

<b>Course number</b>	U-ENG29 22050 LJ10 U-ENG29 22050 LJ55				
<b>Course title (and course title in English)</b>	工業数学 A 1 Applied Mathematics A1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Associate Professor, SHIBAYAMA MITSURU	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
To understand properties of complex functions with a skill for evaluation of integrals appearing in applied mathematics and physics.					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
Calculus, Linear algebra					
Continue to 工業数学 A 1 (2)					

## 工業数学 A 1 (2)

### [Evaluation methods and policy]

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

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

Lars V. Ahlfors 『Complex Analysis』 ( McGraw-Hill Education ) ISBN:978-0070006577

#### ( Related URLs )

(KULASIS)

### [Study outside of class (preparation and review)]

Students need to solve exercises.

#### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Informatics and Mathematical Science

<b>Course number</b>	U-ENG25 22055 LJ55 U-ENG25 22055 LJ75				
<b>Course title (and course title in English)</b>	工業数学 F 1 (機材工ネ原:学番奇数) Applied Mathematics for Engineering F1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, NISHIKAWA MASAOKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
[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.					
<b>[Course objectives]</b>					
Understanding the basics of complex analysis and obtaining ability to practice it					
<b>[Course schedule and contents]</b>					
1. Definition of complex and complex plane 2-3. Differential of complex functions and Cauchy-Riemann relation 4-5. Concept and examples of regular functions 6. Line integral of complex functions 7-8. Cauchy's theorem and integral formula 9-10. Taylor and Laurent series 11-12. Singular points and residue theorem 13. Application to definite integral 14. Concept of conformal mapping, other topics 15. Feedback Confirmation of learning achievement: Regular examination					
<b>[Course requirements]</b>					
Fundamentals of differential and integral calculus					
<b>[Evaluation methods and policy]</b>					
<b>【Evaluation method】</b> 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.)					
<b>【Evaluation standard】</b> Evaluation will be based on class registration guideline.					
----- Continue to 工業数学 F 1 (機材工ネ原:学番奇数) (2) -----					

工業数学F 1 ( 機材工本原 : 学番奇数 ) (2)

**[Textbooks]**

A. Fujimoto 『Outline of complex analysis (Fukuso-kaisekigaku Gaisetsu)』 ( Baifukan ) ISBN:978-4563005719 ( in Japanese, published in 1990. )

**[References, etc.]**

**( Reference books )**

To be referred to during the course

**[Study outside of class (preparation and review)]**

Homework (short reports) for the problems stated in the textbooks will be assigned.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 22055 LJ55 U-ENG25 22055 LJ75			
<b>Course title (and course title in English)</b>	工業数学 F 1 (機材工ネ原:学番偶数) Applied Mathematics for Engineering F1		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer,	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Introduction to complex analysis and some applications					
<b>[Course objectives]</b>					
Understanding the basics of complex analysis and obtaining ability to practice it					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
Fundamentals of differential and integral calculus					
<b>[Evaluation methods and policy]</b>					
Regular examination and Reports					
<b>[Textbooks]</b>					
To be referred to during the course (Nishikawa), Not used (Murakami)					
----- Continue to 工業数学 F 1 (機材工ネ原:学番偶数) (2)					

工業数学 F 1 ( 機材工本原 : 学番偶数 ) (2)

**[References, etc.]**

( **Reference books** )

To be referred to during the course

**[Study outside of class (preparation and review)]**

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG29 32060 LJ55 U-ENG29 32060 LJ10 U-ENG29 32060 LJ54			
<b>Course title (and course title in English)</b>	工業数学 A 2 Applied Mathematics A2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor, FUJIWARA HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>計算機による数値シミュレーションは現代の科学・技術において基礎的かつ普遍的な手法のひとつであり，それら数値シミュレーション手法の信頼性は現代では数学理論に則って論じられる．本講義では代表的な手法を対象に信頼性を述べるとともに，そこでもちいられる数学的手法の枠組みも紹介する．</p>					
<b>[Course objectives]</b>					
<p>計算機による数値シミュレーション手法のアルゴリズムだけでなく，計算手法の信頼性を，線形代数・微積分や関数解析等の数学的枠組みに則って理解する．</p>					
<b>[Course schedule and contents]</b>					
<p>非線形方程式の近似解法(3回程度)，Newton 法等を紹介し，収束性や基本的な性質を述べる．関数近似と数値積分(3回程度)，多項式による近似，台形則やGauss型の数値積分則について，計算手法と誤差評価等を述べる．Banach空間とHilbert空間の基本的な性質(4回程度) 偏微分方程式の数値解法等の信頼性を調べる代表的な数学的枠組みを紹介する．偏微分方程式の数値解法の基礎理論(4回程度)，差分法等を対象に，数値計算手法の信頼性を述べる．</p> <p>数値シミュレーションの先端的話題 (1回程度)，講義で紹介した手法等がどのように発展し応用されるか，紹介する．概ねこの順序を進めるが，履修生の理解に応じて順序や講義回数を調整しながら進める．</p>					
<b>[Course requirements]</b>					
1 回生で学習する程度の微分積分，線形代数．					
<b>[Evaluation methods and policy]</b>					
講義中に課すレポート (20%) と期末試験 (80%)					
Continue to 工業数学 A 2 (2)					

## 工業数学 A 2 (2)

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

一松信 『数値解析』 ( 朝倉書店 , 1982 ) ISBN:978-4-254-11443-0

Rainer Kress 『Numerical Analysis』 ( Springer, 1998 ) ISBN:978-1-4612-6833-8

黒田成俊 『関数解析』 ( 共立出版. 1980 ) ISBN:978-4-320-01106-9

#### ( Related URLs )

( )

### [Study outside of class (preparation and review)]

プログラミングは必須ではないが、講義で紹介する数値シミュレーション法を各自でプログラムを作成して実行することで、講義内容の理解が促進される。

#### ( Other information (office hours, etc.) )

特に設定しないが、質問などは講義終了時など、随時受け付ける。

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Informatics and Mathematical Science

<b>Course number</b>	U-ENG25 32065 LJ55 U-ENG25 32065 LJ75				
<b>Course title (and course title in English)</b>	工業数学 F 2 (機 : 学番奇数) Applied Mathematics for Engineering F2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor, KANO MANABU Graduate School of Informatics Professor, OHTSUKA TOSHIYUKI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Fourier analysis and its application will be described. The major part consists of Fourier series, Fourier transform, and Laplace transform.					
<b>[Course objectives]</b>					
The goal is to understand the basics and applications of Fourier analysis.					
<b>[Course schedule and contents]</b>					
<p>Preliminaries, 1time, The goal and outline of this class are presented. Then, basic knowledge necessary to learn Fourier analysis is briefly reviewed.</p> <p>Fourier series, 1time, Fourier series expansion of periodic functions is described.</p> <p>Complex Fourier series, 1time, Complex Fourier series, its differential and integral, and spectrum are described.</p> <p>Characteristics of Fourier series, 1time, Characteristics of Fourier series are described.</p> <p>Fourier transform, 1time, In order to cope with aperiodic functions, Fourier transform is described.</p> <p>Characteristics and applications of Fourier transform is explained together with the Parseval's equation and its applications.</p> <p>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.</p> <p>Summary of the first half, 1time, A summary of Fourier series and Fourier transform is provided, and an examination will be given.</p> <p>Parseval's equality and its applications, 1time, Parseval's equality, the Wiener-Khinchin theorem, and the relationship between impulse responses and cross-correlation functions in linear systems are described.</p> <p>Introduction to partial differential equations, 1time, Basic notions of partial differential equations are described.</p> <p>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.</p> <p>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.</p> <p>Introduction to Laplace transform, 1time, Laplace transform and its characteristics are described aiming at solving ordinary differential equations.</p> <p>Laplace transform for solving ordinary differential equations, 1time, Ordinary differential equations are solved by applying Laplace transform and its inverse transform.</p>					
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)

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.

**[Course requirements]**

None

**[Evaluation methods and policy]**

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

**[Textbooks]**

Shinichi Ohishi: Fourier Analysis, Iwanami-Shoten isbn{}{9784000077767}

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 32065 LJ55 U-ENG25 32065 LJ75			
<b>Course title (and course title in English)</b>	工業数学 F 2 (機 : 学番偶数) Applied Mathematics for Engineering F2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Senior Lecturer, SENAMI MASATO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,2times, ,2times, ,3times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 工業数学 F 2 (機 : 学番偶数) (2) -----					

工業数学 F 2 (機 : 学番偶数) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 32065 LJ55 U-ENG25 32065 LJ75				
<b>Course title (and course title in English)</b>	工業数学 F 2 (材) Applied Mathematics for Engineering F2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, ICHII TAKASHI Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Fourier analysis, Laplace transform, Linear Algebra and their applications.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
Fourier analysis, Laplace transform, Linear Algebra and their applications, 15 times, 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)					
<b>[Course requirements]</b>					
Prerequisite subjects: complex numbers and basic calculus.					
<b>[Evaluation methods and policy]</b>					
The grading is made based on the regular examination.					
<b>[Textbooks]</b>					
Lecture notes are distributed at the class.					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 工業数学 F 2 (材) (2) -----					

工業数学 F 2 (材) (2)

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**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 32065 LJ55 U-ENG25 32065 LJ75				
<b>Course title (and course title in English)</b>	工業数学 F 2 (工ネ原) Applied Mathematics for Engineering F2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor,ISHIZAWA AKIHIRO Graduate School of Energy Science Associate Professor,IMADERA KENJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
, 9 times, , 2 times, , 3 times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG29 32070 LJ10 U-ENG29 32070 LJ55				
<b>Course title (and course title in English)</b>	工業数学 A 3 Applied Mathematics A3		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Associate Professor, MASE TAKAFUMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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 the Laplace transforms closely related to it.					
<b>[Course objectives]</b>					
To understand the fundamental theories of Fourier analysis and Laplace transforms and develop an ability to apply them to concrete problems.					
<b>[Course schedule and contents]</b>					
Fourier series expansions, 3-4 times: The definition of Fourier series expansions for periodic functions are given and their fundamental results 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, 4-5 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. Laplace transforms, 2-3times: Fundamental properties of Laplace transforms and their applications 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.					
<b>[Course requirements]</b>					
Calculus, Linear Algebra and Differential Equations					
<b>[Evaluation methods and policy]</b>					
Evaluation depends mainly on marks of mid-term examinations (20%) and final one (80%).					
----- <b>Continue to 工業数学 A 3 (2)</b>					

工業数学 A 3 (2)

**[Textbooks]**

S. Nakamura 『Fourier Analysis』 ( Asakura shoten, 2003 ) ISBN:9784254115741

**[References, etc.]**

( **Reference books** )

H.Fukawa 『Mathematics of control and vibration』 ( Korona-sha )

**[Study outside of class (preparation and review)]**

Prepare and review the lectures and solving the problems given on KULASIS or LMS to understand the contents of the textbook and lectures.

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Informatics and Mathematical Science

<b>Course number</b>	U-ENG25 32075 LJ55				
<b>Course title (and course title in English)</b>	工業数学 F 3 (機原) Applied Mathematics for Engineering F3		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,INOUE YASUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Introduction to special functions and mathematical methods for the physical sciences.					
<b>[Course objectives]</b>					
Understanding special functions and mathematical methods for the physical sciences, and developing problem solving skills.					
<b>[Course schedule and contents]</b>					
Orthogonal function,2times, Orthogonal polynomials,2times, Confluent hypergeometric function,1time, Gamma and Beta functions,2times, Bessel function,2times, Generalized function,2times, Green's function,1time, Partial differential equations for physical sciences,2times, Short Exam and Discussion,1time,					
<b>[Course requirements]</b>					
Theories of complex function and differential equation					
<b>[Evaluation methods and policy]</b>					
The course grade will be based on homework(30%) and quizzes(70%).					
<b>[Textbooks]</b>					
Continue to 工業数学 F 3 (機原) (2)					

工業数学 F 3 (機原) (2)

**[References, etc.]**

( **Reference books** )

Mathematical Methods for Physicists, George B. Arfken and Hans J. Weber (Academic Press) isbn{{{9780123846549}}

**[Study outside of class (preparation and review)]**

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 32080 LJ71 U-ENG25 32080 LJ57 U-ENG25 32080 LJ52				
<b>Course title (and course title in English)</b>	工業力学 A (機・宇) Engineering Mechanics A		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor,TERAKAWA TATSURO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>		U-ENG25 32080 LJ71 U-ENG25 32080 LJ57 U-ENG25 32080 LJ52			
<b>Course title (and course title in English)</b>	工業力学 A (エネ) Engineering Mechanics A		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, KINOSHITA KATSUYUKI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
, 4 times, , 3 times, , 2 times, , 2 times, , 2 times, , 2 times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 工業力学 A (エネ) (2)					

工業力学 A (エネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG20 42105 LJ77			
<b>Course title (and course title in English)</b>	工学倫理 Engineering Ethics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,ISHIDA TAIICHIROU Graduate School of Engineering Professor,SENDA KEI Graduate School of Engineering Professor,KAWASE MOTOAKI Graduate School of Informatics Professor,KAWAHARA TATSUYA Graduate School of Letters Professor,ISEDA TETSUJI	
				Part-time Lecturer,TATEBA TAKAFUMI Graduate School of Energy Science Professor,FUJIMOTO HITOSHI Graduate School of Engineering Professor,FUJIHARA TETSUAKI Graduate School of Engineering Professor,SUZUKI MOTOFUMI Graduate School of Management Professor,ICHIKAWA YUTAKA Office of Institutional Advancement and Communications NAKAGAWA MASAYUKI Graduate School of Engineering Professor,URAYAMA KENJI Graduate School of Engineering Professor,KANETA TAKASHI Graduate School of Energy Science Professor,KAWANABE HIROSHI Graduate School of Engineering Senior Lecturer,HAYASHI KAZUKI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.3	<b>Class style</b>	Lecture (Media-based course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
The goal of this class is to understand engineering ethics, and to develop the ability to judge by yourself when you encounter ethical issues.					
<b>[Course schedule and contents]</b>					
Lectures on ethics in various fields of engineering will be given by faculty members of the Graduate School of Engineering or other graduate schools. (Details will be provided after they are determined.) This course is a media course in which all lectures will be given online via Zoom.					
----- <b>Continue to 工学倫理(2)</b> -----					

## 工学倫理(2)

Lectures on ethics in various fields of engineering will be given by faculty members of the Graduate School of Engineering or other graduate schools. (Details will be provided after they are determined.)

### [Course requirements]

None

### [Evaluation methods and policy]

Class participation and reports.

### [Textbooks]

Lecture materials will be distributed.

### [References, etc.]

#### ( Reference books )

『Omnibus Engineering Ethics 』 ( Kyoritsu Shuppan Co., Ltd. ) ISBN:978-4320071964

『Practical Engineering Ethics - A Short Course, New Edition 』 ( Kagaku-Dojin Publishing Company,INC ) ISBN:9784759811551

『Engineering Ethics (Revised Edition) 』 ( CORONA PUBLISHING CO.,LTD. ) ISBN:978-4-339-07798-8

『World of Engineering Ethics (3rd Edition) 』 ( Morikita Publishing Co., Ltd. ) ISBN:978-4-627-97303-9

### [Study outside of class (preparation and review)]

The assignment of the report will be given for each lesson.

