phenomena.					
[Course Schedule and Contents]					
One dimensional heat conduction,2times.Difference between heat and temperature. Similarity among heat, mass, and momentum transfers. Fourier#039s law, Steady heat conduction. Non-steady heat transfer,2times.Diffusion equation, solved by Fourier expansion, Laplace transform, and numerical method. Conservation rules,1time,Fourier#039s law, Steady heat conduction. Molecular kinetics,1time,Maxwell#039s theorr. Heat conduction of cylinder and sphere,1time,Heat transfer of cylindrical and sperical coordinates. 2 dimensional heat conduction,1time,2 dimensional Laplace equation. Green function,2times,Green function. Relation between Schrodinger equation and diffusion equation. Hydrodynamics,2times,Navier Stokes equation. Boundary layer,1time, Electromagnetic radiation,1time, Achievement check,1time,Learning how to solve the problems through practical exercises.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Assignment and written examination					
[Textbook]					
河合著:「物理工学・化学工学を学ぶための熱・物質移動の基礎」丸善(2005) isbn{}{4621076086}					
----- Continue to 熱及び物質移動 (材) (2)					

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Numbering code					
Course title <English>	熱及び物質移動 (工ネ) Heat and Mass Transfer		Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,OKUMURA HIDEYUKI Graduate School of Energy Science Professor,SAGAWA TAKASHI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,2times, ,2times, ,3times, ,2times, ,2times, ,3times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	熱及び物質移動 (材) (2)		Affiliated department, Job title,Name		
[Reference books, etc.]					
(Reference books)					
(Related URLs)					
((50370) http://www.process.mtl.kyoto-u.ac.jp/)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	プラズマ物理学 (原宇) Plasma Physics		Affiliated department, Job title,Name	Graduate School of Engineering Professor,MURAKAMI SADAYOSHI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Fundamental properties of plasma as a universal state of high-temperature matters, basic equation describing plasma, magnetohydrodynamics, plasma waves and transport phenomena are explained.					
[Course Goals]					
to understand basic properties of plasmas and learn fundamental method of analysis					
[Course Schedule and Contents]					
What is a plasma?,2times, Motion of charged particles,2times, Coulomb collision,1time, Basic equations,2times, Equilibrium and stability,1time, Plasma waves,2times, Wave-particle interaction,1time, Transport phenomena,1time, Gas discharge,1time, Nuclear fusion,1time, Confirmation of achievement,1time,					
[Class requirement]					
Basic knowledges of electromagnetism, statistical physics, fluid dynamics and atomic physics are expected.					
[Method, Point of view, and Attainment levels of Evaluation]					
semester-end examination and reports					
[Textbook]					
Hand out will be distributed					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code							
Course title <English>	量子反応基礎論 (原) Fundamentals of Particle Interactions	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor.SAITOU MANABU				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Fri.3	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
,2times, ,4times, ,2times, ,2times, ,2times, ,2times, ,1 times,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	熱統計力学 (字) Thermodynamics and Statistical Mechanics	Affiliated department, Job title,Name	Graduate School of Engineering Professor.ERIGUCHI KOUJI				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Tue.3	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
, 2 times, , 4 times, , 3 times, , 2 times, , 4 times,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	気体力学 (字) Gasdynamics	Affiliated department, Job title,Name	Graduate School of Engineering Professor.TAKATA SHIGERU				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Tue.2	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
Dynamics of high speed gas flows is treated on the basis of the fluid dynamics for compressible inviscid fluid. In this course, one-dimensional and quasi one-dimensional flows are mainly discussed, in order to show typical phenomena coming from the fluid compressibility.							
[Course Goals]							
To learn/understand fundamental issues specific to compressible fluid flows							
[Course Schedule and Contents]							
1. Euler set of equations (2 times) 2. Sound propagation (2 times)-- propagation of infinitesimal disturbance 3. Quasi one-dimension flow (2 times) -- isentropic flow, Laval nozzle, etc. 4. Propagation of finite amplitude disturbance (2 times) -- wave deformation, Riemann invariants, etc. 5. Standing Shock wave (1 times) -- Rankine-Hugoniot relation, etc. 6. Shock tube problem (3 time) -- Riemann problem, Reflection and deflection of waves 7. From one-dimensional to two-dimensional flow (3 times) -- Oblique Shock, Prandtl-Meyer fan, etc.							
[Class requirement]							
Fluid dynamics 1, Elemental Calculus (A,B, I,II), Linear Algebra (A,B)							
[Method, Point of view, and Attainment levels of Evaluation]							
By the final exam., in principle.							
[Textbook]							
H. M. Liepmann and A. Roshko 『Elements of Gasdynamics』 (Dover Publications) ISBN:0486419630							
[Reference books, etc.]							
(Reference books) J. D. Anderson, Jr. 『Modern Compressible Flow (2nd ed.)』 (McGraw-Hill) ISBN:0071006656							
[Regarding studies out of class (preparation and review)]							
Students are expected to read the textbook by themselves in accordance with the progress of the class.							
(Others (office hour, etc.))							
Actual times and order of topics may change, depending on the class attendants or other reasons. A part of topics might be shifted to the class of Aerodynamics.							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	空気力学 (字) Aerodynamics	Affiliated department, Job title,Name	Graduate School of Engineering Professor.TAKATA SHIGERU				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Fri.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
This is the continuation of the class "Gasdynamics (50450)." Mainly treated are two-dimensional inviscid compressible fluid flows and aerodynamic forces acting on the bodies in such flows. A modern approach to gas flows based on the kinetic theory of gases is introduced as well.							
[Course Goals]							
To learn/ understand the fundamental issues of two-dimensional compressible gas flows related to high speed flight.							
[Course Schedule and Contents]							
1. Review of Gasdynamics (2times)-- Shock wave, Mach line, Prandtl-Meyer fan 2. Shock--Expansion wave theory and Interaction of oblique shocks (2times) 3. Non-isentropic flow and Mrocco's theorem (1time) -- Bow shock, Shock--Expansion wave interaction, etc. 4. Small perturbation theory (3times) -- Potential flow, Similarity rules, etc. 5. Steady two-dimensional flow and the method of characteristics (3times) 6. Kinetic theory of gases (4times) -- velocity distribution function, Boltzmann equation, etc.							
[Class requirement]							
Fluid dynamics 1,2, Gasdynamics, Elemental Calculus (A,B, I,II), Linear Algebra (A,B)							
[Method, Point of view, and Attainment levels of Evaluation]							
By the final exam., in principle.							
[Textbook]							
H. M. Liepmann and A. Roshko 『Elements of Gasdynamics』 (Dover Publications) ISBN:0486419630							
[Reference books, etc.]							
(Reference books) J. D. Anderson, Jr. 『Modern Compressible Flow (2nd ed.)』 (McGraw-Hill) ISBN:0071006656							
[Regarding studies out of class (preparation and review)]							
Students are expected to read the textbook by themselves in accordance with the progress of the class.							
(Others (office hour, etc.))							
Actual times and order of topics may change, depending on the class attendants or other reasons.							
*Please visit KULASIS to find out about office hours.							

Numbering code						
Course title <English>	推進基礎論 (宇) Fundamentals of Aerospace Propulsion		Affiliated department, Job title,Name	Graduate School of Engineering Professor,ERIGUCHI KOUJI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester	
Day/period	Mon.1	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
Propulsion Fundamentals, 1time, ,3times, Ionized Gases, 1time, Electromagnetics, 2times, Equation of Ionized Gases, 1time, Atomic and Molecular Collisions, 2times, Diffusion and Transport of Ionized Gases, 1time, Ionized Gases near Solid Surfaces, 2times, Electric Propulsion, 1time, , 1time,						
[Class requirement]						
Fluid Dynamics, Gas Dynamics, Thermodynamics, Electromagnetics						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books) 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, 8th ed. (John Wiley amp Sons, Hoboken, 2010) isbn{}{9780470080245}; G.P. Sutton and O. Biblarz, Rocket Propulsion Elements, 7th ed. (Wiley, New York, 2001) isbn{}{						
Continue to 推進基礎論 (宇) (2)						

Numbering code						
Course title <English>	航空宇宙機力学 (宇) Flight Dynamics of Aerospace Vehicle		Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,AOI SHINYA Graduate School of Engineering Professor,SENDA KEI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester	
Day/period	Mon.2	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
Flight dynamics of aerospace vehicles.						
[Course Goals]						
To understand analytical mechanics through flight dynamics of aerospace vehicles.						
[Course Schedule and Contents]						
Analytical mechanics, 7 times - introduction - coordinates - principle of virtual work - d'Alembert principle - potential - Lagrange equation of motion - conservation law - Lagrange multiplier - Euler-Lagrange equation Rigid body kinematics, 3 times - Euler angles - angular rate - pseudo coordinates Rigid body dynamics, 3 times - kinetic energy of rigid body - linear and angular momentum - inertia tensor - Euler equation of motion Dynamics of space vehicle, 2 times - topics of attitude dynamics of space vehicles Achievement confirmation, 1 time - achievement confirmation to check up level of understanding						
[Class requirement]						
Foundation of mechanics and mathematics						
Continue to 航空宇宙機力学 (宇) (2)						

推進基礎論 (宇) (2)	
0471326429); M. Mitchner and Ch.H. Kruger, Jr., Partially Ionized Gases (Wiley, New York, 1973) isbn{}{0471611727}; F.F. Chen, Introduction to Plasma Physics and Controlled Fusion, 3rd ed. (Springer International Publishing Switzerland, Cham, 2016) isbn{}{9783319223087}; F.F. Chen, Introduction to Plasma Physics and Controlled Fusion, Vol. 1, Plasma Physics, 2nd ed. (Plenum, New York, 1984) isbn{}{9780306413322}; 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) isbn{}{0521433096}; (同, 1995) isbn{}{0521484529}; M.A. Lieberman and A.J. Lichtenberg, Principles of Plasma Discharges and Materials Processing (Wiley-Interscience, Hoboken, 2005) isbn{}{0471720011}.	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

航空宇宙機力学 (宇) (2)	
[Method, Point of view, and Attainment levels of Evaluation]	
Evaluation depends on marks of examination and exercises.	
[Textbook]	
Instructed during class	
[Reference books, etc.]	
(Reference books) L. D. Landau and E. M. Lifshitz 『Mechanics, Volume 1 (Course of Theoretical Physics) a (Elsevier) ISBN:0750628960 Herbert Goldstein 『Classical Mechanics a (Addison-Wesley) ISBN:0201657023 (international ed. ISBN 0321188977) Toda 『Introductory course of physics 1 Mechanics a (Iwanami Shoten) ISBN:4000076418 (in Japanese) Koide 『Introductory course of physics 2 Analytical Mechanics a (Iwanami Shoten) ISBN:4000076426 (in Japanese) Wadachi 『Introductory course of physics 10 Mathematics for physics a (Iwanami Shoten) ISBN: 4000076507 (in Japanese)	
[Regarding studies out of class (preparation and review)]	
Learn the basic mechanics and mathematics for analytical mechanics.	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code							
Course title <English>	固体力学 (宇) Mechanics of Solids	Affiliated department, Job title,Name	Graduate School of Engineering Professor,BIWA SHIROU				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Mon.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
While the methods of stress-strain analysis for elementary structural members are the main topics in the "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, constitutive equations (Hooke's law) are treated together with mathematical analysis of static deformations in elastic bodies. These subjects are important for the understanding of basic principles of large-scale computational analysis of various mechanical/structural systems.							
[Course Goals]							
This course aims to establish the understanding of 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 the "Mechanics of Materials" courses from a rigorous viewpoint.							
[Course Schedule and Contents]							
Week 1 [Preliminaries] Basis vectors; Kronecker's delta; Alternating symbol; Summation convention Weeks 2-3 [Deformation and strain] Description of motion; Material time derivative; Green-Lagrange strain; Infinitesimal strain; Transformation of strain components; Principal strains Weeks 4-5 [Stress] Stress vector, Euler's laws of motion; Cauchy's law; Transformation of stress components; Cauchy's laws of motion; Equilibrium equations; Principal stresses and stress invariants Week 6 [Stress-strain relations] Hooke's law; Elastic moduli; Voigt expression Weeks 7-8 [Fundamental equations of elasticity] Navier's equations; Plane stress and plane strain; Compatibility relation for strain Weeks 9-11 [Two-dimensional problems of elastic deformations] Airy's stress function; Biharmonic equation; Stress function in polar coordinates; Two-dimensional elastostatic problems; Stress concentration around a circular hole Weeks 12-13 [Applications of elasticity] Anisotropic elasticity; In-plane elastic property of laminated plates Weeks 14 [Principle of virtual work] Virtual displacement; Principle of virtual work; Principle of stationary potential energy Week 15 [Final examination/learning achievement evaluation] Week 16 [Feedback]							
[Class requirement]							
The enrolling students are expected to have knowledge in the Mechanics of Materials courses. Good understanding of calculus, linear algebra (eigenvalue problems) and vector analysis is preferable.							
[Method, Point of view, and Attainment levels of Evaluation]							
Grading is made based on the examination (85%) and the reports (15%). The total score of the examination							
----- Continue to 固体力学 (宇) (2)							