### ( Other information (office hours, etc.) )

The class order is subject to change.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

<b>Course number</b>		U-ENG20 12108 LJ77			
<b>Course title (and course title in English)</b>	工学序論 Introduction to Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,TOMISHIMA YOSHIKI Graduate School of Engineering Professor,MURAKAMI SADAYOSHI Graduate School of Global Environmental Studies Professor,Fujiwara Taku Graduate School of Informatics Professor,KASHIMA KENJI Graduate School of Engineering Professor,YOSHII KAZUYOSHI Office of Institutional Advancement and Communications Project Professor,KITANI TETSUO Graduate School of Engineering Professor,SANO NORIAKI Graduate School of Engineering Senior Lecturer,ISHITSUKA KAZUYA	
<b>Target year</b>	1st year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>Engineering is to inquire after truth, to develop useful technologies, and to establish ways how to give back development results of technology to the society.</p> <p>First, we offer special lectures regarding the basic knowledge that students in faculty of engineering are expected to have.</p> <p>Then, we offer a series of intensive lectures about how engineering can suggest solutions of current and future problems of our society, the value of technology, and the responsibilities that researchers and engineers are expected to fulfill.</p>					
<b>[Course objectives]</b>					
Students learn basic matters such as attitudes and responsibilities they are expected to take as a member of social community. They find value in studying engineering and become to consider what they do in future by understanding technology can suggest solutions of problems our society is facing, especially problems about safety and security.					
<b>[Course schedule and contents]</b>					
<p>Special lectures,1time, About basic knowledge and attitude as students who start to learn engineering, and the role of engineering in society.</p> <p>Intensive lectures,6times, A series of lectures offered by special lecturers playing on global stages of science and technology. Lectures are for understanding the role that technology is playing in modern society, for reconfirming importance to study engineering and to work as a researcher and engineer in society, and are to be opportunities to consider own future path. Essays are assigned in every lecture to summarize the lecture content and opinions of other students.</p> <p>Schedule of the lectures are announced later.</p>					
----- <b>Continue to 工学序論(2)</b> -----					

工学序論(2)

**[Course requirements]**

None

**[Evaluation methods and policy]**

Evaluation will be based on participation and essays assigned in every intensive lecture.

**[Textbooks]**

Specify if necessary.

**[References, etc.]**

( Reference books )

Specify if necessary.

**[Study outside of class (preparation and review)]**

Specify if necessary.

**( Other information (office hours, etc.) )**

Information about lecturers and contents of lectures are announced on electric bulletin boards.  
Please confirm to your department office that the credit of this course is admitted to graduation requirements.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

<b>Course number</b>	U-ENG20 32402 SE77				
<b>Course title (and course title in English)</b>	工学部国際インターンシップ 1 Faculty of Engineering International Internship 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HONDA MITSURU Graduate School of Engineering Senior Lecturer, KOWHAKUL, Wasana	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Intensive, year-round
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese and English
<b>[Overview and purpose of the course]</b>					
<p>The internships and related training programs conducted overseas and offered through the Faculty of Engineering and its undergraduate departments at Kyoto University (lasting less than three months) are eligible. Programs conducted domestically are also included, provided they are expected to offer learning outcomes comparable to overseas internships. The aim is to cultivate independence, initiative, international awareness, and language skills by placing students in diverse environments, thereby supporting their career development after graduation.</p>					
<b>[Course objectives]</b>					
<p>The purpose is to enhance the expansion of international perspectives, the acquisition of international sensibilities, the improvement of foreign language proficiency (communication skills), and the enhancement of cultural receptiveness (cross-cultural adaptability) by experiencing internships in diverse environments such as overseas universities and companies.</p>					
<b>[Course schedule and contents]</b>					
<p>[Submission of the internship plan (1 time)] Complete and submit the form ‘ International Internship Plan ’ at least one month before the internship takes place and undergo a preliminary review.</p> <p>[Overseas internship (1 time)] Participate in an internship abroad.</p> <p>[Results debriefing (1 time)] Internship participants report on the results of their internship and discuss their findings.</p>					
<b>[Course requirements]</b>					
<p>Have sufficient language skills in the language(s) spoken at the internship site. * Must have purchased the prescribed overseas travel insurance before traveling to the internship site. * Have submitted an overseas travel registration form in advance.</p>					
<b>[Evaluation methods and policy]</b>					
<p>After registering for the course, one month prior to participating in the internship, students must fill out the “ International Internship Plan ” on the designated form and submit it to the Undergraduate Student Section of Educational Affairs Division for prior review by the faculty members of the ER center.</p>					
Continue to 工学部国際インターンシップ1(2)					

## 工学部国際インターンシップ 1 (2)

After completion of the internship, students will be awarded credits (100%) based on the submission of an internship report and the content of the presentation at the debriefing session.

It is also advisable to submit a certificate of completion from the institution hosting the internship.

The decision to grant credits for graduation will be made by each undergraduate school. If the credits are not approved as credits required for graduation, the ER center will make the decision. In this case, the credits will be treated as excess credits.

Whether the internship is approved as credit for “ 1 ” (1 credit) or “ 2 ” (2 credits) of the International Internship Program of the Faculty of Engineering is determined based on the duration of the internship and the content of the practical training during the internship period, but in the case of “ 2, ” overseas travel is required.

### [Textbooks]

Not used

### [References, etc.]

( Reference books )

None

### [Study outside of class (preparation and review)]

Please consult with your supervisor about your proposal before submitting it to us.

Further instructions will be given as appropriate.

### ( Other information (office hours, etc.) )

Before participating in an internship program, please inquire with the administrative office of your undergraduate school to determine whether or not the internship you wish to participate in will be approved as a credit toward completion of the program. For other information, please contact the ER center.

ER center

Tel: 075-383-2048

Mail: 090aglobal mail2.adm.kyoto-u.ac.jp (Replace with @)

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course that includes off-campus training classes.

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

Continue to 工学部国際インターンシップ 1 (3)

工学部国際インターンシップ1(3)

[Essential courses]

<b>Course number</b>	U-ENG20 22403 SJ77				
<b>Course title (and course title in English)</b>	グローバル・リーダーシップセミナーⅠ(企業調査研究) Global Leadership Seminar I (Study for methodology in a company)		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Senior Lecturer, ISHITSUKA KAZUYA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Intensive, year-round
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>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.</p>					
<b>[Course objectives]</b>					
<p>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.</p>					
<b>[Course schedule and contents]</b>					
<p>Week 1, Guidance Week 2-13, Hands-on training Week 14, Pre-presentation Week 15, Final presentation</p>					
<b>[Course requirements]</b>					
<p>How to register will be announced later. Students who want to join this course is requested to attend the first class.</p>					
<b>[Evaluation methods and policy]</b>					
<p>Students are prohibited to skip hands-on training. Evaluation will be based on presentation.</p>					
<b>[Textbooks]</b>					
<p>Not used</p>					
<b>[References, etc.]</b>					
<p>( Reference books )</p>					
<p>Continue to グローバル・リーダーシップセミナーⅠ(企業調査研究) (2)</p>					

グローバル・リーダーシップセミナーⅠ(企業調査研究)(2)

( Related URLs )

<http://www.glc.t.kyoto-u.ac.jp/ugrad>

**[Study outside of class (preparation and review)]**

Investigating companies in advance. Analyzing the result from hands-on training. Preparing presentation.

**( Other information (office hours, 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.

**[Courses delivered by instructors with practical work experience]**

(1) Category

An omnibus course delivered by invited lecturers and guest speakers from different companies, etc.

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

<b>Course number</b>	U-ENG20 32502 SE77				
<b>Course title (and course title in English)</b>	工学部国際インターンシップ 2 Faculty of Engineering International Internship 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HONDA MITSURU Graduate School of Engineering Senior Lecturer, KOWHAKUL, Wasana	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Intensive, year-round
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese and English
<b>[Overview and purpose of the course]</b>					
<p>The internships and related training programs conducted overseas and offered through the Faculty of Engineering and its undergraduate departments at Kyoto University (typically about three months or longer, as a general guideline) are included. The aim is to cultivate independence, initiative, international awareness, and language skills by placing students in diverse environments, thereby supporting their career development after graduation.</p>					
<b>[Course objectives]</b>					
<p>The purpose is to enhance the expansion of international perspectives, the acquisition of international sensibilities, the improvement of foreign language proficiency (communication skills), and the enhancement of cultural receptiveness (cross-cultural adaptability) by experiencing internships in diverse environments such as overseas universities and companies.</p>					
<b>[Course schedule and contents]</b>					
<p>[Submission of the internship plan (1 time)] Complete and submit the form ‘ International Internship Plan ’ at least one month before the internship takes place and undergo a preliminary review.</p> <p>[Overseas internship (1 time)] Participate in an internship abroad.</p> <p>[Results debriefing (1 time)] Internship participants report on the results of their internship and discuss their findings.</p>					
<b>[Course requirements]</b>					
<p>Have sufficient language skills in the language(s) spoken at the internship site. * Must have purchased the prescribed overseas travel insurance before traveling to the internship site. * Have submitted an overseas travel registration form in advance.</p>					
<b>[Evaluation methods and policy]</b>					
<p>After registering for the course, one month prior to participating in the internship, students must fill out the “ International Internship Plan ” on the designated form and submit it to the Undergraduate Student Section of Educational Affairs Division for prior review by the faculty members of the ER center.</p>					
Continue to 工学部国際インターンシップ 2 (2)					

## 工学部国際インターンシップ 2 (2)

After completion of the internship, students will be awarded credits (100%) based on the submission of an internship report and the content of the presentation at the debriefing session.

It is also advisable to submit a certificate of completion from the institution hosting the internship.

The decision to grant credits for graduation will be made by each undergraduate school. If the credits are not approved as credits required for graduation, the ER center will make the decision. In this case, the credits will be treated as excess credits.

Whether the internship is approved as credit for “ 1 ” (1 credit) or “ 2 ” (2 credits) of the International Internship Program of the Faculty of Engineering is determined based on the duration of the internship and the content of the practical training during the internship period, but in the case of “ 2, ” overseas travel is required.

### [Textbooks]

Not used

### [References, etc.]

( Reference books )

None

### [Study outside of class (preparation and review)]

Please consult with your supervisor about your proposal before submitting it to us.

Further instructions will be given as appropriate.

### ( Other information (office hours, etc.) )

Before participating in an internship program, please inquire with the administrative office of your undergraduate school to determine whether or not the internship you wish to participate in will be approved as a credit toward completion of the program. For other information, please contact the ER center.

ER center

Tel: 075-383-2048

Mail: 090aglobal mail2.adm.kyoto-u.ac.jp (Replace with @)

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course that includes off-campus training classes.

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

Continue to 工学部国際インターンシップ 2 (3)

工学部国際インターンシップ2(3)

[Essential courses]

<b>Course number</b>		U-ENG20 22503 SJ77			
<b>Course title (and course title in English)</b>	グローバル・リーダーシップセミナーⅡ(イノベーションとその事業化) Global Leadership Seminar II (Innovation and its commercialization)		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HONDA MITSURU	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>The capabilities that society expects from Kyoto University students primarily include "deep knowledge in their respective fields of specialization" and the "ability to identify issues on their own and present a path to resolution." In this course, you will develop the latter capability, which is difficult to acquire through regular lectures and university life, by creating new business plans through group work. While individual activities are allowed, group activities are encouraged.</p>					
<b>[Features of this Course]</b>					
<ol style="list-style-type: none"> <li>1. Distinguished Instructors: Under the mentoring of renowned innovators active in the business world, students will engage in setting challenges and planning solutions.</li> <li>2. Activity Budget: A budget will be provided for market research, prototype production, and software development necessary for developing project proposals.</li> <li>3. Presentation Opportunities: Outstanding proposals may be displayed at the Katsura Library, among other opportunities for commercialization.</li> </ol>					
<b>[Mentors]</b>					
<p>- Mitsuaki Oshima, Special Appointment Professor (Honorary Technical Supervisor at Panasonic HD, Director of ESL Research Institute): A leading Japanese innovator, known for inventions like image stabilization for cameras and 5G communication technologies. Recipient of the Purple Ribbon Medal and the Order of the Rising Sun, Gold Rays with Rosette.  <a href="https://hillslife.jp/learning/2018/05/06/new-perspective6/">https://hillslife.jp/learning/2018/05/06/new-perspective6/</a></p> <p>- Seiichi Nishimoto, Honorary Professor (Chairman of the Kyoto Advanced Technology Research Institute): Supports the development of science and technology in the Kyoto area and the growth of ventures and SMEs.  <a href="https://www.astem.or.jp/about/researcher/nishimoto">https://www.astem.or.jp/about/researcher/nishimoto</a></p> <p>- Kentaro Kaneko, Professor (Ritsumeikan University, Research Organization of Science and Technology; Director of RITsumeikan Semiconductor Application research center): Co-founder of FLOSFIA and Patentix, continuously innovating new semiconductor materials.  <a href="https://kaneko-lab.ritsumeikai.ac.jp/">https://kaneko-lab.ritsumeikai.ac.jp/</a>  <a href="https://www.ritsumeikai.ac.jp/research/center/risa/">https://www.ritsumeikai.ac.jp/research/center/risa/</a></p> <p>- Teppei Tsushima, Open Innovation Dept., IP Div., Sony Corporation: Founder of Sony's smartwatch business, wena.  <a href="https://www.sony.com/ja/SonyInfo/DiscoverSony/articles/202203/wena/">https://www.sony.com/ja/SonyInfo/DiscoverSony/articles/202203/wena/</a></p> <p>- Hideki Aoyama, Special Appointment Lecturer, Panasonic HD: Developer of the visible light communication technology LinkRay(TM) and vice-chairman for the international standardization of the IEEE802.15.7 communication standard.  <a href="https://hidekia.github.io/">https://hidekia.github.io/</a></p>					
Continue to グローバル・リーダーシップセミナーⅡ(イノベーションとその事業化)(2)					

- Tsutomu Mukai, Senior Manager, Panasonic HD: Promotes open innovation with venture companies in Israel.

Professor Mitsuaki Oshima is one of Japan's "Top 10 Representative Inventors," known for inventing and developing fundamental patents in technologies such as camera image stabilization in iPhones and high-speed and ultra-low latency communication for 5G mobile phones. Additionally, he invented multi-disciplinary technologies like anti-piracy measures for Nintendo Wii software, digital TV broadcasting standards in Japan, the US, and Europe, and IoT home appliances. He is famous as a serial innovator. Professor Oshima will introduce how groundbreaking inventions that change society originate.

In addition to the mentors, you can learn about the support system for startups and patent strategies from the invited lecturers. For those considering starting a startup, there is information that can be immediately utilized, and for others, there are valuable lessons that will be beneficial when entering society.

More information can be found on the following page (in Japanese):  
<https://www.erc.t.kyoto-u.ac.jp/ugrad>

[Notes]

This seminar is intended for students in their second year of the Engineering Department or higher. The seminar is worth one credit, but whether it is recognized as a required credit for graduation depends on the undergraduate school. Please confirm with your undergraduate school office. Also, a camp is planned for December 5th and 6th, so it is necessary to be enrolled in the Personal Accident Insurance for Students Pursuing Education and Research( " Gakkensai " ). Participation in the camp is recommended.

**[Course objectives]**

Through group work, you can acquire the ability to plan and propose solutions, starting from identifying and setting challenges to envisioning the creation of social value.

**[Course schedule and contents]**

The course will be conducted in person.

- [Orientation] (1 session): The overview and schedule of the course will be explained.
- [Lectures] (4 sessions): Special lectures by experts will be conducted.
- [Team Building] (1 session): An exercise in team building, essential for group work, will be carried out.
- [Group Work] (7 sessions): Students will engage in setting challenges, problem identification, data collection, and group work. Through intensive group work discussions, they will plan and propose solutions to the identified issues, create a draft report, and conduct 2-3 presentations. Holding mini-lectures by special instructors will also be planned.
- [Camp] (1 session): An intensive session dedicated to project work in an environment exclusive to participants and mentors through overnight training camp.
- [Preliminary Review Session] (1 session): A class to practice presentations in preparation for the final presentation event.
- [Final Presentation Event] (1 session): The final presentations will take place, followed by submission of presentation materials.

**[Course requirements]**

If the number of students enrolling in the course is large, the maximum number of students may be determined.

**[Evaluation methods and policy]**

[Evaluation Method]

Grades will be based on regular participation (20%) and the presentation and submission of presentation materials at the final presentation event held during the last lecture session (80%). Regular participation evaluation will focus on the student's active participation in the lectures.

[Evaluation Policy]

We will comprehensively evaluate the ability to identify and set challenges through group discussions, as well as the ability to propose solutions towards achieving goals. Students are required to develop individual or group business plans through the challenges and group work, and to present them at the final presentation event.

Attendance in lectures per se is not a criterion for grade evaluation; however, as the course involves group work, regular attendance is strongly recommended.

**[Textbooks]**

We will let you know if necessary.

**[References, etc.]**

( Reference books )

III. O'Reilly, Charles A. 『Lead and Disrupt: How to Solve the Innovator's Dilemma』 ( Stanford Business Books, 2021 ) ISBN:978-1503629523

We will let you know if necessary.

**[Study outside of class (preparation and review)]**

Please prepare and develop your own ideas in advance that you would like to work on throughout the course.

**( Other information (office hours, etc.) )**

[Schedule for the 2026 Academic Year]

The classes will be conducted in person on Fridays during the 5th period in Lecture Room W3, Research Building 9.

\*Note: The 3rd lecture will be held in Lecture Room W301, Research Building 9 (subject to change in lecture room).

- Orientation: October 2

- Fundamentals of Group Work: October 16

- Special Lectures, In-Person Group Work: October 9, 23, 30; November 6, 15, 27; December 4, 11, 18, 25; January 8

- Camp: December 5 (Sat) 13:00 - December 6 (Sun) 13:00 @ AWL Keihoku

- Preliminary Review Session: January 15

- Final Presentation: January 16 (Sat)

\*Please note that whether the credits earned are recognized as necessary for graduation depends on your undergraduate school. Refer to your undergraduate school course guide for more information.

\*Registration for the course is not through KULASIS but via the following page. It is scheduled to open around September 2026:

[https://www.t.kyoto-u.ac.jp/fs/erc/2026Fall\\_GL\\_seminar2](https://www.t.kyoto-u.ac.jp/fs/erc/2026Fall_GL_seminar2)

\*An additional instructor may be assigned.

For details on office hours, please check KULASIS.

\*Please visit KULASIS to find out about office hours.

### **[Courses delivered by instructors with practical work experience]**

(1) Category

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### **[Essential courses]**

<b>Course number</b>		U-ENG25 25003 LJ54 U-ENG25 25003 LJ71 U-ENG25 25003 LJ75			
<b>Course title (and course title in English)</b>	計算機数学 (原) Mathematics for Computation		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Senior Lecturer, NARITA EMI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course deals with computer-based numerical calculation methods. The goal is to learn a programming language in order to develop the ability to use a series of processing methods (such as planning processing methods), create programs, and analyze results.					
<b>[Course objectives]</b>					
Course objective: By the end of the course, students will be able to use a series of processing methods such as planning processing methods, creating programs, and analyzing results.					
<b>[Course schedule and contents]</b>					
(1) Orientation and terminal operation, 2 classes Login method of the terminal, how to operate the editor, etc. (2) Learn the mechanism of numerical calculation, 2 classes Understanding the principle of numerical calculation, representation of numbers, functions, and I/O (3) Basic programming with Fortran, 2 classes Acquisition of essential items for programming such as branch, repeat, variable, array, and subprogram. Task: sum-difference product quotient, sum of sequence (4) Applicative programming with Fortran, 4 classes Differential equation (Runge-Kutta method), simultaneous linear equation (Gauss elimination method), and so on. Acquire the basic idea of calculation methods and perform actual programming. (5) Basic programming with Python, 4 classes Acquire the basic programming skills in Python. Learn the basic idea of machine-learning algorithms like k-nearest neighbor algorithm, linear model, decision tree, and neural networks, and perform actual programming. (6) Confirmation of learning attainment, 1 class Post explanation discussion and review of examination questions to KULASIS.					
<b>[Course requirements]</b>					
Recommend taking basic information processing and basic information processing exercises.					
<b>[Evaluation methods and policy]</b>					
[Grading method] Grade is based on reports (30%) and one written examination (70%).					
[Grading criterion]					
----- Continue to 計算機数学 (原) (2)					

## 計算機数学（原）(2)

Must score 60 or above out of 100 on the reports and written examination

60 or above: pass

59 or below: fail

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

戸川隼人 『ザ・Fortran90/95』 (サイエンス社) ISBN:4-7819-0913-2

富田博之, 齋藤泰洋 『Fortran 90/95プログラミング』 (培風館) ISBN:978-4-563-01587-9

戸川隼人 『演習と応用 FORTRAN77』 (サイエンス社) ISBN:4781905110

坂本俊之 『基礎からわかるPython』 (C&R研究所) ISBN:978-4-86354-269-3

### [Study outside of class (preparation and review)]

Students will answer the exercises and submit the solutions as a report.

### ( Other information (office hours, etc.) )

Lecture is given in Japanese.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25003 LJ54 U-ENG25 25003 LJ71 U-ENG25 25003 LJ75				
<b>Course title (and course title in English)</b>	計算機数学 (工ネ) Mathematics for Computation		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor,HACHIYA KAN Graduate School of Energy Science Professor,Jun HAYASHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
To acquire the ability of basic computational programing and learn the basic mathematics underlying the computational programing.					
<b>[Course objectives]</b>					
To acquire the ability of basic computational programing and learn the basic mathematics underlying the computational programing.					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Comprehensive evaluation of attendance, exercises and examination.					
<b>[Textbooks]</b>					
Not used					
<b>[References, etc.]</b>					
( Reference books ) Introduced during class					
----- Continue to 計算機数学 (工ネ) (2)					

計算機数学 (工ネ) (2)

**[Study outside of class (preparation and review)]**

Learn the basics of FORTRAN and C.  
Try to understand the exercises in each lecture.

**( Other information (office hours, etc.) )**

Check KULASIS/Office Hours

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25003 LJ54 U-ENG25 25003 LJ71 U-ENG25 25003 LJ75			
<b>Course title (and course title in English)</b>	計算機数学 (機 : 7・9・11組) Mathematics for Computation		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, KURIYAMA REIKO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
Understand and learn the basic knowledge, method and skill of mathematical solution for computation, planning the numerical method, programming, and analyze the results.					
<b>[Course schedule and contents]</b>					
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) -----					

計算機数学 (機 : 7・9・11組) (2)

**[Course requirements]**

Students are recommended to have completed Information Processing Basics and Exercises in Information Processing Basics.

**[Evaluation methods and policy]**

A final examination will be held. In-class reports will be factored in for maximum 40%.

**[Textbooks]**

Not used

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Study and practice the basics of programming (grammar, flowchart, compile, edit, etc).

**( Other information (office hours, 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.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25003 LJ54 U-ENG25 25003 LJ71 U-ENG25 25003 LJ75			
<b>Course title (and course title in English)</b>	計算機数学 (機 : 8・10・12組) Mathematics for Computation		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Senior Lecturer,FUNADA RIKU Graduate School of Informatics Senior Lecturer,EGUCHI KANA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,3times, ,4times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 計算機数学 (機 : 8・10・12組) (2) -----					

計算機数学 (機 : 8・10・12組) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25004 LJ71 U-ENG25 25004 LJ75 U-ENG25 25004 LJ77		
<b>Course title (and course title in English)</b>	材料力学 1 (機宇:学番奇数) Mechanics of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SHIMADA TAKAHIRO
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b> 2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b> Japanese
<b>[Overview and purpose of the course]</b>				
<b>[Course objectives]</b>				
<b>[Course schedule and contents]</b>				
,1time, ,1time, ,2times, ,1time, ,4times, ,1time, ,4times, ,1time,				
<b>[Course requirements]</b>				
None				
<b>[Evaluation methods and policy]</b>				
<b>[Textbooks]</b>				
----- Continue to 材料力学 1 (機宇:学番奇数) (2)				

材料力学 1 (機宇：学番奇数) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25004 LJ71 U-ENG25 25004 LJ75 U-ENG25 25004 LJ77				
<b>Course title (and course title in English)</b>	材料力学 1 (機宇 : 学番偶数) Mechanics of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,HIRAKATA HIROYUKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
0					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 25004 LJ71 U-ENG25 25004 LJ75 U-ENG25 25004 LJ77				
<b>Course title (and course title in English)</b>	材料力学 1 (材工ネ原 : 学番奇数) Mechanics of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor,SUMIGAWA TAKASHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
Concepts of Mechanics of Materials,2times, Subjects on Simple Stress States,3times, Strain Energy,2times, Bending of Beams,5times, Complex beams,2times, ,1time,					
<b>[Course requirements]</b>					
Fundamentals of Mathematics and Physics					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
ISBN:4-563-03465-7 (Zairyō Rikigaku no Kiso, Shibata, Ohtani, Komai, Inoue, Baifukan) isbn{}{4563034657}					
-----					
Continue to 材料力学 1 (材工ネ原 : 学番奇数) (2)					

材料力学 1 ( 材工ネ原 : 学番奇数 ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25004 LJ71 U-ENG25 25004 LJ75 U-ENG25 25004 LJ77				
<b>Course title (and course title in English)</b>	材料力学 1 (材工ネ原 : 学番偶数) Mechanics of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, ABE MASATAKA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,3times, ,2times, ,5times, ,2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 材料力学 1 (材工ネ原 : 学番偶数) (2)					

材料力学 1 ( 材工ネ原 : 学番偶数 ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25005 LJ75 U-ENG25 25005 LJ77 U-ENG25 25005 LJ71			
<b>Course title (and course title in English)</b>	材料力学 2 (機 : 7,8,9,10組) Mechanics of Materials 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor,NISHIKAWA MASAOKI Institute for Life and Medical Sciences Associate Professor,MAKI KOICHIRO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
1-2. Beam bending (Beam bending, Castigliano's theorem) 3-5. Advanced problems of beams (Statically indeterminate beams, Continuous beams, Curved beams) 6-9. Basics of elasticity (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) 10-11. Torsion (Torsion of circular bars, Coil springs, Combination of bending and torsion) 12. Buckling (Buckling of column, Instability, Effect of support conditions, Buckling design) 13-14. Axially symmetric problems and bending of plates (Circular cylinders, Spherical shells, Rotating circular plates, Cylindrical bending, Bending rigidity) 15. Feedback  Academic achievement assessment: Regular examination  * The classes up to the 7th class will be given by Nishikawa (including the mid-term examination), and the classes after that will be given by Maki. * The order and the hours (weights) for each item are possibly subject to change.					
Continue to 材料力学 2 (機 : 7,8,9,10組) (2)					

材料力学 2 (機 : 7,8,9,10組) (2)

**[Course requirements]**

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

**[Evaluation methods and policy]**

[Evaluation method]

Evaluation is based on the mid-term and the final examinations as a general rule, 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.

**[Textbooks]**

T. Shibata et al. 『Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso) 』 ( Baifu-kan ) ISBN: 4563034657

**[References, etc.]**

( **Reference books** )

To be referred to during the course

**[Study outside 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.

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25005 LJ75 U-ENG25 25005 LJ77 U-ENG25 25005 LJ71			
<b>Course title (and course title in English)</b>	材料力学 2 (機 : 11,12組、宇) Mechanics of Materials 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, BIWA SHIRO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>The basic treatments given in the Mechanics of Materials 1 course are extended to problems such as statically indeterminate beams and curved beams subjected to bending, bars subjected to torsion or combination of torsion and bending, columns subjected to compressive loads, cylindrical vessels subjected to internal/external pressures, etc. More general treatments of stresses and strains and their relations are also explained. These issues are of importance for the proper selection and arrangements of materials in the design of various structures/machine elements, and serve as an introduction to more rigorous subjects of the mechanics of solids.</p>					
<b>[Course objectives]</b>					
<p>The aim of this subject is to acquire the methods of stress/strain analysis for relatively simple structural members such as beams, bars, columns and cylindrical vessels subjected to external loads, and to understand the basis of the treatments of two- or three-dimensional stresses and strains, by developing the basic ideas learnt in the Mechanics of Materials 1 course.</p>					
<b>[Course schedule and contents]</b>					
<p>The following topics are discussed in the lecture, but subject to possible changes according to each year's situations.</p> <p>Week 1: Bending of beams (basic equations, Castigliano's theorem, solution methods)  Week 2: Complex problems of beams (statically indeterminate beams, curved beams)  Week 3: Fundamentals of elasticity (1) (definition of stress, equilibrium equations)  Week 4: Fundamentals of elasticity (2) (stresses on an arbitrarily inclined plane, Mohr's circle of stress)  Week 5: Fundamentals of elasticity (3) (principal stresses, correspondence to eigenvalue problems)  Week 6: Fundamentals of elasticity (4) (definition of strain)  Week 7: Fundamentals of elasticity (5) (strains in an arbitrary direction, Mohr's circle of strain)  Week 8: Fundamentals of elasticity (6) (generalized Hooke's law, plane stress/plane strain, relation among elastic constants)  Week 9: Solution of exercise problems  Week 10: Torsion of bars (1) (torsion of bars of circular cross-section)  Week 11: Torsion of bars (2) (coil springs, combined bending and torsion)  Week 12: Buckling of columns (buckling loads, column under eccentric loading, buckling design)  Week 13: Axially symmetric problems (basic equations, thin-walled and thick-walled cylinders)  Week 14: Solution of exercise problems  &lt;Final examination&gt;  Week 15: Feedback</p>					
Continue to 材料力学 2 (機 : 11,12組、宇) (2)					

材料力学 2 (機 : 11,12組、宇) (2)

**[Course requirements]**

Understanding of the Mechanics of Materials 1 course and other basic subjects such as calculus, linear algebra, and mechanics of particles and rigid bodies is prerequisite.

**[Evaluation methods and policy]**

As a rule, grading is made based on the report assignments (25%) and the final examination (75%). If the mid-term examination is conducted, the grading is based on the report assignments (20%), the mid-term examination (40%) and the final examination (40%). Occasional changes will be announced in the classes. The total score is evaluated between 0 and 100 points (the pass mark is 60).

**[Textbooks]**

T. Shibata, R. Ohtani, K. Komai and T. Inoue 『Fundamentals of Strength of Materials (Zairyo-Rikigaku no Kiso) 』 ( Baifu-kan, 1991 ) ISBN:ISBN4-563-03465-7

**[References, etc.]**

( Reference books )

Introduced during class

**[Study outside of class (preparation and review)]**

Contents of the Mechanics of Materials 1 course should be fully reviewed. Reports will be assigned, which need to be solved as homeworks. In addition, it is desirable that an enrolled student works on the textbook by him/herself prior to or after each lecture.

( Other information (office hours, etc.) )

Lectures are given in a black-board style. Students are expected to take the notes to understand the ideas as well as mathematical derivations, and make questions regarding unclear points.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25005 LJ75 U-ENG25 25005 LJ77 U-ENG25 25005 LJ71				
<b>Course title (and course title in English)</b>	材料力学 2 (材工ネ原) Mechanics of Materials 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, KINOSHITA KATSUYUKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,3times, ,2times, ,4times, ,4times, ,1time, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 材料力学 2 (材工ネ原) (2)					

材料力学 2 ( 材工ネ原 ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25007 LJ77 U-ENG25 25007 LJ71 U-ENG25 25007 LJ57				
<b>Course title (and course title in English)</b>	熱力学 2 (機宇) Thermodynamics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,IWAI HIROSHI Graduate School of Engineering Associate Professor,KISHIMOTO MASASHI Graduate School of Engineering Associate Professor,KURIYAMA REIKO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
0					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 25007 LJ77 U-ENG25 25007 LJ71 U-ENG25 25007 LJ57				
<b>Course title (and course title in English)</b>	熱力学 2 (工ネ原) Thermodynamics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, KAWANABE HIROSHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2 ~ 3times, ,2 ~ 3times, ,3times, ,2times, ,2times, ,2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 熱力学 2 (工ネ原) (2)					

**熱力学 2 (工ネ原) (2)**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35008 LJ77 U-ENG25 35008 LJ71			
<b>Course title (and course title in English)</b>	材料基礎学 1 (機宇) Fundamentals of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,HIRAKATA HIROYUKI Graduate School of Engineering Professor,SHIMADA TAKAHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Introductory class to teach fundamentals for Material Science.					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
Bonding and structure of materials: Crystal structure, defects in crystals, structure and properties of polymers etc.: 4 times					
Plastic deformation and fracture: Crystal defect and fracture etc.: 4 times					
Phase diagram: The phase rule, binary system diagram, ternary phase diagram etc.: 2 times					
Solidification and phase transformation, deposition etc.: 1 time					
Processing: Hot and cold processing, recrystallization etc. 1 time					
Steel: Steel processing, material, heat treatment, transformation etc.: 2 times					
feedback lesson: 1 time					
Confirmation of learning achievement: by reports and a test: 1 time					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
reports and a test					
<b>[Textbooks]</b>					
isbn:978-4-901381-58-1 be sold at 日本材料学会事務所 ( <a href="https://www.jsms.jp/index.html">https://www.jsms.jp/index.html</a> )					
----- Continue to 材料基礎学 1 (機宇) (2)					

材料基礎学 1 (機宇) (2)

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**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Read the textbooks before each class, and ascertain the knowledge after the class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35008 LJ77 U-ENG25 35008 LJ71			
<b>Course title (and course title in English)</b>	材料基礎学 1 (工ネ原) Fundamentals of Materials 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TAISHI KOBAYASHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
In this course, we discuss properties that are important in selecting and using materials, as well as the basic concepts necessary for understanding these properties, focusing on metal.					
<b>[Course objectives]</b>					
Course objective: By the end of the course, students will have the basic knowledge they need to pursue further studies in materials science and they will be able to investigate appropriate materials in experimentation and design.					
<b>[Course schedule and contents]</b>					
<p>(1) Structure of matter, 4 classes: Explain the size of the atoms, which 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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(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.</p> <p>(7) Confirmation of learning attainment, 1 class: Post explanation discussion and review of examination questions on KULASIS.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
[Grading method] Grade is based on one written examination.					
Continue to 材料基礎学 1 (工ネ原) (2)					

## 材料基礎学 1 ( 工ネ原 ) (2)

### [Evaluation standard]

Must score at least 60 out of 100 on the written examination

60 or above: pass

59 or below: fail

### [Textbooks]

Others. In addition, printouts will be distributed in class.