Numbering code							
Course title <English>	物理工学演習 1 (工ネ) Exercise on Engineering Science 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor.ISHIYAMA TAKUJI				
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/First semester		
Day/period	Mon.4	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
,9times, ,6times,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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固体力学 (宇) (2)							
----- and the reports is evaluated between 0 and 100 points (the pass mark is 60).							
[Textbook]							
Textbooks are not assigned. The lecture is given in the blackboard style.							
[Reference books, etc.]							
(Reference books) T. Inoue, "Fundamentals of elasticity" (Nikkan Kogyo) S. Kobayashi and K. Kondo, "Elasticity" (Baihu-kan) For references written in English, students are advised to contact the instructor directly.							
[Regarding studies out of class (preparation and review)]							
Homeworks (reports) will be assigned to review the lectures.							
(Others (office hour, etc.))							
The order and hours (weights) of each item are subject to possible change.							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	物理工学演習 1 (原) Exercise on Engineering Science 1	Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,OGURE KENZOU Graduate School of Engineering Associate Professor,MIYADERA TAKAYUKI				
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/First semester		
Day/period	Tue.3,4	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
Linear algebra,5times, Linear differential equations,5times, Laplace transform,4times, Confirmation of achievement in study,1time,							
[Class requirement]							
differential and integral, linear algebra							
[Method, Point of view, and Attainment levels of Evaluation]							
exercises and reports							
[Textbook]							
Prints are distributed in the class.							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code			
Course title <English>	物理学演習 1 (宇) Exercise on Engineering Science 1	Affiliated department, Job title,Name	Part-time Lecturer,TAKAHASHI KENICHI Part-time Lecturer, Part-time Lecturer.
Target year	3rd year students or above	Number of credits	1
Course offered year/period	2019/First semester		
Day/period	Thu.3,4	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
.5?6times, .5?6times, .2times, .1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

物理学演習 2 (工ネ) (2)	
[Textbook]	
Handout will be provided in each topic.	
[Reference books, etc.]	
(Reference books)	
Introduced during class	
[Regarding studies out of class (preparation and review)]	
Students are supposed to study the contents of each topic before the course.	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

Numbering code			
Course title <English>	物理学演習 2 (工ネ) Exercise on Engineering Science 2	Affiliated department, Job title,Name	Graduate School of Energy Science Professor.ISHIHARA KEIICHI Graduate School of Energy Science Professor.ISHIYAMA TAKUJI Graduate School of Energy Science Professor.KAWANABE HIROSHI Graduate School of Energy Science Associate Professor.KASHIWAYA YOSHIAKI Graduate School of Energy Science Professor.IMATANI SHIYOUJI Graduate School of Energy Science Associate Professor.MATSUMOTO KAZUHIKO
Target year	3rd year students or above	Number of credits	1
Course offered year/period	2019/Second semester		
Day/period	Tue.2	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
Exercises for each topic related to energy science will be provided during lecture, and students are supposed to solve them and submit assignments. Answers and commenets including related fields will also be provided.			
[Course Goals]			
This class aims to help students to learn fundamental matters in the field of energy science acquire by solving exercises.			
[Course Schedule and Contents]			
Thermal engineering, 3 weeks Hydrodynamics, 3 weeks Mechanics of materials. 2 weeks Thermodynamics, 2 weeks Physical Chemistry, 2 weeks Crystallography, 2 weeks Summary, 1 week			
[Class requirement]			
It is desirable that students learned the basis of each topic.			
[Method, Point of view, and Attainment levels of Evaluation]			
Evaluation will be based on active participation and assignments.			
----- Continue to 物理学演習 2 (工ネ) (2)			

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Numbering code			
Course title <English>	物理学演習 2 (原) Exercise on Engineering Science 2	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor.YOKOMINE TAKEHIKO Graduate School of Engineering Assistant Professor.OGURE KENZOU
Target year	3rd year students or above	Number of credits	1
Course offered year/period	2019/Second semester		
Day/period	Tue.4,5	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
.4times, .5times, .5times, .1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

Numbering code					
Course title <English>	物理学演習 2 (宇) Exercise on Engineering Science 2	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF	Part-time Lecturer,YAGI DAISUKE	
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/Second semester
Day/period	Fri.3,4	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
Conduct lecture and exercise on aircraft and spacecraft design.					
[Course Goals]					
Understand the basis of aircraft/spacecraft systems, and flight dynamics.					
[Course Schedule and Contents]					
1. History of aircraft and spacecraft [1 week] History of aircraft development and effort in Japan History of spacecraft development and effort in Japan					
2. Spacecraft - Summary of satellite and rocket systems [1 week] Summary of satellite system Summary of rocket system Summary of propulsion system of spacecraft					
3. Spacecraft - Orbit of satellite [1 week] Kepler motion Transfer of orbit					
4. Spacecraft - Principle of rocket propulsion [1 or 2 weeks] Thrust and effective exhaust velocity Specific impulse Ideal velocity and mass component Multi-stage rocket Required velocity increment					
5. Spacecraft - Design exercise [1 or 2 weeks] Exercise on sizing of rocket specification					
6. Aircraft - Summary of airplane system [1 week] Airplane shape Airplane structure Airplane subsystems Airplane engine					
7. Aircraft - Airplane performance [2 or 3 weeks] Standard atmosphere Definition of velocity Aerodynamic characteristics Engine performance Major performances of airplane					
8. Aircraft - Airplane stability and controllability [1 week] Longitudinal stability and controllability Center of gravity limits					
Continue to 物理学演習 2 (宇) (2)					

Numbering code					
Course title <English>	機械システム工学実験 1 (機) Mechanical and System Engineering Laboratory 1	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor,SAITOU MOTOHIRO Graduate School of Engineering Associate Professor,SHIMADA TAKAHIRO Graduate School of Engineering Associate Professor,KOUNO DAISUKE Graduate School of Engineering Associate Professor,YAMADA TAKAYUKI Graduate School of Engineering Professor,INOUE YASUHIRO Graduate School of Engineering Associate Professor,MATSUMOTO MITSUHIRO Graduate School of Engineering Assistant Professor,KURIYAMA REIKO Graduate School of Engineering Assistant Professor,FUJII KEISUKE		
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/First semester
Day/period	Wed.4,5	Class style	Experiment	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,1time, ,2times, ,2times, ,2times, ,2times, ,2times, ,1time, ,1time, ,2times,					
Continue to 機械システム工学実験 1 (機) (2)					

物理学演習 2 (宇) (2)	
Lateral and directional stability and controllability Crosswind landing Trim at engine failure	
9. Aircraft - Airplane airworthiness [1 week] Regulation of airplane airworthiness Lessons learned from accidents	
10. Aircraft - Design exercise [1 or 2 weeks] Exercise on flight test of airplane	
[Class requirement]	
Assumes students understand the fundamentals of dynamics.	
[Method, Point of view, and Attainment levels of Evaluation]	
Evaluation will be based on, submission status and contents of the report to be imposed during this class, and efforts toward the exercise, taking into account the attendance of class.	
[Textbook]	
Handouts will be distributed.	
[Reference books, etc.]	
(Reference books) Introduced during class	
[Regarding studies out of class (preparation and review)]	
Students are likely to make reports outside of class time, which will be imposed during class.	
(Others (office hour, etc.))	
The contents and number of classes are subject to change depending on the situation.	
*Please visit KULASIS to find out about office hours.	

機械システム工学実験 1 (機) (2)	
[Class requirement]	
None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

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Numbering code			
Course title <English>	機械システム工学実験 1 (機) Mechanical and System Engineering Laboratory 1	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor,SAITOU MOTOHIRO Graduate School of Engineering Associate Professor,SHIMADA TAKAHIRO Graduate School of Engineering Assistant Professor,YAMADA TAKAYUKI Graduate School of Engineering Assistant Professor,KURIYAMA REIKO Graduate School of Engineering Professor,INOUE YASUHIRO Graduate School of Engineering Assistant Professor,FUJII KEISUKE
Target year	3rd year students or above	Number of credits	1
Course offered year/period	2019/Second semester		
Day/period	Mon.4,5	Class style	Experiment
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.			
[Class requirement]			
None			
Continue to 機械システム工学実験 1 (機) (2)			

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Numbering code			
Course title <English>	機械システム工学実験 2 (機) Mechanical and System Engineering Laboratory 2	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Assistant Professor,WAKABAYASHI HIDENOBU Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor,OKINO SHINYA Graduate School of Engineering Assistant Professor,hirai yoshikazu Graduate School of Engineering Associate Professor,ENDO TAKAHIRO Institute for Frontier Life and Medical Sciences Assistant Professor,KAMEO YOSHITAKA Graduate School of Engineering Professor,INOUE YASUHIRO Graduate School of Engineering Associate Professor,MATSUMOTO MITSUHIRO Graduate School of Engineering Associate Professor,KOUNO DAISUKE
Target year	3rd year students or above	Number of credits	1
Course offered year/period	2019/First semester		
Day/period	Thu.4,5	Class style	Experiment
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,1time, ,2times, ,2times, ,2times, ,2times, ,2times, ,1time, ,1time, ,2times,			
Continue to 機械システム工学実験 2 (機) (2)			

機械システム工学実験 1 (機) (2)
[Method, Point of view, and Attainment levels of Evaluation]
[Textbook]
[Reference books, etc.] (Reference books)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

機械システム工学実験 2 (機) (2)
[Class requirement] None
[Method, Point of view, and Attainment levels of Evaluation]
[Textbook]
[Reference books, etc.] (Reference books)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

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Numbering code						
Course title <English>	機械システム工学実験 2 (機) Mechanical and System Engineering Laboratory 2	Affiliated department, Job title,Name	Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Assistant Professor,WAKABAYASHI HIDENOBU Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor,OKINO SHINYA Graduate School of Engineering Assistant Professor,hirai yoshikazu Graduate School of Engineering Associate Professor,ENDO T A K A H I R O Institute for Frontier Life and Medical Sciences Assistant Professor,KAMEO YOSHITAKA Graduate School of Engineering Associate Professor,KOUNO DAISUKE Graduate School of Engineering Associate Professor,MATSUMOTO MITSUHIRO			
			Target year	3rd year students or above	Number of credits	1
Day/period	Thu.1,2	Class style	Experiment	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature- based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.						
Continue to 機械システム工学実験 2 (機) (2)						

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Numbering code						
Course title <English>	機械システム工学実験 3 (機) Mechanical and System Engineering Laboratory 3	Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,NONAKA TETSUYA Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor,HORIGUCHI YUKIO Graduate School of Engineering Assistant Professor,MATSUDA NAOKI Graduate School of Engineering Assistant Professor,NAMURA KYOKO Graduate School of Engineering Assistant Professor,KURIYAMA REIKO			
			Target year	3rd year students or above	Number of credits	1
Day/period	Fri.4,5	Class style	Experiment	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
,1time, ,14times,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
Continue to 機械システム工学実験 3 (機) (2)						

機械システム工学実験 2 (機) (2)					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

機械システム工学実験 3 (機) (2)					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	機械システム工学実験 3 (機) Mechanical and System Engineering Laboratory 3	Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor, NONAKA TETSUYA Graduate School of Engineering Senior Lecturer, NAKANISHI HIROAKI Graduate School of Engineering Associate Professor, NAKAJIMA KAORU Graduate School of Engineering Associate Professor, TSUCHIYA TOSHIYUKI Graduate School of Engineering Assistant Professor, HORIGUCHI YUKIO Graduate School of Engineering Assistant Professor, MATSUDA NAOKI Graduate School of Engineering Assistant Professor, NAMURA KYOKO Graduate School of Engineering Assistant Professor, KURIYAMA REIKO		
Target year	3rd year students or above	Number of credits	1	Course offered year/period	2019/Second semester
Day/period	Thu.4,5	Class style	Experiment	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class. \\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, 5times, Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
----- Continue to 機械システム工学実験 3 (機) (2)					

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Numbering code					
Course title <English>	機械設計演習 1 (機) Exercise of Machine Design 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor, NISHIWAKI SHINJI Graduate School of Engineering Associate Professor, NAKAJIMA KAORU Graduate School of Engineering Associate Professor, YOKOKAWA RYUUI Part-time Lecturer, KANEDA SHUICHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.4,5, Fri.4,5	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.4times, .3times, .times, .21times, .21times, .21times, .2times,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

機械システム工学実験 3 (機) (2)					

[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	機械設計演習 1 (機) Exercise of Machine Design 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor, NISHIWAKI SHINJI Graduate School of Engineering Associate Professor, SHIKAMA TAIICHI Graduate School of Engineering Associate Professor, TATSUMI KAZUYA Part-time Lecturer, YAMANAKA KOUSUKE		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.4,5, Thu.4,5	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class. \\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, 5times, Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
----- Continue to 機械設計演習 1 (機) (2)					

機械設計演習 1 (機) (2)

[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.))
*Please visit KULASIS to find out about office hours.

機械設計演習 1 (機) (2)

[Method, Point of view, and Attainment levels of Evaluation]
[Textbook]
[Reference books, etc.]
(Reference books)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.))
*Please visit KULASIS to find out about office hours.