### [References, etc.]

#### ( Reference books )

Introuced during class

### [Study outside of class (preparation and review)]

Practice problems and their solutions will be discussed in class. Therefore, please go over what you learned after each class.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

#### (1) Category

A course with practical content delivered by instructors with practical work experience

#### (2) Details of instructors ' practical work experience related to the course

#### (3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 25009 LJ71				
<b>Course title (and course title in English)</b>	計測学 (機工ネ原 : 学番奇数) Scientific Measurement		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, YOKOKAWA RYUUI Graduate School of Engineering Professor, TSUCHIYA TOSHIYUKI Graduate School of Energy Science Senior Lecturer, KAWAI EMI Graduate School of Energy Science Professor, MIYAKE MASAO Graduate School of Engineering Associate Professor, HIROTANI JUN		
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester	
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese	
<b>[Overview and purpose of the course]</b>						
Basics of scientific instrumentation is covered.						
<b>[Course objectives]</b>						
Understanding of the basics of scientific instrumentation in engineering physics.						
<b>[Course schedule and contents]</b>						
Units and Standards, 2 times, Units and Standards Measurement uncertainty and its evaluation, 3 times, Measurement uncertainty and its evaluation Data processing and statistical analysis, 3 times, Data processing and statistical analysis Electrical and temperature measurement, 2 times, Electrical and temperature measurement Radiation and material measurement, 2 times, Radiation and material measurement Mechanical measurement, 2 times, Mechanical measurement level of attainment, 1 time, level of attainment						
<b>[Course requirements]</b>						
None						
<b>[Evaluation methods and policy]</b>						
Examination. Reports are considered also.						
<b>[Textbooks]</b>						
小寺秀俊、神野郁夫、鈴木亮輔、田中功、富井洋一、中部主敬、箕島弘二、横小路泰義 『計測工学』 (朝倉書店) ISBN:9784254201598						
<b>[References, etc.]</b>						
(Reference books) NA						
----- Continue to 計測学 (機工ネ原 : 学番奇数) (2) -----						

計測学 ( 機工ネ原 : 学番奇数 ) (2)

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**[Study outside of class (preparation and review)]**

NA

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 25009 LJ71				
<b>Course title (and course title in English)</b>	計測学 (機工ネ原 : 学番偶数) Scientific Measurement		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, YOKOKAWA RYUUI Graduate School of Engineering Professor, TSUCHIYA TOSHIYUKI Graduate School of Energy Science Senior Lecturer, KAWAI EMI Graduate School of Energy Science Professor, MIYAKE MASAO Graduate School of Engineering Associate Professor, HIROTANI JUN		
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester	
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese	
<b>[Overview and purpose of the course]</b>						
Basics of scientific instrumentation is covered.						
<b>[Course objectives]</b>						
Understanding of the basics of scientific instrumentation in engineering physics.						
<b>[Course schedule and contents]</b>						
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.						
<b>[Course requirements]</b>						
None						
<b>[Evaluation methods and policy]</b>						
Examination. Reports are considered also.						
----- 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)

**[Textbooks]**

小寺秀俊、神野郁夫、鈴木亮輔、田中功、富井洋一、中部主敬、箕島弘二、横小路泰義 『計測工学』  
( 朝倉書店 ) ISBN:9784254201598

**[References, etc.]**

( Reference books )

NA

**[Study outside of class (preparation and review)]**

NA

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 25012 LJ52 U-ENG25 25012 LJ77 U-ENG25 25012 LJ75			
<b>Course title (and course title in English)</b>	固体物理学 (材工ネ原宇) Solid State Physics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NAKAMURA HIROYUKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Introduction to microscopic solid state physics					
<b>[Course objectives]</b>					
Gateway to atomic and electronic theories for materials					
<b>[Course schedule and contents]</b>					
Crystal and lattice, Diffraction by crystal, Bonding energy of crystal, 2 times, Lattice and crystal structure, Miller indices, Bragg's law, vanishing rule and structure factor, repulsion and attraction between atoms, various atomic bonding Phonon, 3 times, Sound wave in elastic body, dispersion relation, Brillouin zone, acoustic mode and optical mode, phonon Introduction to statistical mechanics, Specific heat of solid, 3 times, Introduction to statistical mechanics, Boltzmann 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, 3 times, 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, 3 times, Density of states, Fermi-Dirac distribution, electron specific heat, resistivity of metals, Hall effect, thermal conductivity of metals Assessment, 1time, Assessment					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on a final examination.					
----- Continue to 固体物理学 (材工ネ原宇) (2)					

固体物理学 ( 材工ネ原宇 ) (2)

**[Textbooks]**

M. Shiga 『Introduction to Solid State Physics for Materials Scientists』 ( Uchidarokakuho ) ISBN: 9784753655526 ( in Japanese )

**[References, etc.]**

( **Reference books** )

C. Kittel 『Introduction to Solid State Physics』 ( Wiley ) ISBN:9780471415268

**[Study outside of class (preparation and review)]**

Knowledge on quantum mechanics and statistical mechanics is highly helpful.

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35013 LJ52 U-ENG25 35013 LJ77				
<b>Course title (and course title in English)</b>	応用電磁気学 (機宇 : 学番奇数) Applied Electromagnetism		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, SHIKAMA TAIICHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2?3times, ,3?4times, ,2?4times, ,3?5times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 35013 LJ52 U-ENG25 35013 LJ77			
<b>Course title (and course title in English)</b>	応用電磁気学 (機宇 : 学番偶数) Applied Electromagnetism		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, NAMURA KYOKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
The general properties of Maxwell's equations, which form the fundamental laws of electromagnetism, as well as the generation and propagation of electromagnetic waves and their applications in engineering are taught in lectures.					
<b>[Course objectives]</b>					
<ul style="list-style-type: none"> <li>• To understand the general properties of Maxwell's equations, which form the fundamental laws of electromagnetism</li> <li>• To understand the generation and propagation of electromagnetic waves and the optical properties of matter</li> <li>• To understand how electromagnetic phenomena are applied in engineering</li> </ul>					
<b>[Course schedule and contents]</b>					
The lecturer instructs students by deciding on the order and frequency (15 sessions in total) in which the following items will be taught, based on each student's background and level of understanding.					
(1) Maxwell's equations and their general properties [3-4 sessions] Maxwell's equations and other basic matters are reviewed.					
(2) Generation and propagation of electromagnetic waves [5-6 sessions] The propagation of electromagnetic waves in a vacuum and waveguide, polarization of electromagnetic waves, radiation of electromagnetic waves from charged particles that undergo accelerated motion and other related matters are explained.					
(3) Reflection, refraction and diffraction of electromagnetic waves [4-5 sessions] Matters such as the laws of reflection and refraction at dielectric boundaries; absorption, refraction, dispersion, and reflection of electromagnetic waves based on oscillator models; group velocity and phase velocity; diffraction of electromagnetic waves; and optical properties of metals, plasma, and other materials are explained.					
(4) Application and development in physical engineering [1-2 sessions] The development and application of electromagnetic waves in engineering are explained.					
Continue to 応用電磁気学 (機宇 : 学番偶数) (2)					

応用電磁気学 (機宇：学番偶数) (2)

**[Course requirements]**

The subject is based on the continuation of electromagnetism, differential and integral calculus, and linear algebra, classes offered by the Faculty of Integrated Human Studies. Students are required to have basic knowledge in vector analysis.

**[Evaluation methods and policy]**

Evaluation is based on the combined grade for tests and submitted materials.

**[Textbooks]**

Others; printouts are distributed in lectures when needed.

**[References, etc.]**

**( Reference books )**

Introduced during teaching sessions

**[Study outside of class (preparation and review)]**

- Students must prepare for and review lecture materials distributed in teaching sessions.
- When appropriate, students are asked to submit reports and assignments demonstrating their learning from preparation and review.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35013 LJ52 U-ENG25 35013 LJ77			
<b>Course title (and course title in English)</b>	応用電磁気学 (工ネ原) Applied Electromagnetism		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SAITOU MANABU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
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Continue to 応用電磁気学 (工ネ原) (2)					

応用電磁気学 (工本原) (2)

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**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25014 LJ75 U-ENG25 25014 LJ52 U-ENG25 25014 LJ57			
<b>Course title (and course title in English)</b>	原子物理学 (材工ネ原宇) Atomic Physics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, MAJIMA TAKUYA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Students are first given an overview of physical phenomena that lead to the discovery of quantum mechanics. Following this, an introduction to quantum mechanics is given using concrete examples to provide a clear outline of various phenomena in the microscopic world, such as atoms and molecules, and the laws that are derived from them.					
<b>[Course objectives]</b>					
Targets include understanding phenomena that cannot be described in classical physics, understanding various laws in the microscopic world that relate to atoms and molecules, and acquiring basic knowledge for quantum mechanics.					
<b>[Course schedule and contents]</b>					
Atomic theories, 1 session: atomic theory of natural philosophy, atomic theory of chemistry, atoms and nuclei, structure of nuclei and elementary particles, current image of elementary particles Kinetic theory of gases, 2 sessions: atomic theory of chemical reactions, basic assumptions of the kinetic theory of gases, pressure and temperature of gases, specific heat of matter, law of the distribution of energy, and velocity of molecules Heat radiation and energy quantum, 2 sessions: properties of heat radiation, Stefan-Boltzmann law, Wien's displacement law, classical radiation formulas (Rayleigh-Jeans, Wien), Planck's radiation formula and energy quantum Photons and electrons, 2 sessions: electrons and their particle properties, the discovery of electrons, beta particles, photons: light particulates, photoelectric effect, Compton effect Atomic models and the quantum condition (old quantum theory), 1 session: theory on the structure of electrons and atoms, Thomson and Nagaoka ' s atomic models, discovery of the atomic nucleus/Rutherford ' s atomic model, Bohr's atomic model Wave function and uncertainty principle (introduction to quantum mechanics), 1 session: fluctuation of electrons, de Broglie wave, double-slit experiment, interpretation of wave function Schrodinger equation and its solution, 2 sessions: operator, expected value, time-independent Schrodinger equation, steady state, eigenvalue equation, square-well potential Quantum mechanical description of a hydrogen atom, 3 sessions: spherical coordinate system, particle in a central potential, angular momentum operator, spherical harmonics, wave function, and energy level of a hydrogen atom Confirmation of learning achieved, 1 session: the degree of learning achieved so far is confirmed					
----- Continue to 原子物理学 (材工ネ原宇) (2)					

## 原子物理学 (材工ネ原宇) (2)

### [Course requirements]

Classical mechanics, electromagnetism, thermodynamics

### [Evaluation methods and policy]

Students are evaluated through a test. A raw score is given as their evaluation.

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

Others; Hatakeyama, A., Ryoushirikigaku, (Nihon Hyouronsha, 2017) ISBN-10: 4535860411,  
Mafune, F., Ryoushi kagaku kiso kara no apuroochi., (Kagaku-Dojin, 2007) ISBN-10: 4759810846,  
Kikuchi, K., Genshi butsurigaku bishiteki butsurigaku nyuumon, (Kyoritsu Shuppan, 1969) ISBN-10:  
4320030478,  
etc.

#### ( Related URLs )

( )

### [Study outside of class (preparation and review)]

Students should read materials such as introductory books on topics covered in lectures to gain an understanding of how the study of physics has emerged throughout history.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35018 LJ75 U-ENG25 35018 LJ77 U-ENG25 35018 LJ71			
<b>Course title (and course title in English)</b>	量子物理学 1 (機 : 学番奇数) Quantum Physics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, SUZUKI MOTOFUMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
In this subject, lectures focus on helping students understand the main concepts underlying quantum mechanics and quantum statistical mechanics, as well as deepening their quantum mechanical understanding of the structure of an atom, structure of a molecule, and the electronic structure of a solid material.					
<b>[Course objectives]</b>					
To master the main concepts underlying quantum mechanics and quantum statistical mechanics, and to deepen one's quantum mechanical understanding of the structure of an atom, the structure of a molecule, and the electronic structure of a solid material.					
<b>[Course schedule and contents]</b>					
(1) Development of quantum mechanics [1-2 weeks] Students receive an overview of Rutherford's atomic model and its difficulties, Bohr's atomic model, experimental facts that show light particulates and the fluctuation of electrons, etc. In addition, students develop an understanding of the limits of classical mechanics and the necessity of quantum mechanics.					
(2) Principles of quantum mechanics [4 weeks] Students are introduced to wave functions and the Schrodinger equation. Further, students gain an understanding of differences between classical mechanics and quantum mechanics by studying the interpretation and properties of wave functions, expected values of physical quantities, and the properties of operators that reveal observable physical quantities. By examining the eigenvalues of operators and the properties of eigenfunctions, students also develop an understanding of the superposition principle of wave functions.					
(3) Motion in one dimension [2-3 weeks] Students are asked to think about the motion of a one-dimensional free particle when there is no external field. By examining the motion of particles when potential hills are present, and studying reflection via potential hills and the transmission phenomena of potential hills, students also gain an understanding of the tunneling effect. In addition, the bound state is explained using the square-well potential as an example.					
(4) Harmonic oscillator [2-3 weeks] Students review harmonic oscillation in classical mechanics and derive the wave function of a one-dimensional harmonic oscillator. Based on this, students are asked to think about the motion of a multidimensional harmonic oscillator and are given an explanation of the Einstein model of specific heat.					
(5) Hydrogen atom [4 weeks] Students are asked to think about motion in a spherically symmetric field using a hydrogen atom as an example. Next, polar coordinates are introduced to allow students to separate a wave function into angular					
----- Continue to 量子物理学 1 (機 : 学番奇数) (2) -----					

## 量子物理学 1 (機: 学番奇数) (2)

and radial parts. Then, an explanation is given on angular momentum in quantum mechanics. Following this, students are asked to obtain the wave function of a hydrogen atom and are given an explanation of the spectrum of a hydrogen atom. Based on the outcome of these activities, the wave function of a multi-electron atom is then examined generally, and an explanation is given on atomic analyses performed via atomic spectroscopy and Auger electron spectroscopy. In addition, students also gain an understanding of the origin of covalent bonds using a hydrogen molecule as an example.

### [Course requirements]

None

### [Evaluation methods and policy]

[Evaluation method]

Evaluation is conducted through a short-answer test.

[Evaluation criteria]

Students must obtain at least 60 out of 100 marks in the short-answer test

60 marks or above: Pass

59 marks or below: Fail

In addition, up to 30% of the report assignments given during teaching sessions may be added to the above evaluation.

### [Textbooks]

Others; none

### [References, etc.]

( Reference books )

Others; there are many textbooks, but any basic textbook will suffice.

### [Study outside of class (preparation and review)]

- Students must prepare for and review lecture materials distributed in teaching sessions.
- When appropriate, students are asked to submit reports and assignments demonstrating their learning from preparation and review.