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Numbering code					
Course title <English>	機械設計演習 1 (機) Exercise of Machine Design 1		Affiliated department, Job title, Name	Graduate School of Engineering Professor, NISHIWAKI SHINJI Graduate School of Engineering Associate Professor, SUMIGAWA TAKASHI Graduate School of Engineering Associate Professor, MATSUMOTO MITSUHIRO Part-time Lecturer, YAMANE MASAHIRO Part-time Lecturer, MATSUI SATOSHI Part-time Lecturer, Part-time Lecturer,	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed,4,5,Fri,4,5	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance, 2times, Guidance on how this class is operated, and how to use computing facility for this class. \\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS, 5times, Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning, 7times, Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
[Class requirement]					
None					

Continue to 機械設計演習 1 (機) (2)					

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Numbering code					
Course title <English>	機械設計演習 2 (機) Exercise of Machine Design 2		Affiliated department, Job title, Name	Graduate School of Engineering Professor, KOMORI MASAHARU Graduate School of Engineering Professor, HIRAYAMA TOMOKO Graduate School of Engineering Associate Professor, KOUNO DAISUKE Graduate School of Engineering Senior Lecturer, NAKANISHI HIROAKI Part-time Lecturer, KANEDA SHUICHI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon,1,2,3,4	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,14times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code			
Course title <English>	機械製作実習 (機) Exercise for Machine Shop Practice	Affiliated department, Job title,Name	Graduate School of Engineering Professor,MATSUBARA ATSUSHI Graduate School of Engineering Associate Professor,KOUNO DAISUKE Graduate School of Engineering Professor,NAKABE KAZUYOSHI Graduate School of Engineering Professor,NISHIWAKI SHINJI Part-time Lecturer,Part-time Lecturer
Target year	2nd year students or above	Number of credits	1
Course offered year/period	2019/Second semester		
Day/period	Wed.5	Class style	Practical training
Language	Japanese		
[Outline and Purpose of the Course]			
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 stirring 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.			
[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 Schedule and Contents]			
Lectures on principle of engines,1time,Students will learn basic knowledge on the principle of a stirring engine and a diesel (gasoline) engine. Lectures on machine tools ,1time,Students will learn basic knowledge on machine tools that they will use in machine shop training. Machine shop training (making a stirring engine),4times,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 stirring engine. Disassembly of an engine,1time,Assembly and disassembly of a commercial diesel (or gasoline) engine. Lectures on safety,1time,A special lecture on safety issues in manufacturing process and product design by a visiting lecturer. Special seminars,7times,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,1time,One-day trip to a factory in Kansai area.			
----- Continue to 機械製作実習 (機) (2)			

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Numbering code			
Course title <English>	材料科学実験および演習 1 (材) Materials Science Laboratory and Exercise 1	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,YUGE KORETAKA
Target year	3rd year students or above	Number of credits	3
Course offered year/period	2019/First semester		
Day/period	Wed.3,4,Thu.3,4	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,6times, ,6times, ,6times, ,6times,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

機械製作実習 (機) (2)	
[Class requirement]	
None.	
[Method, Point of view, and Attainment levels of Evaluation]	
For the credit, students are in principle required to participate in all the classes, and to submit all the reports.	
[Textbook]	
A textbook will be handed out in class.	
[Reference books, etc.]	
(Reference books)	
None.	
(Related URLs)	
(None.)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
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.	
*Please visit KULASIS to find out about office hours.	

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Numbering code			
Course title <English>	材料科学実験および演習 2 (材) Materials Science Laboratory and Exercise 2	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,YUGE KORETAKA
Target year	3rd year students or above	Number of credits	3
Course offered year/period	2019/Second semester		
Day/period	Wed.3,4,Thu.3,4	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,6times, ,6times, ,6times, ,6times,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.]			
(Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.))			
*Please visit KULASIS to find out about office hours.			

Numbering code							
Course title <English>	材料強度物性 (材) Physics of Strength of Materials	Affiliated department, Job title,Name	Graduate School of Engineering Professor,INUI HARUYUKI				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Fri.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
This course explains fundamentals of crystal plasticity and strength of materials including plastic deformation of crystals, yielding, work-hardening, solution hardening, precipitation hardening, properties of grain boundaries, based on dislocation theory.							
[Course Goals]							
This class aims to help students to acquire fundamentals of deformation of crystalline materials and also to acquire ways to interpret strength of crystalline materials based on dislocation theory.							
[Course Schedule and Contents]							
(1) Yielding in crystalline materials [2 weeks] (2) Work hardening, solution hardening and precipitation hardening [3 weeks] (3) Strength and toughness of composites [1 week] (4) Dislocations in crystalline materials [6 weeks] (5) Dislocation motions and thermal activation processes [1 week] (6) Grain boundaries and crystal plasticity of polycrystals [1 week] (7) Feedback [1 week]							
[Class requirement]							
Physics of Crystal Properties and Imperfections							
[Method, Point of view, and Attainment levels of Evaluation]							
Evaluation will be based on a written examination. Attendance and daily reports may be considered in grading determination.							
[Textbook]							
Hand out materials will be provided during the lecture.							
[Reference books, etc.]							
(Reference books) 鈴木秀次 『転位論入門』 (アグネ) ISBN:4750702315 J.P. Hirth and J. Lothe 『Theory of Dislocations』 (McGraw-Hill) ISBN:TY86299777 J.P. Hirth and J. Lothe 『Theory of Dislocations, 2nd ed.』 (Wiley) ISBN:047109125 角野浩二(編) 『結晶の塑性』 (丸善) ISBN:TW86162567 日本金属学会 『材料強度の原子論』 (日本金属学会) ISBN:4889030220 竹内 伸 『結晶塑性論』 (内田老鶴圃) ISBN:978-4-7536-5090-3							
[Regarding studies out of class (preparation and review)]							
To review contents covered in the previous lecture.							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	統計熱力学 Statistical Thermodynamics	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MATSUMOTO MITSUHIRO				
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Mon.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
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.							
[Course Goals]							
- Understanding the relation between macroscopic variables and microscopic states. - Scientific view of various phenomena in science and engineering based on statistics.							
[Course Schedule and Contents]							
1st week: Concepts of statistical physics and Review of basic statistics 2nd week: Counting microscopic states 3rd week: Microcanonical ensemble 4th-6th weeks: Various ensembles and Free energies 7th-9th weeks: Quantum statistics (Bose-Einstein vs. Fermi-Dirac) 10th-11th weeks: Introduction to solid state physics 12th week: Photons and Phonons 13th week: Application to Informatics 14th week: Examination 15th week: Feedback class							
[Class requirement]							
Basic knowledge of thermodynamics, calculus, statistics, analytical mechanics, and quantum physics will be useful.							
[Method, Point of view, and Attainment levels of Evaluation]							
- Written examination - Paper assignment							
[Textbook]							
Lecture notes will be provided.							
[Reference books, etc.]							
(Reference books) Introduced during class							
[Regarding studies out of class (preparation and review)]							
Since this class covers basics in physics with many examples encountered in science and engineering, students of various research fields are welcome.							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	固体物性学 (機) Physics of Solids	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NAKAJIMA KAORU				
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Tue.2	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
Crystal structure,1time, Diffraction of waves by crystals,3~4times, Vibrations of crystals,3~4times, Thermal properties of crystals,2times, Electronic structures of crystals,3~4times, Assessment of achievement,1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books) quotIntroduction to solid state physicsquot by Charles Kittel isbn { }{9780471415268}, international ed. isbn { }{0471680575}							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	統計熱力学 (材工ネ) Statistical Thermodynamics	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,MIYAKE MASAO				
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester		
Day/period	Tue.3	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
In this lecture, fundamental ideas of Statistical Thermodynamics which is effective to microscopic understanding of macroscopic systems and some typical applications to condensed matter physics are presented.							
[Course Goals]							
The goals of this lecture are both to understand fundamental ideal of Statistical Thermodynamics and to study typical applications to condensed matter physics.							
[Course Schedule and Contents]							
Outlines,1time,Basic ideas of Statistical Thermodynamics, thermal equilibrium, fundamentals of Statistics, means of measurements, ergodic theory. Thermodynamic functions,1time,Thermodynamic laws, thermodynamic functions, Legendre transform, Maxwell relations, Gibbs-Helmholtz equation, thermodynamic variation, phase equilibrium. Ideal systems,4times,Phase space of movement, Liouville#039s theorem, micro canonical ensemble,Partition function, relation between Helmholtz free energy and Partition function,Principle of Boltzmann, simple applications of microcanonical ensemble (ideal gas, elastic of gum) .1time, Canonical ensemble,2times,Distribution with the maximum probability, Partition function, the 3rd law of thermodynamics, Gibbs#039s paradox, grand canonical ensemble. Quantum statistics,2times,Grad canonical ensemble 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,4times,Systems with two levels, Schottky type specific heat, Statistics of photons, Planck#039s equation, one dimensional harmonic oscillation, Einstein model and specific heat of solid states. Evaluation of goals,1time,Understanding of typical applications of statistic thermodynamics and submission of homeworks.							
[Class requirement]							
Students are roughly expected to have mastered basics of mathematics, dynamics, elementary quantum mechanics, thermodynamics and statistics.							
[Method, Point of view, and Attainment levels of Evaluation]							
Situation of voluntary submission of some reports and score of exam are totally evaluated.							
Continue to 統計熱力学 (材工ネ) (2)							

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Numbering code					
Course title <English>	精密加工学 (機) Precision Machining			Affiliated department, Job title,Name	Graduate School of Engineering Professor,MATSUBARA ATSUSHI Graduate School of Engineering Associate Professor,KOUNO DAISUKE Graduate School of Engineering Senior Lecturer,BEAUCAMP, Anthony Tadeus Herve
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,2times, ,3times, ,3times, ,2times, ,2times, ,1time, ,1time, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

材料電気化学 (材) (2)					
[Method, Point of view, and Attainment levels of Evaluation]					
(1) Class participation, (2) take-home assignments, and (3) exams. Students will sign a roll sheet every class. Supplementary examination to bail out low-performing students will not be given for any reason.					
[Textbook]					
A course booklet written in Japanese will be given out at the first lecture.					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
Reports given in the lectures will return after checking. Brush up according to the reports returned.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	材料電気化学 (材) Electrochemistry of Materials Processing			Affiliated department, Job title,Name	Graduate School of Engineering Professor,MURASE KUNIAKI Graduate School of Engineering Associate Professor,FUKAMI KAZUHIRO
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
Overview 1 time					
Solution chemistry of electrolytes, 2 times, acid-base reactions, redox reactions, equilibrium of them.					
Introduction of electrode potential and its relation to chemical thermodynamics, 4 times, explanation of electrode surface as an interface for exchange carrier, explanation of the concept of electrode potential and Nernst's equation.					
Electrolysis, 1 time, explanation on the importance of three electrode setup (working, counter and reference electrodes).					
Electrode reactions, 4 times, explanation on the fundamentals of electrochemical reaction rate on a electrode surface toward understanding of batteries and corrosion, explanation on the relation between current and potential, overpotential, diffusion-limitation of reactants.					
Transfer of ions, 2 times, explanation on the transfer of ions in solution for understanding diffusion potential and liquid junction potential.					
Summary, 1 time.					
[Class requirement]					
Knowledge given in Thermodynamics of Materials 2 (by Prof. Uda) is preferable.					
Continue to 材料電気化学 (材) (2)					

Numbering code					
Course title <English>	原子炉基礎演習・実験 (原) Basic Nuclear Reactor Exercise and Experiments			Affiliated department, Job title,Name	Institute for Integrated Radiation and Nuclear Science Professor,UNESAKI HIRONOBU Institute for Integrated Radiation and Nuclear Science Professor,MISAWA TSUYOSHI Institute for Integrated Radiation and Nuclear Science Professor,NAKAJIMA KEN Graduate School of Energy Science Associate Professor.PIYON CHIYORUHO
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.3,4	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
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 performed at Yoshida main campus, and experiments are performed at Research Reactor Institute (Osaka Kumatori-cho).					
[Course Goals]					
Understanding nuclear characteristics and safety system of nuclear reactor through reactor physics experiments					
[Course Schedule and Contents]					
Guidance,6times,Guidance and lectures for experiments are performed at Yoshida main campus. Experiment,1time.Experiments are performed at Research Reactor Institute (Kumatori-cho, Osaka) for 1 week. 1) guidance 2) criticality approach experiment 3) control rod calibration experiment 4) neutron flux measurement experiment 5) operation of nuclear reactor					
[Class requirement]					
Basic knowledge about reactor physic					
[Method, Point of view, and Attainment levels of Evaluation]					
reports before and after experiments					
[Textbook]					
Download from Web site (Japanese, English and Korean versions are available)					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
1) Registration to workers for radioactive material treatment is required before experiment. 2) English course for this experiment is opened.					
*Please visit KULASIS to find out about office hours.					

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Numbering code							
Course title <English>	物理学総論 A (7・8・9組) Introduction to Engineering Science A	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HIRAKATA HIROYUKI Graduate School of Informatics Professor,KANOU MANABU Graduate School of Engineering Professor,KOMORI MASAHARU Graduate School of Engineering Professor,TABATA OSAMU Graduate School of Engineering Professor,YOSHIDA HIDEO Graduate School of Engineering Professor,HANAZAKI HIDESHI Graduate School of Engineering Associate Professor,SHIMADA TAKAHIRO Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,SHIKAMA TAIICHI Graduate School of Engineering Professor,INAMURO TAKAJI Graduate School of Engineering Professor,SENDA KEI				
			Target year	1st year students or above	Number of credits	2	Course offered year/period
Day/period	Wed.2	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
.10times, .4times, .1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
----- Continue to 物理学総論 A (7・8・9組) (2)							

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Numbering code							
Course title <English>	物理学総論 A (9・10・11・12組) Introduction to Engineering Science A	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HIRAKATA HIROYUKI Graduate School of Informatics Professor,KANOU MANABU Graduate School of Engineering Professor,KOMORI MASAHARU Graduate School of Engineering Professor,TABATA OSAMU Graduate School of Engineering Professor,YOSHIDA HIDEO Graduate School of Engineering Professor,HANAZAKI HIDESHI Graduate School of Engineering Associate Professor,SHIMADA TAKAHIRO Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Associate Professor,NAKAJIMA KAORU Graduate School of Engineering Associate Professor,SHIKAMA TAIICHI Graduate School of Engineering Professor,INAMURO TAKAJI Graduate School of Engineering Professor,SENDA KEI				
			Target year	1st year students or above	Number of credits	2	Course offered year/period
Day/period	Wed.2	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.							
----- Continue to 物理学総論 A (9・10・11・12組) (2)							

物理学総論 A (7・8・9組) (2)	

[Textbook]	
[Reference books, etc.] (Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

物理学総論 A (9・10・11・12組) (2)	

[Class requirement] None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.] (Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

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Numbering code					
Course title <English>	物理学総論 B (7・8・9組) Introduction to Engineering Science B	Affiliated department, Job title,Name	Graduate School of Engineering Professor,TSUJI NOBUHIRO Graduate School of Engineering Professor,UDA TETSUYA Graduate School of Engineering Associate Professor,KUROKAWA SHIYUU Graduate School of Engineering Associate Professor,FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor,SEKO ATSUTO Graduate School of Energy Science Professor,HIRATOU TETSUJI Graduate School of Energy Science Professor,IMATANI SHIYOUJI Graduate School of Engineering Professor,TAKAGI IKUJI Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Professor,MURAKAMI SADAYOSHI Graduate School of Engineering Associate Professor,SAITOU MANABU		
			Target year	1st year students or above	Number of credits
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .5times, .4times, .4times, .1time,					
[Class requirement]					
None					
Continue to 物理学総論 B (7・8・9組) (2)					

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Numbering code					
Course title <English>	物理学総論 B (9・10・11・12組) Introduction to Engineering Science B	Affiliated department, Job title,Name	Graduate School of Engineering Professor,UDA TETSUYA Graduate School of Engineering Professor,TSUJI NOBUHIRO Graduate School of Engineering Associate Professor,KUROKAWA SHIYUU Graduate School of Engineering Associate Professor,FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor,SEKO ATSUTO Graduate School of Energy Science Professor,HAGIWARA RIKI Graduate School of Energy Science Professor,ISHIYAMA TAKUJI Graduate School of Engineering Professor,TAKAGI IKUJI Graduate School of Engineering Professor,KANNO IKUO Graduate School of Engineering Professor,MURAKAMI SADAYOSHI Graduate School of Engineering Associate Professor,SAITOU MANABU		
			Target year	1st year students or above	Number of credits
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.					
Continue to 物理学総論 B (9・10・11・12組) (2)					

物理学総論 B (7・8・9組) (2)	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.] (Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

物理学総論 B (9・10・11・12組) (2)	
[Class requirement] None	
[Method, Point of view, and Attainment levels of Evaluation]	
[Textbook]	
[Reference books, etc.] (Reference books)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

Numbering code					
Course title <English>	核物理基礎論 (原) Fundamentals of Nuclear Physics	Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,OGURE KENZOU Graduate School of Engineering Associate Professor,MIYADERA TAKAYUKI		
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Basics of nuclear structure will be explained.					
[Course Goals]					
To understand nuclear structure by using quantum theory.					
[Course Schedule and Contents]					
Properties of nuclei,1time, Mass formula of nuclei,2times, Structure of nuclei,2times, Alpha decays and fission,2times, Beta decays,1time, Isospin, 2times Relativistic particle, 1time Relativistic field, 2times Pion field, 1time Confirmation of achievement in study,1time,					
[Class requirement]					
Quantum physics 1 and 2					
[Method, Point of view, and Attainment levels of Evaluation]					
exam					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
solve problems presented in the lectures.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	放射化学 (工ネ原) Radiochemistry	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SASAKI TAKAYUKI Graduate School of Engineering Associate Professor,TAISHI KOBAYASHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.4times, .1time, .2times, .4times, .3times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	加速器工学 (原) Particle Accelerators	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TSUCHIDA HIDETSUGU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.2times, .2times, .3times, .2times, .2times, .3times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	エネルギー・材料熱化学1 (材工ネ) Thermochemistry for Energy and Materials Science 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HIRATOU TETSUJI Graduate School of Energy Science Associate Professor,HASEGAWA MASAKATSU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course will provide fundamentals of thermochemistry, which will be necessary to think about environmental-friendly materials production / recycling processes.					
[Course Goals]					
Students will be able to calculate thermochemical properties of pure substances, mixtures and solutions, and use phase diagrams.					
[Course Schedule and Contents]					
1st, 2nd and 3rd laws of thermodynamic(3 weeks) Ellingham diagram and equilibrium in gas phase(3 weeks) Activity in binary solution(2 weeks) Phase diagram of binary system(3 weeks) Standard state of activity(2 weeks) Review(1 week) Feedback(1 week)					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Results are evaluated by a term-end examination. However, there are cases where the results of the quizzes in the lectures are considered.					
[Textbook]					
Instructed during class					
[Reference books, etc.]					
(Reference books) David R. Gaskell 『Introduction to metallurgical thermodynamics』 (Scripta Pub. Co) ISBN:0070229457 Seshadri Seetharaman ed. 『Treatise on process metallurgy, vol.1 Process fundamentals』 (Elsevier) ISBN: 9780080969862					
(Related URLs)					
http://www.lupin.mtl.kyoto-u.ac.jp/class.html					
[Regarding studies out of class (preparation and review)]					
In order to be useful for review, quizzes submitted will be returned after checking.					
(Others (office hour, etc.))					
Please bring a scientific calculator and a ruler.					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	エネルギー・材料熱化学2 (材工ネ) Thermochemistry for Energy and Materials Science 2	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HIRATOU TETSUJI Graduate School of Energy Science Associate Professor,HASEGAWA MASAKATSU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course will provide fundamentals of thermochemistry, which will be necessary to think about environmental-friendly materials production / recycling processes.					
[Course Goals]					
Students will be able to calculate thermochemical properties of pure substances, mixtures and solutions, and use phase diagrams.					
[Course Schedule and Contents]					
Regular solution model(3 weeks) Gibbs-Duhem equation(1 week) Henrian activity(1 week) Gibbs phase rule(3 weeks) Phase diagram of ternary system(4 weeks) Nernst equation(1 week) Review(1 week) Feedback(1 week)					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Results are evaluated by a term-end examination. However, there are cases where the results of the quizzes in the lectures are considered.					
[Textbook]					
Instructed during class					
Continue to エネルギー・材料熱化学2 (材工ネ) (2)					

Numbering code					
Course title <English>	材料分析化学 (材) Analytical Sciences	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KAWAI JIYUN		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
1. Quantization,1time,Bragg diffraction equation deduced from Bohr-Sommerferd quantization. Compton scattering equation explained from both wave and particle views. 2. Principle of least action,2times,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,1time,Scheroedinger equation. Matrix mechanics. Role of harmonic oscillator in atomic spectra. 4. Perturbation theory,2times,Time independent perturbation theory applied to ionic crystal. 5. Optical transition,2times,Blackbody radiation. Time dependent perturbation. Tsallis entropy. Electric dipole transition. 6. Harmonic oscillator,1time,Harmonic oscillator. WKB approximation. Field quantization. 7. Electron spectroscopy,1time,Photoelectron spectroscopy of transition metal compounds. Configuration interaction. 8. Symmetry,1time,Symmetry of molecules. Group theory. Projection operator. 9. Interaction between electrons and photons,2times,IR and Smekeal-Raman spectroscopy. 10. Angular momentum and spin,1time,Angular momentum and spin. Spin-orbital interaction. 11. Check of achievement,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Checked only by exam.					
Continue to 材料分析化学 (材) (2)					

エネルギー・材料熱化学2 (材工ネ) (2)	
[Reference books, etc.]	
(Reference books) David R. Gaskell 『Introduction to metallurgical thermodynamics』 (Scripta Pub. Co) ISBN:0070229457 Seshadri Seetharaman ed. 『Treatise on process metallurgy, vol.1 Process fundamentals』 (Elsevier) ISBN: 9780080969862	
(Related URLs) http://www.lupin.mtl.kyoto-u.ac.jp/class.html	
[Regarding studies out of class (preparation and review)]	
In order to be useful for review, quizzes submitted will be returned after checking.	
(Others (office hour, etc.)) Please bring a scientific calculator and a ruler. *Please visit KULASIS to find out about office hours.	

材料分析化学 (材) (2)	
[Textbook]	
J. Kawai, "Quantum Spectrochemistry", 2nd Edition, AGNE Gijutsu Center, Tokyo (2015).(ISBN: 9784901496759) isbn[{}]{9784901496759}	
[Reference books, etc.]	
(Reference books)	
(Related URLs) (http://www.process.mtl.kyoto-u.ac.jp/)	
[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.	

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Numbering code							
Course title <English>	固体電子論 (材) Electon Theory of Solids			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,KUROKAWA SHIYUU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Tue.1	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
Band Theory for Solids,4times, Fermi surface of metals,3times, Electronic structure of semiconductors,4times, Electronic structure of surfaces and interfaces,3times, Recent topics in solid state physics and surface science,1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	インターンシップ (原) Internship			Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,OGURE KENZOU		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	インターンシップ (機) Internship			Affiliated department, Job title,Name	Graduate School of Engineering Professor,HASUO MASAHIRO Graduate School of Engineering Professor,KUROSE RYOUICHI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
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.							
[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 Schedule and Contents]							
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. Internship location: Based on recruitment from companies. You can find them at company's web sites and/or the educational affairs office of the Engineering Science office (Butsuri Kyoumu).							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
Credits (2) are approved based on the summary report (50%) and presentation (50%) about the internship activities.							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
Consult with the internship host location.							
(Others (office hour, etc.))							
Pre-registration at the educational affairs office of the Engineering Science (Butsuri Kyoumu) is required.							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	理工学英語 (原) English for Engineering Science			Affiliated department, Job title,Name	Graduate School of Engineering Assistant Professor,OGURE KENZOU		
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Lecture	Language	Japanese and English		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
,14times, ,1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code					
Course title <English>	機械設計製作（機工ネ宇） Design and Manufacturing Processes			Affiliated department, Job title,Name	Graduate School of Engineering Professor,MATSUBARA ATSUSHI Graduate School of Engineering Professor,NISHIWAKI SHINJI
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
,3times, ,4times, ,7times, ,4times, ,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

システム工学（エネ原）(2)					
[Textbook]					
Instructed during class					
[Reference books, etc.]					
(Reference books)					
Introduced during class					
[Regarding studies out of class (preparation and review)]					
Instruct in class.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	システム工学（エネ原） Systems Engineering			Affiliated department, Job title,Name	Graduate School of Energy Science Professor,KAWANABE HIROSHI
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Systems engineering is basic idea about a system assembled with some elements. In the course, modeling method of a system, function analysis, economical evaluation, optimization method and reliability analysis are offered. Also, energy system as one of application cases; a thermal and power plant is lectured.					
[Course Goals]					
- To understand a variety of method and characteristics of system analysis.					
- To acquire the basic knowledge to optimize the energy systems.					
[Course Schedule and Contents]					
1. Introduction of systems engineering(2): Lectures on definition and structure of a system and basic performance of a system. Also, lecture the basics of systems engineerings.					
2. Schedule planning method(2): Lectures on the method of a program for work processes. "Program Evaluation and Review Technique" and "Critical Path Method" are lectured.					
3. Linear programming(5): Lectures on LP method for the optimization of a system. For the application example, analysis of energy system is also offered.					
4. Decision-making problem(2): Lectures on a modeling of decision-making process and method for optimization.					
5. System reliability analysis(2): Lectures on a system design and reliability analysis method.					
6. Application for a energy system(2): Systems engineering method is applied to thermal and power plants.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluate by report(s) and examination.					
----- Continue to システム工学（エネ原）(2)					

Numbering code					
Course title <English>	構造物性学（材） Structural Properties of Materials			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,NOSE YOSHITAROU Graduate School of Engineering Associate Professor,SHIBATA AKINOBU
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
The properties of metals and alloys strongly depend on their microstructures, which are controlled by processing. In this lecture, we talk on formation mechanism on micro- and nano-structures in metals and alloys from the atomistic viewpoints, and on their properties. Through the lecture, how to control or utilize practical materials are studied.					
[Course Goals]					
To study relationship between microstructures and properties in metals and alloys. To understand formation mechanism of microstructures through each phase transformation and its control.					
[Course Schedule and Contents]					
(1) Thermodynamics, phase diagram and atomic diffusion [2-3 weeks]					
(2) Phase transformation through diffusion [4-5 weeks]					
(3) Diffusionless phase transformation [3-4 weeks]					
(4) Recrystallization and recovery [3-4 weeks]					
(5) Feedback [1 week]					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluation will be based on a written examination. In some cases, reports and attend are considered.					
[Textbook]					
Utilizing resumes provided in the lecture.					
[Reference books, etc.]					
(Reference books)					
Introduced during class					
[Regarding studies out of class (preparation and review)]					
To review contents in the last time before the lecture.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

物質科学基礎 (材) (2)	
[Textbook]	
No textbook is required for this course. A course booklet will be given out at the first lecture.	
[Reference books, etc.]	
(Reference books) B. D. Cullity, S.R. Stock 『Elements of X-Ray Diffraction (3rd ed.)』 (Prentice Hall) ISBN: 9780201610918 L. Smart, E. Moore 『Solid State Chemistry: An Introduction (4th ed.)』 (CRC Press) ISBN: 9781439847909 A. R. West 『Solid State Chemistry and Its Applications (2nd ed.)』 (Wiley) ISBN:9781119942948	
(Related URLs)	
(Not available)	
[Regarding studies out of class (preparation and review)]	
The take-home assignments and their suggested answers should effectively be used for preparation and review.	
(Others (office hour, etc.))	
Not available	
*Please visit KULASIS to find out about office hours.	