### ( Other information (office hours, etc.) )

Students are divided into two classes, and lectures on the above contents are given in the same time slots.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

Continue to 量子物理学 1 (機: 学番奇数) (3)

量子物理学 1 (機:学番奇数) (3)

(2) Details of instructors' practical work experience related to the course

(3) Details of practical classes delivered based on instructors' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35018 LJ75 U-ENG25 35018 LJ77 U-ENG25 35018 LJ71				
<b>Course title (and course title in English)</b>	量子物理学 1 (機 : 学番偶数) Quantum Physics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, NAKAJIMA KAORU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
0					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
examination and homework					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 35018 LJ75 U-ENG25 35018 LJ77 U-ENG25 35018 LJ71			
<b>Course title (and course title in English)</b>	量子物理学 1 (材原宇) 情報 Quantum Physics 1		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer, Itoh Akio	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>Quantum theory is one of the most successful theories in the modern physics. It explains well a lot of peculiar phenomena which can not be understood within the classical theory. The main purpose of this course is to understand the fundamental mathematical structure of the quantum theory.</p> <p>We may use online materials. Check LMS in advance.</p>					
<b>[Course objectives]</b>					
<p>An important purpose of this course is to understand the fundamental mathematical structure of the quantum theory. In addition one is hoped to become capable to calculate some basic properties of a quantum mechanical particle on one-dimensional space.</p>					
<b>[Course schedule and contents]</b>					
<ol style="list-style-type: none"> <li>1. Introduction. Wave mechanics and matrix mechanics.</li> <li>2. Mathematical structure of quantum theory (1) State and observable.</li> <li>3. Mathematical structure of quantum theory (2) Hilbert space and state vectors.</li> <li>4. Mathematical structure of quantum theory (3) operators and observables</li> <li>5. Mathematical structure of quantum theory (4) Schroedinger equation and time evolution</li> <li>6. One particle on one-dimensional space (1) classical theory and its quantization</li> <li>7. One particle on one-dimensional space (2) CCR and Robertson's uncertainty relation</li> <li>8. Potential problem (1) General theory</li> <li>9. Potential problem (2) General theory and its mathematical addendum</li> <li>10. Square well potential</li> <li>11. Box potential</li> <li>12. Scattering theory</li> <li>13. Harmonic oscillator (1)</li> <li>14. Harmonic oscillator (2)</li> <li>15. Summary</li> </ol>					
<b>[Course requirements]</b>					
Classical mechanics, Linear algebra					
----- Continue to 量子物理学 1 (材原宇) 情報 (2) -----					

量子物理学 1 (材原宇) 情報 (2)

**[Evaluation methods and policy]**

**【Evaluation method】**

Evaluation will be based on reports.

**【Evaluation policy】**

The result of reports should be 60 and above out of 100.

60 and above: Passed

59 and below: Failed

**[Textbooks]**

Not used

**[References, etc.]**

**( Reference books )**

Modern Quantum Mechanics (J.J.Sakurai) isbn{{9780805382914}} isbn{{9781292024103}}

Lectures on Quantum Theory (C.J. Isham) isbn{{1860940013}}

**[Study outside of class (preparation and review)]**

Clarify what you have learnt and what you do not understand. Solve a problem set which will be distributed.

**( Other information (office hours, etc.) )**

Send an email.

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45019 LJ71 U-ENG25 45019 LJ75 U-ENG25 45019 LJ77			
<b>Course title (and course title in English)</b>	量子物理学 2 (機) Quantum Physics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HASUO MASAHIRO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,3times, ,3times, ,1?2times, ,1?2times, ,2times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 量子物理学 2 (機) (2)					

量子物理学 2 (機) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45019 LJ71 U-ENG25 45019 LJ75 U-ENG25 45019 LJ77				
<b>Course title (and course title in English)</b>	量子物理学 2 (材原宇) 情報 Quantum Physics 2		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer, Itoh Akio	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>Quantum theory is an astonishing theory. It describes perfectly a lot of phenomena inspite of its peculiar mathematical formulation.</p> <p>An important purpose of this course is to understand the formulation and to become capable to manipulate it. We may use online materials. Check LMS in advance.</p>					
<b>[Course objectives]</b>					
<p>To understand the fundamental structure of quantum theory.</p> <p>To be able to calculate some properties of quantum mechanical particle in three dimensional space.</p>					
<b>[Course schedule and contents]</b>					
<ol style="list-style-type: none"> <li>1. Fundamental framework</li> <li>2. Angular momentum (1)</li> <li>3. Angular momentum (2) generator of space rotation</li> <li>4. Eigenvalue of Angular momentum operator. SU(2) and SO(3)</li> <li>5. Spin</li> <li>6. Central potential</li> <li>7. Hydrogen atom</li> <li>8. perturbation theory (1)</li> <li>9. perturbation theory (2)</li> <li>10. Heisenberg equation</li> <li>11. Interaction picture</li> <li>12. Bell's inequality</li> <li>13. Mixed state</li> <li>14. Many particle and Quantum field</li> <li>15. Applications to quantum information</li> </ol>					
<b>[Course requirements]</b>					
Quantum Physics 1					
<b>[Evaluation methods and policy]</b>					
<p><b>【Evaluation method】</b> Evaluation will be based on reports.</p> <p><b>【Evaluation policy】</b></p>					
Continue to 量子物理学 2 (材原宇) 情報 (2)					

量子物理学 2 ( 材原宇 ) 情報 (2)

The result of reports should be 60 and above out of 100.

60 and above: Passed

59 and below: Failed

**[Textbooks]**

Not used

**[References, etc.]**

( **Reference books** )

Modern Quantum Mechanics (J.J.Sakurai) isbn{{9780805382914}} isbn{{9781292024103}}

Lectures on Quantum Theory (C.J. Isham) isbn{{1860940013}}

**[Study outside of class (preparation and review)]**

Solve a distributed problem set.

( **Other information (office hours, etc.)** )

Send an email.

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 35020 LJ71				
<b>Course title (and course title in English)</b>	連続体力学 (工ネ) Continuum Mechanics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, KINOSHITA KATSUYUKI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 連続体力学 (工ネ) (2)					

連続体力学 (工ネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35020 LJ71				
<b>Course title (and course title in English)</b>	連続体力学 (機) Continuum Mechanics		<b>Instructor's name, job title, and department of affiliation</b>	Institute for Life and Medical Sciences Professor, ADACHI TAJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This lecture provides an introduction to the theory of continuum mechanics for its application to the fields of bioengineering and biomedical engineering. (in Japanese)					
<b>[Course objectives]</b>					
Students will be able to understand tensor analysis and continuum mechanics, and to apply them in modeling of living tissues and cells.					
<b>[Course schedule and contents]</b>					
1 ) Introduction to continuum mechanics					
2 ) Mathematical preliminaries Matrix algebra, Index notation, Summation convention, Eigenvalues and eigenvectors					
3 , 4 ) Vectors and tensors Cartesian tensors, Scalar and vector products, Dyadic product, Coordinate transformation, Invariants, Nabla operator, Divergence theorem					
5 , 6 ) Kinematics Bodies and configurations, Displacement, Strain tensor, Compatibility, Material time derivative					
7 , 8 ) Stress and equilibrium Force and stress, Stress tensor, Traction, Cauchy stress, Principal stresses, Equation of equilibrium					
9 , 10 ) Conservation Laws and governing equations Mass conservation, Linear and angular momentum, The first law of thermodynamics for continua					
11 , 12 ) Constitutive models Constitutive equations, Stress-strain relationship, Linear elasticity, Newtonian viscous fluids, Material symmetry, Biological tissues					
13 , 14 ) Boundary value problems Differential equations with a set of boundary conditions, Navier-Stokes equation, Navier's equation					
----- <b>Continue to 連続体力学 (機) (2)</b>					

## 連続体力学（機）(2)

1 5 ) Feedbacks

Application of continuum mechanics to the analyses of biological tissues, Introduction to biomechanics

### [Course requirements]

None

### [Evaluation methods and policy]

Exam 100 (+ Reports max 10)

### [Textbooks]

安達泰治、富田佳宏 『連続体力学の基礎（第2版）』（養賢堂, 2022）ISBN:ISBN-10: 4842505907

### [References, etc.]

（Reference books）

Introduced during class

### [Study outside of class (preparation and review)]

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### （Other information (office hours, etc.)）

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35023 LJ77 U-ENG25 35023 LJ28 U-ENG25 35023 LJ71				
<b>Course title (and course title in English)</b>	エネルギー変換工学 (エネ) Energy Conversion		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KUROSE RYOUICHI Graduate School of Energy Science Professor, Jun HAYASHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
Energy source and energy conversion system, 3?4times,* Energy resources ,3?4times, ,3?4times, ,3?4times,					
<b>[Course requirements]</b>					
Knowledge of thermodynamics is required.					
<b>[Evaluation methods and policy]</b>					
Achievement will be synthetically evaluated from attendance, report and final examination.					
<b>[Textbooks]</b>					
Nothing. Print material is properly distributed.					
<b>[References, etc.]</b>					
( Reference books ) It will be introduced, if necessary.					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>	U-ENG25 35023 LJ77 U-ENG25 35023 LJ28 U-ENG25 35023 LJ71				
<b>Course title (and course title in English)</b>	エネルギー変換工学（機） Energy Conversion		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KUROSE RYOUICHI Graduate School of Energy Science Professor, Jun HAYASHI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
エネルギーシステムの基本的な考え方を身につけるために、各種エネルギー源（機械エネルギー、熱エネルギー、化学エネルギー）およびエネルギー変換過程（化学エネルギーから熱エネルギーへの変換、機械エネルギーと熱エネルギーの変換、など）について概説し、エネルギー変換過程に関する基礎的事項、エネルギー有効利用に関して講述する。					
<b>[Course objectives]</b>					
エネルギー変換工学に関する基礎的事項を習得するとともに、エネルギー資源事情、省エネルギー・新エネルギーシステム技術、環境対策などに関する問題意識を高めることに目標を置く。					
<b>[Course schedule and contents]</b>					
諸論（1～2回：林）： ・エネルギーの形態 ・エネルギー資源と環境					
エネルギー源（4～5回：林）： ・機械エネルギー ・熱エネルギー ・化学エネルギー ・種々のエネルギー形態におけるエクセルギー ・エクセルギーの消滅とその防止					
エネルギー変換過程（3～4回：林）： ・化学エネルギーから熱エネルギーへの変換 ・機械エネルギーと熱エネルギーの変換					
エネルギー利用（3～4回：黒瀬）： ・自然エネルギー、バイオマスエネルギー及び廃棄物のエネルギー利用 ・エネルギーの輸送と貯蔵					
（講義：14回、フィードバック1回）					
Continue to エネルギー変換工学（機）(2)					

## エネルギー変換工学（機）(2)

### [Course requirements]

熱力学を学習していることを前提とする。

### [Evaluation methods and policy]

平常点、レポート、ならびに学期末試験等を総合して到達目標への達成度を評価する（初回の講義で説明する）。

### [Textbooks]

プリント資料等を適宜配布する。

### [References, etc.]

#### （ Reference books ）

日本機械学会 「エネルギー工学」

### [Study outside of class (preparation and review)]

授業の前に、身の回りにある様々なエネルギーの形態およびそれら相互の変換過程について、予備的に考察しておくことが望ましい。また、授業後は講義内容を復習し、各種エネルギー変換システムの原理と適正な評価の方法、設計・制御の指針、等について理解しておく。

### （ Other information (office hours, etc.) ）

上記各項目の講義順序および時間配分は、年度によって異なることがある。  
資料等の配布は電子的に行う場合がある。

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35024 LJ77 U-ENG25 35024 LJ71			
<b>Course title (and course title in English)</b>	振動工学 (機) Vibration Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI Graduate School of Informatics Senior Lecturer,FUNADA RIKU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,3times, ,3times, ,1time, ,4times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 振動工学 (機) (2)					

振動工学（機）(2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35024 LJ77 U-ENG25 35024 LJ71			
<b>Course title (and course title in English)</b>	振動工学 ( 宇 ) Vibration Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, SENDA KEI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
To introduce the fundamentals of analytical methods for linear dynamic systems, especially the modeling of vibration phenomena and their analysis.					
<b>[Course objectives]</b>					
To acquire basic knowledge of analytical methods for linear dynamic systems, especially modeling, and analysis of vibration phenomena, and to acquire the ability to analyze various dynamic systems.					
<b>[Course schedule and contents]</b>					
<p>The following topics will be covered. For each topic, the number of weeks indicated in [ ] will be allocated, with confirmation of students' understanding. The order of lectures for each item and subitem, as well as the number of lecture weeks allocated to each, are not fixed. The professor will determine these appropriately based on their teaching approach and the students' background and level of understanding. Sufficient consideration will be given to provide students with guidance on how to proceed throughout the 15-lecture course, enabling them to prepare in advance.</p> <p>(1) Introduction [1 week] Outline and fundamentals of analytical methods for linear dynamic systems will be presented.</p> <p>(2) Fourier analysis [1 week] The fundamentals of the Fourier series and the Fourier transform, along with their applications to vibration analysis, will be explained.</p> <p>(3) Analysis of one-degree-of-freedom vibration systems [4 weeks] Free and forced vibrations of one-degree-of-freedom systems consisting of masses, springs, and damping will be explained.</p> <p>(4) Analysis of 2-DOF vibration system [3 weeks] The equations of motion, eigenfrequency, undamped free vibration, and the properties of the eigenfrequency of 2-DOF vibration systems consisting of masses, springs, and damping will be explained.</p> <p>(5) Analysis of multi-degree-of-freedom vibration systems [3 weeks] An explanation will be given of the eigen vibration of general multi-degree-of-freedom systems, the mode coordinate system, and the analysis of free/forced vibration using mode coordinates.</p> <p>(6) Analysis of distributed constant vibration systems [3 weeks] Using the longitudinal vibration of a bar, the vibration of a string, and the bending vibration of a beam as examples, this section explains the boundary conditions, natural frequencies, and modes. It compares them with the analysis of multi-degree-of-freedom vibration systems.</p>					
----- <b>Continue to 振動工学 ( 宇 ) (2)</b>					

## 振動工学（宇）(2)

### [Course requirements]

Basic Mechanics and Mathematics, Basic Differential and Integral Calculus including Ordinary Differential Equations, Fourier Analysis

### [Evaluation methods and policy]

Grades are assessed on a scale of 100 points, based on the scores of regular tests and class participation. Class participation is assessed based on submitted assignments, class participation, and in-class comments. Class participation is taken into account up to a maximum of 20% of the overall grade. The assessment criteria follow the policy for grading in the Faculty of Engineering, as stated in the course handbook.

### [Textbooks]

Takuzo Iwatsubo and Hiroshi Matsuhisa 『Fundamentals of Vibration Engineering』 ( Morikita Publishing Co., Ltd. ) ISBN:9784627666825 ( 2014 )

### [References, etc.]

#### ( Reference books )

Tokuo Terasawa 『Vibrations and Waves』 ( Iwanami Shoten, Publishers ) ISBN:9784000077477 ( Physics Text Series 7 )

Miki Wadachi 『Mathematics for Physics』 ( Iwanami Shoten, Publishers ) ISBN:9784000298704 ( Physics Introduction Course, New Edition 10 )

Takeo Inami 『Ordinary Differential Equations』 ( Iwanami Shoten, Publishers ) ISBN:9784000299152 ( Basic Mathematics for Science and Engineering, New Edition 3 )

Masayuki Oikawa 『Partial Differential Equations』 ( Iwanami Shoten, Publishers ) ISBN:9784000299169 ( Basic Mathematics for Science and Engineering, New Edition 4 )

Reijiro Fukuda 『Fourier Analysis』 ( Iwanami Shoten, Publishers ) ISBN:9784000299183 ( Basic Mathematics for Science and Engineering, New Edition 6 )

#### ( Related URLs )

NA

### [Study outside of class (preparation and review)]

Students should learn the basic mechanics and mathematics in advance as necessary. They should answer the questions given as assignments, understand the lecture content, review it by reorganizing their notes, etc., and systematize the content they have learned. For this reason, it takes an average of about 4 hours of preparation and review for each lesson.

### ( Other information (office hours, etc.) )

Instructions will be given during class.

\*Please visit KULASIS to find out about office hours.