Numbering code					
Course title <English>	材料科学基礎 1 (材) Fundamentals of Materials Science I	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,KISHIDA KIYOSUKE Graduate School of Engineering Associate Professor,NOSE YOSHITAROU		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
To understand structures in solids, mainly metal crystals, from the viewpoint of atomic interaction. Based on the knowledge, to study fundamental characteristics of lattice defects and properties in crystalline solid materials controlled by it, in particular diffusion and mechanical strength.					
[Course Goals]					
The aim of this lecture is to learn a way of considering to understand diffusion and mechanical properties in addition to fundamental studies on crystals and lattice defects.					
[Course Schedule and Contents]					
(1) Structure of solids 【1 week】 (2) Lattice defects 【1 week】 (3) Diffusion in solids 【5 weeks】 (4) Deformation of crystalline materials 【2 weeks】 (5) Plastic deformation of single crystals of metallic materials 【2 weeks】 (6) Plastic deformation of polycrystalline metals 【2 weeks】 (7) Deformation twinning and creep deformation 【1 week】 (8) Feedback 【1 week】					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
A end-term examination will be a main part of grading determination. Attendance and daily reports may be considered in grading determination.					
[Textbook]					
Utilizing resumes provided in the lecture.					
[Reference books, etc.]					
(Reference books) Introduced during class					
[Regarding studies out of class (preparation and review)]					
To review contents in the last time before the lecture.					
(Others (office hour, etc.))					
A part of themes will be added or omitted depending on a number of classes in the term.					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料統計物理学 (材) Statistical Physics of Materials	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TABATA YOSHIKAZU Graduate School of Engineering Associate Professor,YUGE KORETAKA		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
First and second law of thermodynamics, Irreversible process,2times, Thermodynamic functions, Phase Equilibrium and Phase Transition,2times, Analytical mechanics and concept of statistical mechanics,3times, Basic of classical statistical thermodynamics,2times, ,3times, Quantum statistical thermodynamics,3times, Check of acquisition,1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料科学基礎 2 (材工ネ) Fundamentals of Materials Science II	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,ICHII TAKASHI Graduate School of Engineering Associate Professor,SHIBATA AKINOBU Graduate School of Engineering Associate Professor,FUKAMI KAZUHIRO		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Thu.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This lecture focuses on symmetry, tensor and elastodynamics that are of importance for materials science.					
[Course Goals]					
To understand the role of symmetry, tensor and elastodynamics on materials science.					
[Course Schedule and Contents]					
Vector and tensor,4-5times,Fundamentals of vector and tensor Symmetry in molecules and crystals,4-5times,Fundamentals of symmetry in molecules and crystals Elastodynamics,4-5times,Fundamentals of elastodynamics					
[Class requirement]					
Fundamentals of thermodynamics					
[Method, Point of view, and Attainment levels of Evaluation]					
Grading is due to the term-end examination. The record of attendance may be taken into account.					
[Textbook]					
Handouts will be given in lectures.					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	エネルギー化学1 (エネ原) Energy chemistry 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HAGIWARA RIKA		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Fundamental chemistry such as quantum chemistry, solid state chemistry, physical chemistry will be described in this course for deeper understanding of energy conversion and applications. Especially chemical bonding and structures and their energetics will be discussed in this course.					
[Course Goals]					
Deeper understanding of energy conversion and applications from the viewpoint of chemistry					
[Course Schedule and Contents]					
Atomic structure, 2 times, Understanding of fundamentals of inorganic chemistry such as atomic orbital, electronic structure of many-electron atoms, atomic radii, ionic radii, lanthanide contraction, ionization potential, electron affinity and electronegativity. .3 times, Understanding of fundamentals of inorganic solid state chemistry such as crystal lattice, symmetry of crystal, close packing structure, metals, alloys, intermetallic compounds, ionic crystals and covalent crystals .2 times, The factors such as ionic radii, coordination number, lattice energy affecting the crystal structure will be described. Thermochemistry of solid compounds will be discussed. .3 times, Chemical bonding theory and energetics such as Lewis structure, resonance structure, valence bond theory, molecular geometry and VSEPR theory, hybridization orbital, molecular orbital, bond length, bonding radii, bond energy will be described. .2 times, Symmetry operation and symmetry elements, molecular point groups will be described. Applications to molecular orbitals, molecular vibration, vibrational spectroscopies will be discussed. .3 times, Concepts and theory of Bronsted acids and bases, Lewis acids and bases, their reactions, solvent effects will be described. Learning achievement evaluation will be made in the last class.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Overall evaluation of the activity in the class, homework, and term-end exam					
[Textbook]					
Shriver and Atkins#039 Inorganic Chemistry, the 6th ed., Oxford University Press.					
[Reference books, etc.]					
(Reference books)					
Continue to エネルギー化学1 (エネ原) (2)					

エネルギー化学1 (エネ原) (2)	

[Regarding studies out of class (preparation and review)]	
(Others (office hour, etc.))	
Homeworks will be occasionally assigned as supplementary exercises. Depending on the progress in the class, schedule may be partially changed. Homeworks and supplementary materials are provided at URL: http://www.chem.energy.kyoto-u.ac.jp The text book will be used in Energy chemistry II held in fall semester.	
*Please visit KULASIS to find out about office hours.	

Numbering code					
Course title <English>	エネルギー化学2 (エネ原) Energy chemistry 2	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor, MATSUMOTO KAZUHIKO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.4	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
1. Oxidation and Reduction, 3 times, reduction potentials, redox stability, diagrammatic presentation of potential data, chemical extraction of the elements 2. Molecular symmetry, 2 times, an introduction to symmetry analysis, applications of symmetry, symmetries of molecular orbitals, representations 3. An introduction to coordination chemistry, 2 times language of coordination chemistry, constitution and geometry, isomerism and chirality, thermodynamics of complex formation 4. Physical techniques in inorganic chemistry, 2 times diffraction methods, absorption spectroscopy, resonance techniques, ionization-based techniques, chemical analysis, magnetometry, electrochemical techniques, microscope techniques 5. Periodic trends, Hydrogen, Group 1 and 2 elements, 1 time periodic properties, periodic characteristics of compounds, hydrogen, alkali metal, and alkali earth metal compounds, topics related to energy chemistry (hydrogen energy system, secondary batteries) 6. Group 13, 14, 15, and 16 elements, 1 time boron, aluminium, carbon, silicon, nitrogen, and chalcogen compounds, topics related to energy chemistry (carbonaceous materials, solar cells, energy resources) 7. Exercises and comments, 3 times Exercises and comments on the topics in this lecture 8. Summary, once					
[Class requirement]					
Students are supposed to understand the lecture "Energy Chemistry 1".					
Continue to エネルギー化学2 (エネ原) (2)					

エネルギー化学2 (エネ原) (2)	

[Method, Point of view, and Attainment levels of Evaluation]	
Evaluation will be based on assignments and exercises (40 %) and final examination (60%).	
[Textbook]	
Shriver & Atkins; Inorganic Chemistry (6th Ed.) ISBN 9784807908981 which is used in Energy Chemistry 1. isbn { } {9784807908981 }	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
Reading the textbook and reviewing the assignments are recommended.	
(Others (office hour, etc.))	
Assignments are given every week to support understanding of the lecture.	
*Please visit KULASIS to find out about office hours.	

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Numbering code							
Course title <English>	中性子理工学 (原) Neutron Physics and Engineering	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TASAKI SEIJI	Target year	3rd year students or above	Number of credits	2
Day/period	Tue.3	Class style	Lecture	Course offered year/period	2019/Second semester		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
.1time, .1time, .1time, .4times, .2times, .3times, .2times, .1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	流体力学 1 (工原宇) Fluid Dynamics 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor.INAMURO TAKAJI	Target year	2nd year students or above	Number of credits	2
Day/period	Tue.2	Class style	Lecture	Course offered year/period	2019/Second semester		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
Guidance,2times,Guidance on how this class is operated, and how to use computing facility for this class.\\ Basic knowledge on the role of IDS in network security and how machine learning can help the intrusion detection. Intrusion Detection by Signature-Based IDS,5times,Learn the mechanism of intrusion detection by signature-based IDS by studying open source signature-based IDS and attacks, such as correspondence between alarms issued from IDS and communications, and adding signatures to detect attacks. Intrusion Detection by Machine Learning,7times,Learn the method of classifying normal and malicious traffic by machine learning algorithms and public dataset for benchmarking intrusion detection performance. Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code							
Course title <English>	流体力学 1 (機) Fluid Dynamics 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KUROSE RYOUICHI	Target year	2nd year students or above	Number of credits	2
Day/period	Tue.2	Class style	Lecture	Course offered year/period	2019/Second semester		
[Outline and Purpose of the Course]							
Fundamental of fluid dynamics: introduction, fluid properties, governing equations (Navier-Stokes equations, N-S equations), solution methods of N-S equations, laminar/turbulent flows, boundary layer flow.							
[Course Goals]							
Understanding of the principle of fluid flow.							
[Course Schedule and Contents]							
1 time : Introduction 2 time : Stationary fluid 4 times: Viscous fluid (Laminar flow /Turbulent flow) 5 times: Macroscopic expression of fluid motion 2 times: Exercise 1 times: Summary							
[Class requirement]							
N/A							
[Method, Point of view, and Attainment levels of Evaluation]							
Term-end exam							
[Textbook]							
Instructed during class							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
Instructed during class.							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code							
Course title <English>	流体力学 2 (機) Fluid Dynamics 2	Affiliated department, Job title,Name	Graduate School of Engineering Professor,HANAZAKI HIDESHI	Target year	3rd year students or above	Number of credits	2
Day/period	Thu.2	Class style	Lecture	Course offered year/period	2019/First semester		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
.2times, .4times, .2times, .3times, .1time, .2times, .1 times,							
[Class requirement]							
Fluid Dynamics 1							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
G. K. Batchelor, An Introduction to Fluid Dynamics (Cambridge University Press, 1967). isbn{} { 052104118X}, (同, 2000) isbn{} { }{9780521663960}							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

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Numbering code						
Course title <English>	流体力学2 (エネ宇) Fluid Dynamics2			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,OOWADA TAKU Graduate School of Engineering Senior Lecturer,SUGIMOTO HIROSHI Graduate School of Engineering Professor,INAMURO TAKAJI	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester	
Day/period	Thu.2	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
,2times, ,3times, ,3times, ,6times, ,1time,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code						
Course title <English>	航空宇宙工学演義 (宇) Engineering Exercise in Aeronautics and Astronautics			Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor,ERIGUCHI KOUJI	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester	
Day/period	Tue.3,4	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
[Course Goals]						
[Course Schedule and Contents]						
..						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code						
Course title <English>	マイクロ加工学 (機エネ) Microfabrication			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Associate Professor,YOKOKAWA RYUUI	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester	
Day/period	Mon.3	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
This course covers microfabrication technology for MEMS as well as semiconductors.						
[Course Goals]						
[Course Schedule and Contents]						
,1time, ,2times, ,3times, ,2times, ,2times, ,2times, ,2times, ,1time,						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
[Textbook]						
[Reference books, etc.]						
(Reference books)						
[Regarding studies out of class (preparation and review)]						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code						
Course title <English>	固体物性論 (材エネ) Condensed Matter Physics			Affiliated department, Job title,Name	Graduate School of Engineering Professor,NAKAMURA HIROYUKI Graduate School of Engineering Associate Professor,TABATA YOSHIKAZU	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester	
Day/period	Fri.3	Class style	Lecture	Language	Japanese	
[Outline and Purpose of the Course]						
Basic concept of optical, magnetic and superconducting properties of matters.						
[Course Goals]						
Understanding of basic concept of optical, magnetic and superconducting properties of matters.						
[Course Schedule and Contents]						
Review of electromagnetism, 2times, Maxwell's equations and electromagnetic wave, vector potential, Hamiltonian for charged particle in electromagnetic field, etc. Optical properties of matter, 3times, optical constants, electromagnetic wave in solid, Lorentz model, Drude model, band structure and optical response, Kramers-Kronig relation, etc. Magnetism, 6times, magnetic moment, atomic magnetism, single-ion magnetism, paramagnetism, ferromagnetism, antiferromagnetism, molecular field, metallic magnetism, magnetic anisotropy, magnetization process, etc. Superconductivity, 3times, Meisner effect, type-1 and type-2 superconductivity, London equation, flux quantization, origin of superconductivity, Josephson effect, SQUID, etc. Assessment, 1time, Assessment						
[Class requirement]						
None						
[Method, Point of view, and Attainment levels of Evaluation]						
Evaluation will be based on a final examination.						
[Textbook]						
Not used						
[Reference books, etc.]						
(Reference books)						
S. Blundel 『Magnetism in Condensed Matter (Oxford Master Series in Physics)』 (Oxford University Press) ISBN:0198505914 C. Kittel 『Introduction to Solid State Physics』 (Wiley) ISBN:9780471415268						
[Regarding studies out of class (preparation and review)]						
Basics of quantum mechanics and statistical mechanics is necessary.						
(Others (office hour, etc.))						
*Please visit KULASIS to find out about office hours.						

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Numbering code									
Course title <English>	量子物性基礎論 (原) Introduction to Solid State Physics	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,MATSUO JIROU Graduate School of Engineering Senior Lecturer,SEKI TOSHIO	Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese				
[Outline and Purpose of the Course]									
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.									
[Course Goals]									
To further develop the understanding of interactions between solid state and phonons, electrons and particles on a microscopic scale.									
[Course Schedule and Contents]									
Introduction, 1 times,Revision of crystal type and structure Free electron model,3times,Wave function theory of one dimensional lattice, energy state and Fermi surface Band structure,3times,Blochrsquos theory, Brillouin zone, Laue law, diffraction and structural factor Defects and dislocations,2times,Vacancy, diffusion, color center Optical property,2times,Kramers-Kronig relation, Drude theory, electron gas, Plasmom Semiconductor,1time,Band gap, electrons and holes, Homogeneous semiconductor, doping Junction theory,1time,p-n junctions, metal-semiconductor junction, hetero-junction Final examination and report,2times,Evaluation will be given by the contents of the reports and quizzes of the subjects leaned in this course.									
[Class requirement]									
None									
[Method, Point of view, and Attainment levels of Evaluation]									
Coursework will be evaluated with attendance and report on subjects.									
[Textbook]									
[Reference books, etc.]									
(Reference books) C. Kittel, Introduction to Solid State Physics 8th edition (Wiley) isbn{ }{9780471415268}									
[Regarding studies out of class (preparation and review)]									
(Others (office hour, etc.))									
*Please visit KULASIS to find out about office hours.									

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Numbering code									
Course title <English>	原子核工学序論 2 (原) Introduction to Nuclear Engineering 2	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor,SASAKI TAKAYUKI	Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese				
[Outline and Purpose of the Course]									
[Course Goals]									
[Course Schedule and Contents]									
.4times, .9times, .1time, .1time,									
[Class requirement]									
None									
[Method, Point of view, and Attainment levels of Evaluation]									
[Textbook]									
[Reference books, etc.]									
(Reference books)									
[Regarding studies out of class (preparation and review)]									
(Others (office hour, etc.))									
*Please visit KULASIS to find out about office hours.									

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Numbering code									
Course title <English>	原子核工学序論 1 (原) Introduction to Nuclear Engineering 1	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor,SASAKI TAKAYUKI	Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese				
[Outline and Purpose of the Course]									
[Course Goals]									
[Course Schedule and Contents]									
.7times, .7times, .1time,									
[Class requirement]									
None									
[Method, Point of view, and Attainment levels of Evaluation]									
[Textbook]									
[Reference books, etc.]									
(Reference books)									
[Regarding studies out of class (preparation and review)]									
(Others (office hour, etc.))									
*Please visit KULASIS to find out about office hours.									

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Numbering code									
Course title <English>	流体熱工学 (原) Fluid Flow and Heat Transfer	Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOKOMINE TAKEHIKO	Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.2	Class style	Lecture	Language	Japanese				
[Outline and Purpose of the Course]									
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.									
[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 Schedule and Contents]									
.1.0times, .1.0times, .2.0times, .4.0times, .1.0times, .5.0times, .1.0times,									
[Class requirement]									
None									
[Method, Point of view, and Attainment levels of Evaluation]									
Evaluation based on the written examination, but it is also rating a student#039s class performance.									
[Textbook]									
[Reference books, etc.]									
(Reference books)									
[Regarding studies out of class (preparation and review)]									
(Others (office hour, etc.))									
*Please visit KULASIS to find out about office hours.									

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Numbering code					
Course title <English>	伝熱工学 (機) Heat Transfer	Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,IWAI HIROSHI Graduate School of Engineering Associate Professor,TATSUMI KAZUYA		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
This course focuses on the heat transfer phenomena at the foundation of heating, cooling, and insulation techniques, that is heat conduction, convection heat transfer, and thermal radiation. With respect to heat conduction, we will discuss the steady-unsteady phenomenon and the theory of extended surface heat transfer. With respect to convective heat transfer, we will discuss single-phase forced convection/natural convection and the boiling and condensation transfer accompanying phase transitions. With respect to thermal radiation, we will discuss the basic theory.					
[Course Goals]					
Provide basic knowledge and deepen understanding of heat transfer phenomena (heat conduction, convective heat transfer, thermal radiation).					
[Course Schedule and Contents]					
(1) General information: Based on multiple examples of energy conversion requiring heating, cooling, and insulation techniques, and temperature control of equipment, explain the importance of heat transfer engineering and the basic mechanisms of heat transfer phenomena.					
(2-4) Heat conduction: Explain the basics of heat conduction phenomena, specifically heat flux, thermal conductivity and Fourier ' s law, and the derivation of the equation of heat conduction, with reference to basic case examples. Explain thermal contact resistance, steady heat conduction, and heat conduction resistance in flat plates, pipes, etc., the theory of extended surfaces (fins), and so on.					
(5) Basic information on convective heat transfer: Formulate the governing equations of flow in heat transfer. Explain dimensionless numbers such as Prandtl number, Nusselt number, Stanton number, Grashof number, and Rayleigh number. Derive the momentum and energy equations for the boundary layer flow and heat transfer.					
(6-9) Convective heat transfer without phase change: Explain specific examples of forced convective heat transfer, as well as general information. As examples of external flow heat transfer, explain laminar and turbulent boundary layer flow over a flat plate accompanying heat transfer. Also, as an example of internal flow heat transfer, explain heat transfer of flows within tubes. Also, explain natural convection along a vertical heated plate.					
(10, 11) Convective heat transfer accompanying phase changes: With respect to boiling heat transfer, explain the boiling curve in pool boiling and nucleate boiling, transition boiling, film boiling heat transfer mechanisms, and the effects of various factors that affect nucleate boiling heat transfer and methods to enhance heat transfer. With respect to condensation heat transfer, explain the difference between dropwise condensation and film condensation, phenomena in condensation interfaces, and the Nusselt solution in vertical plate film					
Continue to 伝熱工学 (機) (2)					

Numbering code					
Course title <English>	材料基礎学 2 (工ネ) Fundamentals of Materials 2	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,OKUMURA HIDEYUKI		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.3times, .2times, .2times, .2times, .1time, .1time, .3times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
Text book can be bought at the society of material science, Japan at Hyakumanben near Kyoto university. http://www.jsms.jp/					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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伝熱工学 (機) (2)					
condensation. (12-14) Radiation heat transfer: Discuss black bodies and gray bodies, Kirchhoff ' s law, Planck ' s law, and Wien ' s displacement law, Stefan-Boltzmann ' s law, radiation transfer between black body surfaces and radiation in actual surfaces, and the properties of radiation in gases.					
(15) Confirmation of learning attainment.					
[Class requirement]					
Students are required to have completed Thermodynamics 1, Thermodynamics 2, Fluid Dynamics 1, and Fluid Dynamics 2.					
[Method, Point of view, and Attainment levels of Evaluation]					
A final examination will be held. In-class quizzes and reports, when carried out, will be factored in.					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
Students are required to have completed Thermodynamics 1, Thermodynamics 2, Fluid Dynamics 1, and Fluid Dynamics 2.					
(Others (office hour, etc.))					
The order of classes listed above and their timing may differ depending on the year.					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	設計工学 1 Design Engineering 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,KOMORI MASAHARU Graduate School of Engineering Professor,HIRAYAMA TOMOKO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Mon.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .4times, .3times, .3times, .2times, .2times, .1time, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

原子核工学実験 1 (2)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

エネルギー-応用工学設計演習・実験 2 (2)
[Course Schedule and Contents] .6times, .6times, .6times, .6times, .1time,
[Class requirement] None
[Method, Point of view, and Attainment levels of Evaluation]
[Textbook]
[Reference books, etc.] (Reference books)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.

Numbering code		※	
Course title <English>	エネルギー-応用工学設計演習・実験 2 Design Practice and Experiments for Applied Energy Science and Engineering 2	Affiliated department, Job title,Name	Graduate School of Energy Science Associate Professor,OKUMURA HIDEYUKI Graduate School of Energy Science Associate Professor,ABE MASATAKA Graduate School of Energy Science Associate Professor,HACHIYA KAN Graduate School of Energy Science Assistant Professor,IKENOUE TAKUMI Graduate School of Energy Science Professor,IMATANI SHIYOUJI Graduate School of Energy Science Assistant Professor,IMADERA KENJI Graduate School of Energy Science Assistant Professor,OGAWA TAKAYA Graduate School of Energy Science Associate Professor,KASHIWAYA YOSHIKI Graduate School of Energy Science Associate Professor,KINOSHITA KATSUYUKI Graduate School of Energy Science Associate Professor,HASEGAWA MASAKATSU Graduate School of Energy Science Associate Professor,Jun HAYASHI Graduate School of Energy Science Assistant Professor,HORIBE NAOTO Graduate School of Energy Science Associate Professor,MATSUMOTO KAZUHIKO Graduate School of Energy Science Associate Professor,MIYAKE MASAO
Target year	3rd year students or above	Number of credits	3
Course offered year/period	2019/Second semester		
Day/period	Wed.3,4,Thu.3,4	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
Continue to エネルギー-応用工学設計演習・実験 2 (2)			

Numbering code		※	
Course title <English>	原子核工学実験 2 Nuclear Engineering Laboratory 2	Affiliated department, Job title,Name	Graduate School of Engineering ALL STAFF Graduate School of Engineering Assistant Professor,IMAI MAKOTO
Target year	3rd year students or above	Number of credits	3
Course offered year/period	2019/Second semester		
Day/period	Thu. 1,2,3,4	Class style	Seminar
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents] .1time, .2times, .1time, .1time, .1time, .1time, .1time, .1time, .1time, .1time, .1time, .2times, .1time, .2times,			
[Class requirement] None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
Continue to 原子核工学実験 2 (2)			

原子核工学実験 2 (2)			
[Reference books, etc.] (Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.			

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Numbering code			
Course title <English>	熱力学 1 (機字 : 学番奇数) Thermodynamics 1	Affiliated department, Job title, Name	Graduate School of Engineering Professor, NAKABE KAZUYOSHI Graduate School of Engineering Associate Professor, TATSUMI KAZUYA
Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Fri.1	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,1time, ,5times, ,2times, ,2times, ,4times, ,1time, ,1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.] (Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.			

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Numbering code			
Course title <English>	材料強度学 Strength and Fracture of Materials	Affiliated department, Job title, Name	Graduate School of Engineering Associate Professor, SUMIGAWA TAKASHI
Target year	4th year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Thu.2	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
,2times, ,2times, ,3times, ,1?2times, ,1?2times, ,1?2times, ,1?2times, ,1time,			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.] (Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.			

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Numbering code			
Course title <English>	熱力学 1 (機字 : 学番偶数) Thermodynamics 1	Affiliated department, Job title, Name	Graduate School of Engineering Professor, YOSHIDA HIDEO Graduate School of Engineering Associate Professor, Iwai HIROSHI
Target year	2nd year students or above	Number of credits	2
Course offered year/period	2019/First semester		
Day/period	Fri.1	Class style	Lecture
Language	Japanese		
[Outline and Purpose of the Course]			
[Course Goals]			
[Course Schedule and Contents]			
0			
[Class requirement]			
None			
[Method, Point of view, and Attainment levels of Evaluation]			
[Textbook]			
[Reference books, etc.] (Reference books)			
[Regarding studies out of class (preparation and review)]			
(Others (office hour, etc.)) *Please visit KULASIS to find out about office hours.			