Continue to 振動工学（宇）(3)

振動工学（宇）(3)

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35025 LJ77 U-ENG25 35025 LJ71			
<b>Course title (and course title in English)</b>	制御工学 1 (機工ネ原 : 学番奇数) Control Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KOH HOSODA Graduate School of Engineering Senior Lecturer, Kawasetsu Takumi	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
, 1time, , 3times, , 2times, , 2-3times, , 3times, , 2-3times, , 1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 制御工学 1 (機工ネ原 : 学番奇数) (2)					

制御工学 1 (機工ネ原:学番奇数) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35025 LJ77 U-ENG25 35025 LJ71			
<b>Course title (and course title in English)</b>	制御工学 1 (機工ネ原 : 学番偶数) Control Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor,OHTSUKA TOSHIYUKI Graduate School of Informatics Professor,AZUMA SHUNICHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
The course goal is to understand the basic concepts of Classical Control Theory such as transfer functions, frequency responses and stability.					
<b>[Course schedule and contents]</b>					
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.					
<b>[Course requirements]</b>					
Elementary knowledge of Laplace Transform is required.					
<b>[Evaluation methods and policy]</b>					
Scores of quizzes, reports and the regular examination are taken into account.					
----- 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)

**[Textbooks]**

T. Sugie, M. Fujita: Introduction of Feedback Control. Corona Publishing Co. Ltd. isbn{{9784339033038}}

**[References, etc.]**

( Reference books )

T. Sugie, H. Kajiwara: Exercises in System Control Engineering. Corona Publishing Co. Ltd. isbn{{9784339033069}}

( Related URLs )

(none)

**[Study outside of class (preparation and review)]**

( Other information (office hours, 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.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35025 LJ77 U-ENG25 35025 LJ71			
<b>Course title (and course title in English)</b>	制御工学 1 ( 宇 ) Control Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, MARUTA ICHIROU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
Complex function theory, Ordinary differential equation theory					
<b>[Evaluation methods and policy]</b>					
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)					

## 制御工学 1 ( 宇 ) (2)

### [Textbooks]

T. Sugie and M. Fujita 『Introduction to feedback control』 ( Corona Publisher ) ISBN:4339033030 ( in Japanese )

### [References, etc.]

#### ( Reference books )

Introduced during class

### [Study outside 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.

### ( Other information (office hours, 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.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35027 LJ71			
<b>Course title (and course title in English)</b>	制御工学 2 (機) Control Engineering 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor, AZUMA SHUNICHI Graduate School of Engineering Senior Lecturer, Kawasetsu Takumi	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,2times, ,2times, ,2times, ,1time, ,2times, ,2times, ,2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
-----					
Continue to 制御工学 2 (機) (2)					

制御工学 2 (機) (2)

-----  
**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35027 LJ71			
<b>Course title (and course title in English)</b>	制御工学 2 ( 宇 ) Control Engineering 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, FUJIMOTO KENJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
Students will learn state-space equations, stability analysis, feedback controller synthesis and observer design.					
<b>[Course schedule and contents]</b>					
The basic schedule of the course is as follows.					
<ol style="list-style-type: none"> <li>1. Introductions</li> <li>2. Ordinary differential equations and state-space equations</li> <li>3. Eigenvalues, eigenvectors and systems</li> <li>4. Solutions of state-space equations</li> <li>5. Stability</li> <li>6. Transfer functions and realization theory</li> <li>7. Controllability</li> <li>8. Observability</li> <li>9. Coordinate transformation and canonical decomposition</li> <li>10. Controllability canonical form</li> <li>11. Observability canonical form</li> <li>12. State feedback control</li> <li>13. State observers and output feedback control</li> <li>14. Optimal control and Kalman filters</li> <li>15. Summary</li> </ol>					
<b>[Course requirements]</b>					
Students are required to take basic knowledge of linear algebra and differential equation theory. It is also preferable to take Control Engineering 1.					
----- Continue to 制御工学 2 ( 宇 ) (2) -----					

## 制御工学 2 ( 宇 ) (2)

### [Evaluation methods and policy]

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.

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

Introduced during class

### [Study outside of class (preparation and review)]

We will give a report for each unit. Review is necessary after every lecture.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35030 LJ71				
<b>Course title (and course title in English)</b>	生産工学 (機) Production Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, IZUI KAZUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course deals with how to construct and operate a manufacturing system of a mechanical product.					
<b>[Course objectives]</b>					
The goal is to understand the concept of a manufacturing system, and to become able to handle related basic decision-making problems.					
<b>[Course schedule and contents]</b>					
Introduction, 1time, The overall concept of a manufacturing system is given. 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. Production amp Operations Management, 2times, Demand forecasting, production planning, inventory management, MRP, JIT, etc. are covered. , 3times, Production Scheduling, 2times, Basic approaches for single machine scheduling, flow shop scheduling, job shop scheduling, and project scheduling are introduced. Plant Layout amp Line Blancing, 2times, Basic approaches for plant layout and line balancing are introduced. 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. , 1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
The regular examination, in-class examinations and reports are taken into account.					
----- <b>Continue to 生産工学 (機) (2)</b>					

生産工学（機）(2)

**[Textbooks]**

Not used

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Homework problems are assigned.

**( Other information (office hours, etc.) )**

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

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35035 LJ75				
<b>Course title (and course title in English)</b>	結晶物性学 (材工ネ) Physics of Crystal Properties and Imperfections		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KISHIDA KIYOUSUKE	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
(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]					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on one (or two) written examination(s). Daily reports may be considered in grading determination.					
<b>[Textbooks]</b>					
Hand out materials will be provided during the lecture.					
<b>[References, etc.]</b>					
( <b>Reference books</b> ) 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 P.M. Anderson, J.P. Hirth and J. Lothe 『Theory of Dislocations, 3rd ed.』 ( Cambridge University Press, — Continue to 結晶物性学 (材工ネ) (2)					

**結晶物性学 (材工ネ) (2)**

2017) ISBN:0521864364

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

**[Study outside of class (preparation and review)]**

To review contents covered in the previous lecture.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35036 LJ62 U-ENG25 35036 LJ75 U-ENG25 35036 LJ76				
<b>Course title (and course title in English)</b>	材料物理化学 (工ネ) Physical Chemistry of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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).					
<b>[Course schedule and contents]</b>					
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.					
----- Continue to 材料物理化学 (工ネ) (2)					

## 材料物理化学（エネ）(2)

Feedback class (1 class)

Via questions and answer using the study support service (LMS), students will gain a deeper understanding of the contents of this course.

### [Course requirements]

Students are recommended to have finished the course Energy and Material Thermochemistry I.

### [Evaluation methods and policy]

Grading will be performed in principle using scores on regular tests. Consideration may also be given to exercises, quizzes, and reports assigned in classes.

### [Textbooks]

Materials will be distributed during class or using the student support service (LMS).

### [References, etc.]

( Reference books )

『アトキンス物理化学』（東京化学同人）

### [Study outside of class (preparation and review)]

Notification will be made via the study support service (LMS).

For each week 's class, class contents and quiz answers will be posted on the study support service (LMS). Students are requested to review and gain a sufficient understanding of these before each next class period.

### ( Other information (office hours, etc.) )

Problem-solving type assignments will be designated as necessary using practice exercises as well as the study support service (LMS).

This lecture may be changed to the on-demand via LMS on account of the speaker.

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.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35037 LJ75 U-ENG25 35037 LJ57				
<b>Course title (and course title in English)</b>	熱及び物質移動 (材) Heat and Mass Transfer		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HIDEYUKI YASUDA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
The fundamentals of transport phenomena for the engineers and/or researchers related to physical engineering are given.					
<b>[Course objectives]</b>					
To be able to apply the fundamental equations of thermal and mass transport studied in the class to real phenomena.					
<b>[Course schedule and contents]</b>					
<p>One dimensional heat conduction, 2times, Difference between heat and temperature. Similarity among heat, mass, and momentum transfers. Fourier's law, Steady heat conduction.</p> <p>Non-steady heat transfer, 2times, Diffusion equation, solved by Fourier expansion, Laplace transform, and numerical method.</p> <p>Conservation rules, 1time, Fourier's law, Steady heat conduction.</p> <p>Molecular kinetics, 1time, Maxwell's theory.</p> <p>Heat conduction of cylinder and sphere, 1time, Heat transfer of cylindrical and spherical coordinates.</p> <p>2 dimensional heat conduction, 1time, 2 dimensional Laplace equation.</p> <p>Green function, 2times, Green function. Relation between Schrödinger equation and diffusion equation.</p> <p>Hydrodynamics, 2times, Navier Stokes equation.</p> <p>Boundary layer, 1time,</p> <p>Electromagnetic radiation, 1time,</p> <p>Achievement check, 1time, Learning how to solve the problems through practical exercises.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Assignment and written examination					
----- Continue to 熱及び物質移動 (材) (2)					

## 熱及び物質移動（材）(2)

### [Textbooks]

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  
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}}

### [References, etc.]

（ Reference books ）

（ Related URLs ）

((50370) <http://www.process.mtl.kyoto-u.ac.jp/>)

### [Study outside of class (preparation and review)]

The homework will be announced in the lecture.

（ Other information (office hours, etc.) ）

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35037 LJ75 U-ENG25 35037 LJ57			
<b>Course title (and course title in English)</b>	熱及び物質移動 (エネ) Heat and Mass Transfer		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor,OKUMURA HIDEYUKI Graduate School of Energy Science Professor,SAGAWA TAKASHI Graduate School of Energy Science Associate Professor,OGAWA TAKAYA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,3times, ,2times, ,2times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 熱及び物質移動 (エネ) (2)					

熱及び物質移動 (エネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35040 LJ59 U-ENG25 35040 LJ52 U-ENG25 35040 LJ77			
<b>Course title (and course title in English)</b>	プラズマ物理学 (原宇) Plasma Physics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,MURAKAMI SADAYOSHI Graduate School of Engineering Assistant Professor,Morishita, Yuya	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Fundamental properties of plasma as a universal state of high-temperature matters, basic equation describing plasma, magnetohydrodynamics, plasma waves and transport phenomena are explained.					
<b>[Course objectives]</b>					
to understand basic properties of plasmas and learn fundamental method of analysis					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
Basic knowledges of electromagnetism, statistical physics, fluid dynamics and atomic physics are expected.					
<b>[Evaluation methods and policy]</b>					
semester-end examination and reports					
<b>[Textbooks]</b>					
Hand out will be distributed .					
<b>[References, etc.]</b>					
( Reference books ) Introduced during class					
----- Continue to プラズマ物理学 (原宇) (2)					

プラズマ物理学 (原宇) (2)

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**[Study outside of class (preparation and review)]**

Please read and study the handouts in advance about the contents of the day's class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35041 LJ52 U-ENG25 35041 LJ53			
<b>Course title (and course title in English)</b>	量子反応基礎論 (原) Fundamentals of Particle Interactions		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SAITOU MANABU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,4times, ,2times, ,2times, ,2times, ,2times, , 1 times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 量子反応基礎論 (原) (2)					

量子反応基礎論 (原) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35045 LJ52 U-ENG25 35045 LJ77				
<b>Course title (and course title in English)</b>	気体力学 ( 宇 ) Gasdynamics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TAKATA SHIGERU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
To learn/understand fundamental issues specific to compressible fluid flows					
<b>[Course schedule and contents]</b>					
1. Euler set of equations (2-3 times) 2. Sound propagation (2 times)-- propagation of infinitesimal disturbance 3. Quasi one-dimension flow (2-3 times) -- isentropic flow, Laval nozzle, etc. 4. Propagation of finite amplitude disturbance (2-3 times) -- wave deformation, Riemann invariants, etc. 5. Standing Shock wave (1-2 times) -- Rankine-Hugoniot relation, etc. 6. Shock tube problem (2 time) -- Riemann problem, Reflection and deflection of waves					
<b>[Course requirements]</b>					
Fluid dynamics 1, Elemental Calculus (A,B, I,II), Linear Algebra (A,B)					
<b>[Evaluation methods and policy]</b>					
By the final exam., in principle.					
<b>[Textbooks]</b>					
H. M. Liepmann and A. Roshko 『Elements of Gasdynamics』 ( Dover Publications ) ISBN:0486419630					
<b>[References, etc.]</b>					
( <b>Reference books</b> ) J. D. Anderson, Jr. 『Modern Compressible Flow (2nd ed.)』 ( McGraw-Hill ) ISBN:0071006656					
<b>[Study outside of class (preparation and review)]</b>					
Students are expected to read the textbook by themselves in accordance with the progress of the class.					
( <b>Other information (office hours, etc.)</b> )					
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.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 35046 LJ77 U-ENG25 35046 LJ52			
<b>Course title (and course title in English)</b>	熱統計力学 (宇) Thermodynamics and Statistical Mechanics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, ERIGUCHI KOUJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
, 2 times, , 4 times, , 3 times, , 2 times, , 4 times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 熱統計力学 (宇) (2)					

熱統計力学 ( 宇 ) (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35047 LJ77 U-ENG25 35047 LJ52			
<b>Course title (and course title in English)</b>	空気力学 (宇) Aerodynamics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TAKATA SHIGERU Graduate School of Engineering Associate Professor, TSUJI TETSURO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
To learn/ understand the fundamental issues of two-dimensional compressible gas flows related to high speed flight.					
<b>[Course schedule and contents]</b>					
1. From one-dimensional to two-dimensional flow (3 times) -- Oblique Shock, Prandtl-Meyer fan, etc. 2. Shock--Expansion wave theory and Interaction of oblique shocks (2 times) 3. Non-isentropic flow and Mrocco's theorem (1-2 times) -- Bow shock, Shock--Expansion wave interaction, etc. 4. Small perturbation theory (3 times) -- Potential flow, Similarity rules, etc. 5. Steady two-dimensional flow and the method of characteristics (3-4 times) 6. Kinetic theory of gases (2-3 times) -- velocity distribution function, Boltzmann equation, etc.					
<b>[Course requirements]</b>					
Fluid dynamics 1,2, Gasdynamics, Elemental Calculus (A,B, I,II), Linear Algebra (A,B)					
<b>[Evaluation methods and policy]</b>					
By the final exam., in principle.					
<b>[Textbooks]</b>					
H. M. Liepmann and A. Roshko 『Elements of Gasdynamics』 ( Dover Publications ) ISBN:0486419630					
----- Continue to 空気力学 (宇) (2)					

## 空気力学 ( 宇 ) (2)

### [References, etc.]

#### ( Reference books )

J. D. Anderson, Jr. 『Modern Compressible Flow (2nd ed.)』 ( McGraw-Hill ) ISBN:0071006656

### [Study outside of class (preparation and review)]

Students are expected to read the textbook by themselves in accordance with the progress of the class.

### ( Other information (office hours, 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.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35048 LJ77				
<b>Course title (and course title in English)</b>	推進基礎論 ( 宇 ) Fundamentals of Aerospace Propulsion		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, ERIGUCHI KOUJI Graduate School of Engineering Associate Professor, URABE KEIICHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
Fluid Dynamics, Gas Dynamics, Thermodynamics, Electromagnetics					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
R. W. Humble, G. N. Henry, and W. J. Larson, <u>Space Propulsion Analysis and Design</u> (McGraw-Hill, New					
Continue to 推進基礎論 ( 宇 ) (2)					

## 推進基礎論 ( 宇 ) (2)

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{ }{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}.

### [Study outside of class (preparation and review)]

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35049 LJ77				
<b>Course title (and course title in English)</b>	航空宇宙機力学 (宇) Flight Dynamics of Aerospace Vehicle		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, SENDA KEI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Flight dynamics of aerospace vehicles.					
<b>[Course objectives]</b>					
To understand analytical mechanics through the flight dynamics of aerospace vehicles.					
<b>[Course schedule and contents]</b>					
<p>The following topics will be covered. For each topic, the number of weeks indicated in [ ] will be allocated, with confirmation of students' understanding. The order of lectures for each item and subitem, as well as the number of lecture weeks allocated to each, are not fixed. The professor will determine these appropriately based on their teaching approach and the students' background and level of understanding. Sufficient consideration will be given to provide students with guidance on how to proceed throughout the 15-lecture course, enabling them to prepare in advance.</p> <p>Analytical mechanics, [7 times]</p> <ul style="list-style-type: none"> <li>- introduction</li> <li>- coordinates</li> <li>- principle of virtual work</li> <li>- d'Alembert principle</li> <li>- potential</li> <li>- Lagrange equation of motion</li> <li>- conservation law</li> <li>- Lagrange multiplier</li> <li>- Euler-Lagrange equation</li> </ul> <p>Rigid body kinematics, [4 times]</p> <ul style="list-style-type: none"> <li>- Euler angles</li> <li>- angular rate</li> <li>- pseudo coordinates</li> </ul> <p>Rigid body dynamics, [3 times]</p> <ul style="list-style-type: none"> <li>- kinetic energy of a rigid body</li> <li>- linear and angular momentum</li> <li>- inertia tensor</li> <li>- Euler equation of motion</li> </ul> <p>Dynamics of space vehicle, [1 time]</p> <ul style="list-style-type: none"> <li>- topics of attitude dynamics of space vehicles</li> </ul>					
Continue to 航空宇宙機力学 (宇) (2)					

## 航空宇宙機力学 ( 宇 ) (2)

### [Course requirements]

Foundation of mechanics and mathematics

### [Evaluation methods and policy]

Grades are assessed on a scale of 100 points, based on the scores of regular tests and class participation. Class participation is assessed based on submitted assignments, class participation, and in-class comments. Class participation is taken into account up to a maximum of 20% of the overall grade. The assessment criteria follow the policy for grading in the Faculty of Engineering, as stated in the course handbook.

### [Textbooks]

Instructed during class

### [References, etc.]

#### ( Reference books )

L. D. Landau and E. M. Lifshitz 『Mechanics: Volume 1』 ( Butterworth-Heinemann ) ISBN: 9780750628969 ( 1982 )

Herbert Goldstein 『Classical Mechanics』 ( Pearson ) ISBN:9781292026558 ( 2013 )

Morikazu Toda 『Introductory course of physics 1 Mechanics』 ( Iwanami Shoten ) ISBN:9784000298612 ( 2017, in Japanese )

Shoichro Koide 『Introductory course of physics 2 Analytical Mechanics』 ( Iwanami Shoten ) ISBN: 9784000298629 ( 2017, in Japanese )

Miki Wadachi 『Introductory course of physics 10 Mathematics for physics』 ( Iwanami Shoten ) ISBN: 9784000298704 ( 2017, in Japanese )

#### ( Related URLs )

NA

### [Study outside of class (preparation and review)]

Students should learn the basic mechanics and mathematics in advance as necessary. They should answer the questions assigned, understand the lecture content, review it by reorganizing their notes, and systematize what they have learned. For this reason, each lesson requires about 4 hours of preparation and review.

### ( Other information (office hours, etc.) )

Instructions will be given during class.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35051 LJ71			
<b>Course title (and course title in English)</b>	固体力学 ( 宇 ) Mechanics of Solids		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, BIWA SHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>While the methods of stress-strain analysis for elementary structural members are the main topics in the "Mechanics of Materials" courses, 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. Torsion of thin-walled members is included as a glimpse of the mechanics of aircraft structures. The significance of this course lies in the treatments of more general physical laws of the mechanical behavior of solids. The topics of this course are important for the understanding of basic principles of large-scale computational analysis employed for the design of various structures and machine elements.</p>					
<b>[Course objectives]</b>					
<p>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 values of approximate theories given in the "Mechanics of Materials" courses from a rigorous viewpoint.</p>					
<b>[Course schedule and contents]</b>					
<p>The following topics are discussed in the lectures, but subject to possible change according to each year's situations.</p> <p>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 4-6 [Stress and laws of motion] 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  Weeks 7-8 [Stress-strain relations] Hooke's law; Elastic moduli; Voigt expression  Weeks 9-10 [Fundamental equations of elasticity] Navier's equations; Plane stress and plane strain; Compatibility relation for strain  Weeks 11-12 [Two-dimensional problems of elastic deformations] Airy's stress function; Biharmonic equation; Stress function in polar coordinates; Stress concentration around a circular hole  Week 13 [St. Venant's theory of torsion] Warping function; Prandtl's stress function; Torsion of bars of thin-walled cross-sections; Shear flow  Week 14 [Principle of virtual work] Virtual displacement; Principle of virtual work; Principle of stationary potential energy  &lt;Final examination&gt;  Week 15 [Feedback]</p>					
----- Continue to 固体力学 ( 宇 ) (2)					

## 固体力学 ( 宇 ) (2)

### [Course requirements]

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 also necessary.

### [Evaluation methods and policy]

Grading is made based on the examination (80%) and the reports (20%). The total score of the examination and the reports is evaluated between 0 and 100 points (the pass mark is 60). Occasional changes will be announced in the classes.

### [Textbooks]

Textbooks are not assigned. The lecture is given in the blackboard style.

### [References, 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.

### [Study outside of class (preparation and review)]

Contents of "Mechanics of Materials" courses should be fully reviewed. Homeworks (reports) will be assigned to review the lectures.

### ( Other information (office hours, etc.) )

Lectures are given in a black-board style. Students are expected to take the notes to understand the ideas and mathematical derivations, and make questions regarding unclear points.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35054 SJ77 U-ENG25 35054 SJ71			
<b>Course title (and course title in English)</b>	物理工学演習 1 (工ネ) Exercise on Engineering Science 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor,SUMIGAWA TAKASHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,9times, ,6times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 物理工学演習 1 (工ネ) (2)					

物理工学演習 1 (エネ) (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35054 SJ77 U-ENG25 35054 SJ71			
<b>Course title (and course title in English)</b>	物理工学演習 1 (原) Exercise on Engineering Science 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Assistant Professor, OGURE KENZOU Graduate School of Engineering Senior Lecturer, NARITA EMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
Linear algebra, 5times, Linear differential equations, 5times, Laplace transform, 4times, Confirmation of achievement in study, 1time,					
<b>[Course requirements]</b>					
differential and integral, linear algebra					
<b>[Evaluation methods and policy]</b>					
exercises and reports					
<b>[Textbooks]</b>					
Prints are distributed in the class.					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>	U-ENG25 35054 SJ77 U-ENG25 35054 SJ71				
<b>Course title (and course title in English)</b>	物理工学演習 1 (宇) Exercise on Engineering Science 1		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer,Ishiguro Takahisa Part-time Lecturer,TAKAGI YOHEI Part-time Lecturer,UEDA KENTARO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course provides the basics of conceptual aircraft design, mainly commercial aircraft, including flight dynamics, aircraft structure, aircraft systems, equipment, etc. Also, this course includes the exercises about aircraft configuration, airframe construction type, aircraft system design, etc.					
<b>[Course objectives]</b>					
This course aims to acquire the necessary skills and basic knowledge for aircraft design. This course helps to visualize the outline of aircraft development through a few tours of facilities outside the university.					
<b>[Course schedule and contents]</b>					
(1) Aircraft sizing <Instructor: Ueda Kentaro> <ul style="list-style-type: none"> <li>• Basic knowledge of aircraft and flight mechanics (2 sessions)</li> <li>• Determination of aircraft configuration (3 sessions)</li> </ul> (2) Airframe structural design <Instructor: Takagi Yohei> <ul style="list-style-type: none"> <li>• Basic knowledge of aircraft structure, loads, strength, materials and manufacturing methods (2 sessions)</li> <li>• Design and strength calculation of main structural members (3 sessions)</li> </ul> (3) Aircraft Systems and equipment <Instructor: Ishiguro Takahisa> <ul style="list-style-type: none"> <li>• Basic knowledge of aircraft systems and equipment (2 sessions)</li> <li>• System design of sensor systems (2 sessions)</li> </ul>					
<b>[Course requirements]</b>					
This course requires understanding the fundamental of dynamics.					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on the below. <ul style="list-style-type: none"> <li>• Attendance and participation in course.</li> <li>• Submission and performance of exercises and homeworks.</li> </ul>					
Continue to 物理工学演習 1 (宇) (2)					

物理工学演習 1 ( 宇 ) (2)

**[Textbooks]**

To be distributed at class.

**[References, etc.]**

( **Reference books** )

To be introduced during class.

**[Study outside of class (preparation and review)]**

Possibly will be given some homeworks, which requires submission of reports.

( **Other information (office hours, etc.)** )

For exercises during the class, writing tools, rulers, protractor, compasses, graph papers and a calculator.  
It is recommended to use laptop PC or tablet in which spread software like EXCEL is installed.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35055 SJ71 U-ENG25 35055 SJ77			
<b>Course title (and course title in English)</b>	物理工学演習 2 (工ネ) Exercise on Engineering Science 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor,KAWANABE HIROSHI Graduate School of Energy Science Professor,MATSUMOTO KAZUHIKO Graduate School of Energy Science Associate Professor,HORIBE NAOTO Graduate School of Energy Science Associate Professor,OGAWA TAKAYA Graduate School of Energy Science Associate Professor,KAWANISHI SAKIKO  Part-time Lecturer,HAYASHI KAZUHIRO Graduate School of Energy Science Senior Lecturer,KAWAI EMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
This class aims to help students to learn fundamental matters in the field of energy science acquire by solving exercises.					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
It is desirable that students learned the basis of each topic.					
Continue to 物理工学演習 2 (工ネ) (2)					

物理工学演習 2 (エネ) (2)

**[Evaluation methods and policy]**

Evaluation will be based on active participation and assignments.

**[Textbooks]**

Handout will be provided in each topic.

**[References, etc.]**

**( Reference books )**

Introduced during class

**[Study outside of class (preparation and review)]**

Students are supposed to study the contents of each topic before the course.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35055 SJ71 U-ENG25 35055 SJ77			
<b>Course title (and course title in English)</b>	物理工学演習 2 (原) Exercise on Engineering Science 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Assistant Professor, OGURE KENZOU Graduate School of Engineering Senior Lecturer, NARITA EMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.4,5	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Students will learn how to solve applied physical-mathematical problems through practical exercises. These problems appear in broad fields, including fluid thermal engineering, and are significant.					
<b>[Course objectives]</b>					
This course is designed to provide students with the mathematical background necessary for studying engineering science. Students will learn how to deal with boundary value problems, partial differential equations, and special functions. This is important for study, including fluid thermal engineering, in the future. In addition, students will learn the basics of statistical data analysis. This is important for identifying the physical mechanisms behind the observed data and for constructing statistical models that can approximately and phenomenologically replace the physical mechanisms in the future.					
<b>[Course schedule and contents]</b>					
Boundary value problems (5 classes): Initial-boundary-value problems like wave phenomena and thermal diffusion. Special functions (5 classes): Partial differential equations like Legendre differential equation and Bessel differential equation. Statistical data analysis (4 classes): Calculation of statistics and visualization. Statistical modeling. Feedback (1 class)					
<b>[Course requirements]</b>					
Calculus, Linear algebra					
<b>[Evaluation methods and policy]</b>					
Students will learn how to solve the problems and answer the exercises. The solutions will be submitted as a report through LMS. Grades will be based on the content of the reports, which will be graded on a 100-point scale.					
----- Continue to 物理工学演習 2 (原) (2)					

物理工学演習 2 (原) (2)

**[Textbooks]**

Texts will be distributed.

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Students will answer the exercises and submit the solutions as a report through LMS.

**( Other information (office hours, etc.) )**

Students can ask their questions during and after the lessons or by email.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35055 SJ71 U-ENG25 35055 SJ77			
<b>Course title (and course title in English)</b>	物理学演習 2 (宇) Exercise on Engineering Science 2		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer,NAKANISHI TOSHIYUKI Part-time Lecturer,FUJIWARA SATOSHI Part-time Lecturer,SASAKI ATSUSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Conduct lecture and exercise on aircraft and spacecraft design.					
<b>[Course objectives]</b>					
Understand the basis of aircraft/spacecraft systems and flight dynamics, and acquire a basic attitude toward aircraft/spacecraft design.					
<b>[Course schedule and contents]</b>					
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					
Continue to 物理学演習 2 (宇) (2)					

## 物理工学演習 2 ( 宇 ) (2)

- Engine performance  
Major performances of airplane
8. Aircraft - Airplane stability and controllability [1 week]  
Longitudinal stability and controllability  
Center of gravity limits  
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

\* As part of the class, students may take a tour of facilities outside the university related to aircraft/spacecraft.

### [Course requirements]

Assumes students understand the fundamentals of dynamics.

### [Evaluation methods and policy]

[Evaluation method]

Evaluation will be based on report (75%) and class performance (25%).

Evaluation for class performance includes the attendance at the class and the effort toward the exercise.

[Evaluation policy]

Evaluate the degree of understanding of aircraft/spacecraft systems and flight dynamics, and the degree of mastery of basic attitude toward aircraft/spacecraft design.

### [Textbooks]

Handouts will be distributed.

### [References, etc.]

( Reference books )

Introduced during class

### [Study outside of class (preparation and review)]

Students are likely to make reports outside of class time, which will be imposed during class.

### ( Other information (office hours, etc.) )

The contents and number of classes are subject to change depending on the situation.

\*Please visit KULASIS to find out about office hours.

Continue to 物理工学演習 2 ( 宇 ) (3)

物理工学演習 2 ( 宇 ) (3)

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35056 EJ71			
<b>Course title (and course title in English)</b>	機械システム工学実験 1 (機) Mechanical and System Engineering Laboratory 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN	
				Graduate School of Engineering Associate Professor, NAMURA KYOKO	
				Graduate School of Engineering Associate Professor, PILLAI, Abhishek Lakshman	
				Graduate School of Engineering Assistant Professor, GUO Yuting	
				Graduate School of Engineering Professor, TSUCHIYA TOSHIYUKI	
				Institute for Life and Medical Sciences Assistant Professor, Hironori Takeda	
				Graduate School of Informatics Assistant Professor, BANNO IKUMI	
				Graduate School of Engineering Assistant Professor, WAKABAYASHI HIDENOBU	
				Graduate School of Engineering Program-Specific Assistant Professor, Ma Cheng	
				Institute for Life and Medical Sciences Assistant Professor, MINEGISHI MISA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.4,5	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,2times, ,2times, ,2times, ,2times, ,2times, ,1time, ,1time, ,2times,					
Continue to 機械システム工学実験 1 (機) (2)					

機械システム工学実験 1 (機) (2)

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35056 EJ71			
<b>Course title (and course title in English)</b>	機械システム工学実験 1 (機) Mechanical and System Engineering Laboratory 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN	
				Graduate School of Engineering Associate Professor, NAMURA KYOKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	Graduate School of Engineering Associate Professor, PILLAI, Abhishek Lakshman
					Graduate School of Engineering Professor, TSUCHIYA TOSHIYUKI
<b>Days and periods</b>	Mon.4,5	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Graduate School of Informatics Assistant Professor, BANNO IKUMI
					Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
----- Continue to 機械システム工学実験 1 (機) (2) -----					

機械システム工学実験 1 (機) (2)

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35057 EJ71			
<b>Course title (and course title in English)</b>	機械システム工学実験 2 (機) Mechanical and System Engineering Laboratory 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN Graduate School of Engineering Associate Professor, NAMURA KYOKO Graduate School of Engineering Assistant Professor, Wataru MATSUNAGA Graduate School of Engineering Assistant Professor, WAKABAYASHI HIDENOBU Graduate School of Engineering Senior Lecturer, NAKANISHI HIROAKI Graduate School of Engineering Assistant Professor, SHIMOFURI MASAKI Institute for Life and Medical Sciences Assistant Professor, Kaneko Taikopaul Graduate School of Engineering Program-Specific Assistant Professor, MICHIKAWA RYOHEI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.4,5	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,2times, ,2times, ,2times, ,2times, ,2times, ,1time, ,1time, ,2times,					
<b>[Course requirements]</b>					
None					
----- 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 2 (機) (2)

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

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**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35057 EJ71			
<b>Course title (and course title in English)</b>	機械システム工学実験 2 (機) Mechanical and System Engineering Laboratory 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN Graduate School of Engineering Associate Professor, NAMURA KYOKO Graduate School of Engineering Assistant Professor, Wataru MATSUNAGA Graduate School of Engineering Assistant Professor, WAKABAYASHI HIDENOBU Graduate School of Engineering Senior Lecturer, NAKANISHI HIROAKI Graduate School of Engineering Assistant Professor, SHIMOFURI MASAKI Institute for Life and Medical Sciences Assistant Professor, Kaneko Taikopaul Graduate School of Engineering Program-Specific Assistant Professor, MICHIKAWA RYOHEI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.1,2	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
None					
----- 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 2 (機) (2)