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Numbering code					
Course title <English>	熱力学 1 (工ネ原) Thermodynamics 1	Affiliated department, Job title,Name	Graduate School of Energy Science Professor,ISHIHARA KEIICHI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
In this course, Thermodynamics 1, the basic laws of thermodynamics are introduced. Also discussed are fundamental items including state changes of ideal and real gases, cycles, flow of gases, phase transformation, free energy, phase equilibrium and the phase rule, single-component phase diagrams, etc.					
[Course Goals]					
Students will gain an understanding of the meaning and significance of the first and second laws of thermodynamics, fundamental concepts for thermodynamics. Students will also be able to quantitatively deal with changes in thermodynamic quantity that accompany state changes.					
[Course Schedule and Contents]					
Introduction to thermodynamics (1class) History of thermodynamics, introduction of variables and units used in thermodynamics.					
The first law of thermodynamics (2classes) Explanation is provided of definition of heat, Quasi-static process, specific heat, enthalpy, ideal gas.					
The second law of thermodynamics (2classes) Explanation is made of reversible and irreversible process, Ideal cycle, Carnot cycle by ideal gas, introduction of entropy.					
Thermal engine (3classes) Discussion in these classes will include the free expansion/compression of gas, Otto cycle, Brayton cycle, Carnot cycle.					
Free energy (3classes) Explanation is made of free energy, Maxwell equations, Joule-Thompson's experiment.					
Phase transformation (2classes) Explanation is made regarding various items, including phase, first order phase transformation, metastable equilibrium, critical point, second order phase transportation.					
Confirmation of extent of student learning (1class) Confirmation is made, via practice problems and exercises, of the extent that students have learned the contents of this course.					
Feedback (1class) Based on test results, critical reviews will be made of student work.					
----- Continue to 熱力学 1 (工ネ原) (2)					

Numbering code					
Course title <English>	材料熱力学 1 (材) Thermodynamics of Materials 1	Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUGIMURA HIROYUKI		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.2times, .4times, .2times, .3times, .2times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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熱力学 1 (工ネ原) (2)					

[Class requirement]					
The fundamental calculus as taught by the Institute of Liberal Arts and Science is a prerequisite for this course.					
[Method, Point of view, and Attainment levels of Evaluation]					
Written examination					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books) Thermodynamics and statistical mechanics (A. Harajima, Baifukan) (in Japanese). isbn{}{9784563021399}					
[Regarding studies out of class (preparation and review)]					
After each class, students should spend time to review the equations and its derivations and understand the meaning.					
(Others (office hour, etc.))					
Depending on the number of course classes scheduled for each school year and other factors, a portion of the Syllabus may be omitted, or additions may be made thereto.					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料熱力学 2 (材) Thermodynamics of Materials 2	Affiliated department, Job title,Name	Graduate School of Engineering Professor,UDA TETSUYA		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
Fundamental of thermodynamics,4times,Internal energy,enthalpy,heat capacity\\Entropy and second law\\ Direction of system change Chemical potential,3times,Extensive and intensive variable,chemical potential\\Composition-dG diagram and chemical potential\\Phase rule,phase equilibria\\Ideal solution,Henrian standard state, activity Phase diagrams,1time,Relationship between phase diagram and Gibbs energy\\Invariant reaction in binary systems Thermodynamics for electrode and ion,2times,Electrode potential, electromotive force\\Standard state for ion, Standard hydrogen electrode Chemical potential diagrams,3times,Chemical potential diagrams for ternary systems\\Electrode potential-pH diagram					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	量子無機材料学 1 (材) Electronic Structures of Inorganic Materials 1	Affiliated department, Job title, Name	Graduate School of Engineering Professor, TANAKA ISAO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
Introduction to quantum theory, 3times, Description of electrons, Schrodinger equation Electronic structures of isolated atoms, 3times, hydrogen-like atoms, quantum numbers, many-electron atoms, self-consistent method, electron spin Electronic structure of simple molecules, 3times, molecular orbital method, homo/hetero nuclear diatomic molecules, chemical bondings Electronic structures of crystals, 4times, electronic structure of monoatomic crystals and binary compounds, 1D chain of hydrogen atoms, Bloch theorem, band calculations Application to materials science, 1time, Density functional theory calculations and their application to materials science Assessment of mastery of the course content, 1time, Assessment of mastery of the course content					
[Class requirement]					
Understanding of contents for Basic Phys. Chemistry (quantum theory) is preferred.					
[Method, Point of view, and Attainment levels of Evaluation]					
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.					
[Textbook]					
The textbook for this lecture (in Japanese) can be purchased at a bookstore. isbn { } {9784753655595}					
Continue to 量子無機材料学 1 (材) (2)					

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Numbering code					
Course title <English>	量子無機材料学 2 (材) Electronic Structures of Inorganic Materials 2	Affiliated department, Job title, Name	Graduate School of Engineering Associate Professor, SEKO ATSUTO		
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Tue.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[Course Goals]					
Learning the fundamentals of quantum chemistry and band theory, and their applications to the issues in materials science.					
[Course Schedule and Contents]					
Electronic structure theory for materials science, 1time, The roles of electronic structure theory in materials research and development. Fundamentals of electronic structure theory, 2times, The characteristics and physical meanings of wavefunctions, total energy, and one-electron energy. Theory, approximations, and methods in quantum chemistry (1), 4times, Variational method and perturbation method. Theory, approximations, and methods in quantum chemistry (2), 3times, Hartree and Hartree-Fock approximations in quantum chemistry. Electronic band structure calculation, 2times, Density functional theory, pseudopotential and basis set in electronic band structure calculation. Electronic structure and chemical bonding of molecules and solids, 2times, The electronic structure and chemical bonding of molecules and solids. Assessment of mastery of the course content, 1time, The mastery of the course content is assessed.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluations are made based on the examination. The results of quizzes and reports may be considered.					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
Continue to 量子無機材料学 2 (材) (2)					

量子無機材料学 1 (材) (2)
[Reference books, etc.]
(Reference books) Standard textbooks for elementary quantum physics, quantum chemistry and solid state theory may be used.
[Regarding studies out of class (preparation and review)]
Support materials are available on KULASIS. Password is given in the lecture room. They may be used for reviewing.
(Others (office hour, etc.))
*Please visit KULASIS to find out about office hours.

量子無機材料学 2 (材) (2)
[Regarding studies out of class (preparation and review)]
(Others (office hour, etc.))
*Please visit KULASIS to find out about office hours.

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Numbering code					
Course title <English>	知能システム工学（機）		Affiliated department, Job title,Name	Graduate School of Engineering Professor,SAWARAGI TETSUO Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Wed.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.2times, .2times, .2times, .2times, .2times, .2times, .2-3times,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	材料組織学 Fundamentals of Microstructure of Materials		Affiliated department, Job title,Name	Graduate School of Engineering Professor,HIDEYUKI YASUDA	
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Mon.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
Properties of materials depend on not only lattice structure and composition but also microstructure. In this lecture, microstructure evolution during phase transformation (i.e. solidification) will be explained by using thermodynamics and kinetics. Students study microstructure evolution (nucleation, growth, solute partition, microstructure selection, equilibrium / non-equilibrium processes).					
[Course Goals]					
1. To understand relationship between microstructure evolution and thermodynamics / kinetics. 2. To be able to use thermodynamics and kinetics for understanding microstructure in various materials.					
[Course Schedule and Contents]					
1.Introduction (1):fundamentals of thermodynamics and kinetics, which are required for understanding this class 2.Nucleation and curvature effect (1): classical nucleation theory, curvature effect 3.Interface morphology (1): interface morphology (atomic scale), macroscopic interface shape 4.Growing interface (2-3): local equilibrium at interface, solute partition, stability of interface 5.Dendritic growth (1-2): mechanism of dendritic growth, selection 6.Solute partition and segregation (1): solute partition at interface, segregation (non-uniform distribution of solutes) 7.Eutectic growth (1-2): cooperative growth of multiple phases, selection of microstructure 8.Non-equilibrium phase transformation (1-2): rapid solidification, non-equilibrium and metastable phases 9. Microstructure and phase Diagram, selection rules 10. Final examination / Learning achievement evaluation, and feedback 11. Feedback					
[Class requirement]					
Fundamentals of Microstructure of Materials 1,2 and 3					
[Method, Point of view, and Attainment levels of Evaluation]					
Evaluation method: Evaluation will be based on one written examination. Evaluation standard: The result of a written examination should be 60 and above out of 100. (60 and above: Passed, 59 and below: Failed)					
Evaluation may includes short reports.					
[Textbook]					
松原英一郎他 『金属材料組織学』(朝倉書店) ISBN:9784254240184					
Continue to 材料組織学(2)					

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Numbering code					
Course title <English>	材料科学基礎 3 Fundamentals of Materials Science III		Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,TOYOURA KAZUAKI	
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .1time, .1time, .3times, .4times, .4times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
isbn{}{9784254240184}					
[Reference books, etc.]					
(Reference books)					
isbn{}{9784563067120} isbn{}{9784563067137} D.A.Porter and K.E.Easterling: Phase Transformations in Metals and Alloys isbn{}{0412450305}					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

材料組織学(2)					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
Students are required to carry out a review of class.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	高分子材料概論 (材) Introduction to Polymer Materials			Affiliated department, Job title,Name	Part-time Lecturer,FUKUDA TAKESHI
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Fri.2	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .3times, .4times, .4times, .2times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.] (Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	結晶回折学 (材) Xray Diffraction			Affiliated department, Job title,Name	Graduate School of Engineering Professor.MATSUBARA EIICHIROU
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Thu.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
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.					
[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 Schedule and Contents]					
Basic properties of x-rays,3times,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,3times,1.One dimensional crystal symmetry\2.7 crystal systems and 14 Bravais#039 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,1time,1. Description of lattice planes and directions\2. Stereo projection Diffraction by crystals,3times,1. Diffraction by crystalline lattice\2. Bragg conditions and scattering angle\3. Calculation of structure factors Diffraction by a powder sample,1time,1. Principle of diffractometer\2. X-ray diffraction by powder sample Structural analyses of cubic systems,time,1. Determination of a lattice parameter in cubic systems\2. Determination of Bravais#039 lattice in cubic systems Reciprocal lattice and diffraction condition,3times,1. Definition of reciprocal lattices\2. Reciprocal lattice and real lattice\3. Reciprocal lattice and diffraction condition					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
The course will be evaluated from the scores of a midterm examination (40%) and a final examination (60%).					
[Textbook]					
Instructed during class					
[Reference books, etc.] (Reference books)					
----- Continue to 結晶回折学 (材) (2)					

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Numbering code					
Course title <English>	原子炉物理学 (原) Nuclear Reactor Physics			Affiliated department, Job title,Name	Graduate School of Engineering Professor.KANNO IKUO
Target year	3rd year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Fri.1	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.4times, .4times, .3times, .3times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.] (Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

結晶回折学 (材) (2)					

[Regarding studies out of class (preparation and review)]					
Concentrate on a lecture, and review the contents which you got by a lecture by rearranging your lecture note and studying any questions of lecture contents for at least 4 hours in each lecture.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code							
Course title <English>	エレクトロニクス入門 (機宇) 情報 Introduction to Electronics			Affiliated department, Job title,Name	Graduate School of Informatics Professor,MORIKURA MASAHIRO		
Target year	2nd year students or above	Number of credits	2	Course offered year/period	2019/First semester		
Day/period	Tue.5	Class style	Lecture	Language	Japanese		
[Outline and Purpose of the Course]							
[Course Goals]							
[Course Schedule and Contents]							
.2times, .5times, .2times, .5times, .1time,							
[Class requirement]							
None							
[Method, Point of view, and Attainment levels of Evaluation]							
[Textbook]							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究 1 (材) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUGIMURA HIROYUKI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
担当教員の指導のもと、材料科学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 ~ 4 回 研究課題の設定 5 ~ 9 回 先行研究の調査、報告 1 0 ~ 1 2 回 設定課題の新規性、独創性等の検討 1 3 ~ 1 5 回 研究計画の立案							
上記の研究活動を 4 単位分実施するとともに、特別研究報告書の執筆指導などを行う。							
[Class requirement]							
物理工学科材料科学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、出席状況に基づいて行う。							
[Textbook]							
指導教員が個別に指示する教科書等を利用する							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究 1 (機) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Engineering Professor,HOUJIYOU MASAKI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
担当教員の指導のもと、機械工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 ~ 4 回 研究課題の設定 5 ~ 9 回 先行研究の調査、報告 1 0 ~ 1 2 回 設定課題の新規性、独創性等の検討 1 3 ~ 1 5 回 研究計画の立案							
[Class requirement]							
物理工学科機械システム学コースが指定する、入学年次に対応した特別研究着手条件を満たしていること。							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
配属研究室で指定される。							
[Reference books, etc.]							
(Reference books) 木下是雄 『理科系の作文技術』(中央公論新社(新書)) ISBN:9784121006240							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究 1 (工ネ) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HAGIWARA RIKI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar	Language	Japanese		
[Outline and Purpose of the Course]							
担当教員の指導のもと、エネルギー応用工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 ~ 4 回 研究課題の設定 5 ~ 9 回 先行研究の調査、報告 1 0 ~ 1 2 回 設定課題の新規性、独創性等の検討 1 3 ~ 1 5 回 研究計画の立案							
[Class requirement]							
物理工学科エネルギー応用工学コースが指定する入学年次の特別研究着手条件を満たしていること。							
[Method, Point of view, and Attainment levels of Evaluation]							
一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究1(原) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOKOMINE TAKEHIKO		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、原子核工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1～4回 研究課題の設定 5～9回 先行研究の調査、報告 10～12回 設定課題の新規性、独創性等の検討 13～15回 研究計画の立案							
[Class requirement]							
理工学原子核工学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books) 各指導教員が紹介する							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究1(材) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUGIMURA HIROYUKI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、材料科学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1～4回 研究課題の設定 5～9回 先行研究の調査、報告 10～12回 設定課題の新規性、独創性等の検討 13～15回 研究計画の立案							
上記の研究活動を4単位分実施するとともに、特別研究報告書の執筆指導などを行う。							
[Class requirement]							
理工学材料科学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、出席状況に基づいて行う。							
[Textbook]							
指導教員が個別に指示する教科書等を利用する							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究1(宇) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Engineering Professor,ERIGUCHI KOUJI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、航空宇宙工学の関連分野(航空宇宙力学、流体力学、流体数学、推進工学、制御工学、機能構造力学、分子流体力学)に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1～4回 研究課題の設定 5～9回 先行研究の調査、報告 10～12回 設定課題の新規性、独創性等の検討 13～15回 研究計画の立案							
[Class requirement]							
理工学宇宙基礎工学コースが指定する入学年次の特別研究着手条件を満たしていること。							
[Method, Point of view, and Attainment levels of Evaluation]							
一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books) 各担当教員から研究テーマに応じて指示する。							
[Regarding studies out of class (preparation and review)]							
指示された参考書および学術論文等を学期をかけて読み進めること。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>	特別研究1(工ネ) Graduation Thesis1			Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HAGIWARA RIKI		
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、エネルギー応用工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1～4回 研究課題の設定 5～9回 先行研究の調査、報告 10～12回 設定課題の新規性、独創性等の検討 13～15回 研究計画の立案							
[Class requirement]							
理工学エネルギー応用工学コースが指定する入学年次の特別研究着手条件を満たしていること。							
[Method, Point of view, and Attainment levels of Evaluation]							
一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45995 GJ77					
Course title <English>		特別研究1(原) Graduation Thesis1		Affiliated department, Job title,Name		Graduate School of Engineering Professor.YOKOMINE TAKEHIKO	
Target year	4th year students or above	Number of credits	4	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、原子核工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、報告の作成などを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1～4回 研究課題の設定 5～9回 先行研究の調査、報告 10～12回 設定課題の新規性、独創性等の検討 13～15回 研究計画の立案							
[Class requirement]							
理工工学科原子核工学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books) 各指導教員が紹介する							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2(材) Graduation Thesis2		Affiliated department, Job title,Name		Graduate School of Engineering Professor.SUGIMURA HIROYUKI	
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、材料科学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1回 設定課題の新規性、独創性等の再検証 2～7回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 8～9回 成果のまとめ、中間発表のための資料作成 10回 特別研究中間発表会での発表 11～13回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 14～15回 特別研究報告書の執筆							
上記の研究活動を6単位分実施するとともに、特別研究報告書の執筆指導などを行う。							
[Class requirement]							
理工工学科材料科学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、出席状況、中間発表会における発表内容、特別研究報告書の内容に基づいて行う。							
Continue to 特別研究2(材)(2)							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2(機) Graduation Thesis2		Affiliated department, Job title,Name		Graduate School of Engineering Professor.HOUIIYOU MASAKI	
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language		
[Outline and Purpose of the Course]							
担当教員の指導のもと、機械工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1回 設定課題の新規性、独創性等の再検証 2～10回 実験または理論検討の実施、結果の考察、実験または理論検討の計画の修正などにより研究を遂行 11～13回 成果のまとめ、特別研究報告書の執筆、学術発表会のための資料作成 14回 学術発表会での発表 15回 特別研究報告書の訂正							
[Class requirement]							
理工工学科機械システム学コースが指定する、入学年次に対応する特別研究着手条件を満たしていること。また、特別研究1を履修済みであること。							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、学術発表会における発表内容、特別研究報告書の内容に基づいて行う。							
[Textbook]							
各研究室において指定する。							
[Reference books, etc.]							
(Reference books) 木下是雄『理科系の作文技術』(中央公論新社(新書)) ISBN:9784121006240							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

特別研究2(材)(2)							
[Textbook]							
指導教員が個別に指示する教科書等を利用する							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2 (エネ) Graduation Thesis2		Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HAGIWARA RIKI		
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language		
[Outline and Purpose of the Course]							
担当教員の指導のもと、エネルギー応用工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 回 設定課題の新規性、独自性等の再検証 2 ~ 10 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 1 ~ 1 2 回 成果のまとめ、中間発表のための資料作成 1 3 回 特別研究中間発表会での発表 1 4 ~ 1 5 回 特別研究報告書の執筆							
[Class requirement]							
理工学科学科エネルギー応用工学コースが指定する入学年次の特別研究着手条件を満たしていること。							
[Method, Point of view, and Attainment levels of Evaluation]							
一連の研究活動の実施状況、中間発表会における発表内容、特別研究報告書の内容に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2 (宇) Graduation Thesis2		Affiliated department, Job title,Name	Graduate School of Engineering Professor,ERIGUCHI KOUJI		
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language		
[Outline and Purpose of the Course]							
担当教員の指導のもと、航空宇宙工学の関連分野（航空宇宙力学、流体力学、流体数理学、推進工学、制御工学、機能構造力学、分子流体力学）に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験（シミュレーション含む）と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 回 設定課題の新規性、独自性等の再検証 2 ~ 10 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 1 ~ 1 2 回 成果のまとめ、発表のための資料作成 1 3 回 ~ 1 5 回 特別研究の発表と報告書の執筆							
[Class requirement]							
理工学科学科宇宙基礎工学コースが指定する入学年次の特別研究着手条件を満たし、特別研究1（宇）を修得していること。							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、報告会における発表内容、特別研究報告書の内容に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
各担当教員から研究テーマに応じて指示する。							
[Regarding studies out of class (preparation and review)]							
指示された参考書および学術論文等を学期をかけて読み進めること。							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2 (原) Graduation Thesis2		Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOKOMINE TAKEHIKO		
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, Second semester		
Day/period	Intensive	Class style	Seminar		Language		
[Outline and Purpose of the Course]							
特別研究1の成果を踏まえ、担当教員の指導のもと、原子核工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 回 設定課題の新規性、独自性等の再検証 2 ~ 10 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 1 回 成果のまとめ 1 2 ~ 1 4 回 特別研究報告書の執筆 1 5 回 特別研究報告会での成果発表(ポスター発表)							
[Class requirement]							
理工学科学科原子核工学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、特別研究報告書の内容、特別研究報告会(ポスター発表)における発表内容に基づいて行う。							
[Textbook]							
Not used							
[Reference books, etc.]							
(Reference books)							
Introduced during class							
[Regarding studies out of class (preparation and review)]							
各指導教員の指示に従うこと							
(Others (office hour, etc.))							
*Please visit KULASIS to find out about office hours.							

Numbering code		U-ENG25 45998 GJ77					
Course title <English>		特別研究2 (材) Graduation Thesis2		Affiliated department, Job title,Name	Graduate School of Engineering Professor,SUGIMURA HIROYUKI		
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, First semester		
Day/period	Intensive	Class style	Seminar		Language	Japanese	
[Outline and Purpose of the Course]							
担当教員の指導のもと、材料科学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。							
[Course Goals]							
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。							
[Course Schedule and Contents]							
1 回 設定課題の新規性、独自性等の再検証 2 ~ 7 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 8 ~ 9 回 成果のまとめ、中間発表のための資料作成 1 0 回 特別研究中間発表会での発表 1 1 ~ 1 3 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 4 ~ 1 5 回 特別研究報告書の執筆							
上記の研究活動を6単位分実施するとともに、特別研究報告書の執筆指導などを行う。							
[Class requirement]							
理工学科学科材料科学コースが指定する入学年次の特別研究着手条件を満たしていること							
[Method, Point of view, and Attainment levels of Evaluation]							
成績評価は一連の研究活動の実施状況、出席状況、中間発表会における発表内容、特別研究報告書の内容に基づいて行う。							

Continue to 特別研究2 (材) (2)

特別研究 2 (材) (2)	

[Textbook]	
指導教員が個別に指示する教科書等を利用する	
[Reference books, etc.]	
(Reference books)	
[Regarding studies out of class (preparation and review)]	
各指導教員の指示に従うこと	
(Others (office hour, etc.))	
*Please visit KULASIS to find out about office hours.	

Numbering code		U-ENG25 45998 GJ77			
Course title <English>	特別研究 2 (原) Graduation Thesis2			Affiliated department, Job title,Name	Graduate School of Engineering Professor,YOKOMINE TAKEHIKO
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, First semester
Day/period	Intensive	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
特別研究 1 の成果を踏まえ、担当教員の指導のもと、原子核工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。					
[Course Goals]					
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。					
[Course Schedule and Contents]					
1 回 設定課題の新規性、独創性等の再検証 2 ~ 1 0 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 1 回 成果のまとめ 1 2 ~ 1 4 回 特別研究報告書の執筆 1 5 回 特別研究報告会での成果発表(ポスター発表)					
[Class requirement]					
物理工学科原子核工学コースが指定する入学年次の特別研究着条件を満たしていること					
[Method, Point of view, and Attainment levels of Evaluation]					
成績評価は一連の研究活動の実施状況、特別研究報告書の内容、特別研究報告会(ポスター発表)における発表内容に基づいて行う。					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books)					
Introduced during class					
[Regarding studies out of class (preparation and review)]					
各指導教員の指示に従うこと					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code		U-ENG25 45998 GJ77			
Course title <English>	特別研究 2 (エネ) Graduation Thesis2			Affiliated department, Job title,Name	Graduate School of Energy Science Professor,HAGIWARA RIKA
Target year	4th year students or above	Number of credits	6	Course offered year/period	2019/Intensive, First semester
Day/period	Intensive	Class style	Seminar	Language	Japanese
[Outline and Purpose of the Course]					
担当教員の指導のもと、エネルギー応用工学に関する研究課題を設定し、その課題解決のための研究活動を主体的に取り組む。この研究活動を通じて課題解決能力を習得する。得られた成果を関連研究と比較し、その意義や重要性等についてまとめる能力を養う。					
[Course Goals]					
課題設定、関連研究の調査、研究計画の立案、実験と検証を行う。これらの成果を特別研究としてまとめ、発表することを通じて、研究活動について学ぶ。					
[Course Schedule and Contents]					
1 回 設定課題の新規性、独創性等の再検証 2 ~ 1 0 回 実験の実施、結果の考察、実験計画の修正などにより研究を遂行 1 1 ~ 1 2 回 成果のまとめ、中間発表のための資料作成 1 3 回 特別研究中間発表会での発表 1 4 ~ 1 5 回 特別研究報告書の執筆					
[Class requirement]					
物理工学科エネルギー応用工学コースが指定する入学年次の特別研究着条件を満たしていること。					
[Method, Point of view, and Attainment levels of Evaluation]					
一連の研究活動の実施状況、中間発表会における発表内容、特別研究報告書の内容に基づいて行う。					
[Textbook]					
Not used					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
各指導教員の指示に従うこと。					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

Numbering code					
Course title <English>	電気回路基礎論 Fundamentals of Circuit Theory			Affiliated department, Job title,Name	Graduate School of Engineering Associate Professor,HISAKADO TAKASHI
Target year	1st year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Tue.5	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
The course introduces the fundamentals of the electric circuit. Topics covered include: resistive elements and networks; independent sources; switches and dynamics of first- and second-order networks; phasor analysis; 2-port circuits.					
[Course Goals]					
Students are expected to learn the transient analysis by differential equation and steady state analysis by phasor.					
[Course Schedule and Contents]					
DC circuit,3times,We introduce Kirchhoff#039s current law and Kirchhoff#039s voltage law, Ohm#039s law and independent sources. Differential equation of circuit,5times,We introduce inductors and capacitors and explain the differential equation of circuit. AC circuit,4times,We introduce phasor and explain the steady state analysis. two-port circuit,2times,We extend one-port elements to two-port circuits. academic achievement test,1time,The level of understanding on this lecture will be confirmed.					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
Reports and examinations					
[Textbook]					
奥村浩士 『エース電気回路理論入門』(朝倉書店) ISBN:4254227469					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
After the lesson, solve problems in the text.					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	数值解析 Numerical Analysis		Affiliated department, Job title,Name	Graduate School of Informatics Professor,NISHIMURA NAOSHI	
Target year	End year students or above	Number of credits	2	Course offered year/period	2019/Second semester
Day/period	Wed.3	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .6times, .3times, .4times, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					

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Numbering code					
Course title <English>	数理解析 Analysis in Mathematical Sciences		Affiliated department, Job title,Name	Graduate School of Informatics Professor,NISHIMURA NAOSHI Graduate School of Informatics Associate Professor,YOSHIKAWA HITOSHI	
Target year	4th year students or above	Number of credits	2	Course offered year/period	2019/First semester
Day/period	Thu.4	Class style	Lecture	Language	Japanese
[Outline and Purpose of the Course]					
[Course Goals]					
[Course Schedule and Contents]					
.1time, .5times, .3times, .2times, .1time, .1time, .1time, .1time,					
[Class requirement]					
None					
[Method, Point of view, and Attainment levels of Evaluation]					
[Textbook]					
[Reference books, etc.]					
(Reference books)					
[Regarding studies out of class (preparation and review)]					
(Others (office hour, etc.))					
*Please visit KULASIS to find out about office hours.					