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

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**[Courses delivered by instructors with practical work experience]**

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**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35058 EJ71			
<b>Course title (and course title in English)</b>	機械システム工学実験 3 (機) Mechanical and System Engineering Laboratory 3		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN Graduate School of Engineering Associate Professor, NAMURA KYOKO Graduate School of Engineering Assistant Professor, Susumu Minami Graduate School of Engineering Program-Specific Assistant Professor, Jike Han Graduate School of Informatics Assistant Professor, KATO SHOTA Graduate School of Engineering Assistant Professor, Satomi Matsumoto Graduate School of Engineering Assistant Professor, MORIKAWA KENTARO Graduate School of Engineering Assistant Professor, Yinli Wang	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.4,5	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,14times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
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 3 (機) (2)

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

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**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35058 EJ71				
<b>Course title (and course title in English)</b>	機械システム工学実験 3 (機) Mechanical and System Engineering Laboratory 3		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, HIROTANI JUN Graduate School of Engineering Associate Professor, NAMURA KYOKO Graduate School of Engineering Assistant Professor, Susumu Minami Graduate School of Informatics Assistant Professor, KATO SHOTA Graduate School of Engineering Assistant Professor, Satomi Matsumoto Graduate School of Engineering Assistant Professor, MORIKAWA KENTARO Graduate School of Engineering Assistant Professor, Yinli Wang		
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester	
<b>Days and periods</b>	Thu.4,5	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese	
<b>[Overview and purpose of the course]</b>						
<b>[Course objectives]</b>						
<b>[Course schedule and contents]</b>						
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation, 1time, Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>						
<b>[Course requirements]</b>						
None						
----- 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 3 (機) (2)

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35059 SJ71			
<b>Course title (and course title in English)</b>	機械設計演習 1 (機) Exercise of Machine Design 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI	
				Graduate School of Engineering Associate Professor,NAKAJIMA KAORU	
				Graduate School of Engineering Associate Professor,FUJIMOTO KAZUYA	
				Part-time Lecturer,Akai Kazuki	
				Part-time Lecturer,ISOME YUKA	
				Part-time Lecturer,Nishimura Kosuke	
				Part-time Lecturer,Morishima Akichika	
				Part-time Lecturer,MORIMOTO TAKASHI	
				Part-time Lecturer,FUKUDA AKINORI	
				Part-time Lecturer,NAKAZAWA MANAMI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.4,5,Fri.4,5	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,4times, ,3times, ,-times, ,21times, ,21times, ,21times, ,2times,					
Continue to 機械設計演習 1 (機) (2)					

**機械設計演習 1 (機) (2)**

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35059 SJ71			
<b>Course title (and course title in English)</b>	機械設計演習 1 (機) Exercise of Machine Design 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI	
				Graduate School of Engineering Associate Professor,SHIKAMA TAIICHI	
		Graduate School of Informatics Senior Lecturer,EGUCHI KANA		Part-time Lecturer,FUKUOKA TOMOYUKI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.4,5,Thu.4,5	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
----- Continue to 機械設計演習 1 (機) (2) -----					

機械設計演習 1 (機) (2)

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35059 SJ71				
<b>Course title (and course title in English)</b>	機械設計演習 1 (機) Exercise of Machine Design 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI Graduate School of Engineering Associate Professor,MATSUMOTO MITSUHIRO Graduate School of Engineering Senior Lecturer,NAKANISHI HIROAKI  Part-time Lecturer,YAMAMURA SHINYA  Part-time Lecturer,KIBA HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.4,5,Fri.4,5	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
----- Continue to 機械設計演習 1 (機) (2)					

**機械設計演習 1 (機) (2)**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35060 SJ71				
<b>Course title (and course title in English)</b>	機械設計演習 2 (機) Exercise of Machine Design 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KOMORI MASAHARU Graduate School of Engineering Professor, HIRAYAMA TOMOKO Graduate School of Engineering Associate Professor, KOUNO DAISUKE Part-time Lecturer, KANEDA SHUICHI Part-time Lecturer, YUKAWA SHINJIRO		
	<b>Target year</b>	3rd year students or above		<b>Number of credits</b>	2	<b>Year/semesters</b>
<b>Days and periods</b>	Mon.1,2,3,4	<b>Class style</b>	Seminar (Face-to-face course)		<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>						
<p>In this exercise, students will learn that design is essentially the process of defining product specifications by clarifying the concept of a product business and deriving its objectives, background, and relevant constraints. The goal of this exercise is to help students understand the interest and integrative nature of design. Students will also learn efficient methods for conducting design work.</p> <p>This exercise is based on team-oriented activities. All tasks including conceptualization, examination, design, preparation, and presentation are carried out in teams. Through this process, students will experience the significance of working as a team rather than as individuals, and will develop leadership and communication skills.</p> <p>Furthermore, by repeatedly conducting presentations and reviews, students will acquire the ability to clearly communicate their ideas to others, identify insufficiently examined aspects of their own designs, and experience the effectiveness of the review process.</p> <p>Exercises using three-dimensional CAD (3D CAD) will be conducted. Through hands-on experience, students will deepen their understanding of effective ways to use 3D CAD for efficient design.</p>						
<b>[Course objectives]</b>						
Students will acquire the ability to understand and practice the essence of design, efficient design methodologies, and the effectiveness of team-based activities.						
<b>[Course schedule and contents]</b>						
<p>Students will conduct the design of a mechanical system.</p> <p>Product Planning (1 week): Students consider the design objectives and express them in the form of a product concept.</p> <p>Development of Design Specifications (3 weeks): Objectives and concepts are expressed using concrete metrics, and the target design is defined as specifically as possible.</p>						
						Continue to 機械設計演習 2 (機) (2)

## 機械設計演習 2 (機) (2)

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### Conceptual Design and Detailed Design (4 weeks):

Students consider what is required to realize the defined specifications and examine concrete methods to achieve them.

### Design Process Using 3D CAD (2 weeks):

Before prototyping, students verify whether the proposed design satisfies the specifications. Structural strength and functional issues are evaluated using computer-based analysis.

### Manufacturing (3 weeks):

The designed product is fabricated, and potential problems are identified and evaluated.

### Review and Presentation (1 week):

Students develop skills for communicating their ideas to others and clarify unexamined aspects of their designs through reviews.

### Assessment of Learning Outcomes (1 week):

The level of achievement regarding the content of this exercise is evaluated.

### [Course requirements]

None

### [Evaluation methods and policy]

Evaluation is based on class participation and presentations.

Class participation accounts for approximately 80% of the final grade, and presentations account for approximately 20%.

Class participation is evaluated based on involvement in team activities and submitted materials (such as records of team activities and 3D CAD files).

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

Instructions will be provided at the start of the exercise, and materials will be distributed as necessary.

### [Study outside of class (preparation and review)]

Students are expected to take this exercise while reviewing the content of Design Engineering I and Design Engineering II.

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Continue to 機械設計演習 2 (機) (3)

## 機械設計演習 2 (機) (3)

### ( Other information (office hours, etc.) )

As enrollment may be limited, students should plan their course registration accordingly. This exercise involves team-based activities, and withdrawing partway through the course may cause problems for team members. Students are therefore required to attend all sessions from beginning to end.

Information regarding student recruitment is usually posted around June or July, and applications are accepted at that time. The application deadline is typically in July; students should pay careful attention to announcements.

For details on office hours, please check KULASIS.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25061 PJ71				
<b>Course title (and course title in English)</b>	機械製作実習 (機) Exercise for Machine Shop Practice			<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor,KOUNO DAISUKE	
					Graduate School of Engineering Professor,NISHIWAKI SHINJI	
					Graduate School of Engineering Associate Professor,KURIYAMA REIKO	
					Institute for Life and Medical Sciences Assistant Professor,Hironori Takeda	
					Graduate School of Engineering Associate Professor,ADACHI MASATO	
					Graduate School of Engineering Program-Specific Assistant Professor,Jike Han	
					Graduate School of Informatics Assistant Professor,KATO SHOTA	
					Graduate School of Engineering Assistant Professor,Wataru MATSUNAGA	
					Graduate School of Engineering Assistant Professor,GUO Yuting	
					Graduate School of Engineering Assistant Professor,Yinli Wang	
					Part-time Lecturer,Ryuei HAKAMATA	
					Part-time Lecturer,YUKAWA SHINJIRO	
					Part-time Lecturer,KUSUURA TAKAHISA	
<b>Target year</b>	2nd year students or above		<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.5	<b>Class style</b>	Practical training (Face-to-face course)		<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>						
In this exercise, students will acquire comprehensive knowledge and hands-on experience related to manufacturing and production engineering.						
This exercise consists of the following three components:						
(1) Practical training in parts machining and machine assembly using various machine tools						
(2) Lectures delivered by specialists involved in manufacturing						
(3) Factory visits						
(1) The practical training will be conducted intensively over one week between August and September in the Machine Shop at Katsura Campus. The main activity will be the fabrication of components for a smartphone stand, followed by assembly work. In addition, students will assemble and disassemble a commercially available engine in order to acquire disassembly and assembly techniques and to deepen their understanding of machine elements and systems.						
(2) In the lecture component, faculty members or engineers who have been engaged in design, manufacturing, management, and related activities at machine manufacturers will be invited as guest lecturers. They will give						
----- <b>Continue to 機械製作実習 (機) (2)</b>						

## 機械製作実習（機）(2)

lectures on real-world examples of machine development, mechanical engineering knowledge required in industrial settings, and safety engineering.

(3) During the factory visits, students will tour manufacturers' facilities and learn about actual manufacturing practices in society.

### [Course objectives]

Through experience in fundamental machining processes such as turning, milling, and drilling, students will acquire basic knowledge and skills related to machine tools, machining methods, cutting tools, measurement, machining accuracy, and safe working practices, as well as knowledge of advanced machining technologies.

Through engine assembly and disassembly, students will acquire fundamental techniques for machine assembly and disassembly.

Students will understand the definition of safe mechanical systems and methods for constructing such systems.

Through factory visits, students will understand real-world manufacturing practices and their relationship to academic coursework.

Through special lectures by external instructors, students will understand practical examples of machine development and the mechanical engineering skills required in industry.

### [Course schedule and contents]

Lecture on Machine Tools: 1 session (1 hour, July)

Basic knowledge necessary for the safe use of machine tools employed in this exercise (lathe, milling machine, drill press) will be explained.

Smartphone Stand Manufacturing Practice: 2 sessions (12 hours in total, August-September)

Students will practice the fabrication of cylindrical parts using a lathe, plate parts using a milling machine, hole drilling and thread cutting using a drill press and taps, as well as assembly and finishing.

Engine Assembly and Disassembly: 1 session (6 hours, August-September)

Through the assembly and disassembly of a commercially available diesel engine, students will understand the fundamentals of engine mechanisms and principles of machine assembly.

Integrated Learning: 1 session (3 hours, August-September)

By observing actual machine tools and learning through videos, students will understand the latest trends in production technologies.

Introduction to Safety Engineering: 1 session (3 hours, August-September)

Mechanisms of industrial accidents and accident prevention technologies will be discussed through case studies, including falling accidents, malfunctions and operational errors in crane operations, and system safety in process industries, followed by discussion.

Planned Lecturer:

Continue to 機械製作実習（機）(3)

## 機械製作実習（機）(3)

Sato R&D Co., Ltd. #8211 Mr. Kunihito Sato

Manufacturing Seminar: 3 sessions (1.5 hours each, second semester)

Mechanical engineers engaged in design, manufacturing, and management at machine manufacturers will be invited to give lectures on real-world examples of machine development and the mechanical engineering knowledge required in industry.

Planned Lecturers:

Okuma Corporation #8211 Mr. Ryuei Hakamata

Office YUKAWA #8211 Mr. Shinjiro Yukawa

TechnoProducer Co., Ltd. #8211 Mr. Takahiro Kusuura

(One additional lecturer may be added.)

Factory Visit: 1 session (approximately 4-5 hours, planned for June 18, the university anniversary)

Students will visit a manufacturer ' s factory in the Kansai region to learn about real-world manufacturing practices in society.

### [Course requirements]

It is desirable that students review the content of machine design and manufacturing in advance.

### [Evaluation methods and policy]

Students will be evaluated based on reports and submitted assignments.

In principle, attendance at all practical sessions, factory visits, and lectures included in this exercise, as well as submission of all reports, is required to earn course credit.

As many activities involve group work and site visits where individual behavior affects others, unexcused absences or tardiness due to personal reasons will be dealt with strictly throughout this exercise.

### [Textbooks]

Text materials and, when necessary, pre-study materials will be distributed.

### [References, etc.]

( Reference books )

None.

( Related URLs )

(None.)

### [Study outside of class (preparation and review)]

Post-exercise study is required for report preparation.

Instructional materials may be distributed, and pre-exercise preparation may be required.

Continue to 機械製作実習（機）(4)

## 機械製作実習（機）(4)

### ( Other information (office hours, etc.) )

An orientation for second-year students in the Mechanical Systems Engineering Course will be held in April to explain the overview of this exercise. Detailed schedules for the practical training will be announced at that time.

Many components of this exercise, such as the smartphone stand manufacturing practice (one week per student) and the safety engineering lecture (3 hours), are conducted intensively during the summer vacation. As individual scheduling adjustments cannot be accommodated, students should ensure that there are no conflicts with personal commitments when enrolling. Information for prospective students, including group assignments and guidance announcements, will be provided primarily through LMS; students are required to check it regularly.

Guidance is usually conducted around July. Students who do not attend this guidance session without prior notice will not be permitted to enroll in this exercise, as it includes essential lectures on machine tools, safety precautions, and appropriate work clothing for safe operation. Students should pay close attention to announcements on LMS.

For details on office hours, please check KULASIS.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35062 SJ75				
<b>Course title (and course title in English)</b>	材料科学実験および演習 1 (材) Materials Science Laboratory and Exercise 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,TABATA YOSHIKAZU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	3	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.3,4,Thu.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,6times, ,6times, ,6times, ,6times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 35063 SJ75				
<b>Course title (and course title in English)</b>	材料科学実験および演習 2 (材) Materials Science Laboratory and Exercise 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,TABATA YOSHIKAZU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	3	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.3,4,Thu.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,6times, ,6times, ,6times, ,6times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>		U-ENG25 35066 EJ77			
<b>Course title (and course title in English)</b>	航空宇宙工学実験 1 (宇) Engineering Laboratory in Aeronautics and Astronautics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,TAKATA SHIGERU Graduate School of Engineering Professor,SENDA KEI Graduate School of Engineering Assistant Professor,HATTORI MASANARI Graduate School of Engineering Assistant Professor,ISHII YOSUKE	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	1	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.3,4	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,4times, ,4times, ,4times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 航空宇宙工学実験 1 (宇) (2) -----					

航空宇宙工学実験 1 ( 宇 ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35067 EJ77			
<b>Course title (and course title in English)</b>	航空宇宙工学実験 2 ( 宇 ) Engineering Laboratory in Aeronautics and Astronautics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,TAKATA SHIGERU Graduate School of Engineering Associate Professor,URABE KEIICHIRO Graduate School of Engineering Associate Professor,MARUTA ICHIROU Graduate School of Engineering Senior Lecturer,SUGIMOTO HIROSHI	
	<b>Target year</b>	3rd year students or above		<b>Number of credits</b>	1
<b>Days and periods</b>	Tue.3,4	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,4times, ,4times, ,4times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 航空宇宙工学実験 2 ( 宇 ) (2) -----					

航空宇宙工学実験 2 ( 宇 ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35069 LJ75				
<b>Course title (and course title in English)</b>	金属材料学 (材) Structural Metallic Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TSUJI NOBUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
Outline of Lecture,1time, Microstructure Evolution in Cast Alloys,2times, Deformation, Recovery, Recrystallization and Grain Growth,3times, ,3times, Heat Treatment in Steels,5times, Summary,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Attendance, exercises, home-works and exam.					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 金属材料学 (材) (2)					

金属材料学 (材) (2)

( Related URLs )

(<http://www.tsujilab.mtl.kyoto-u.ac.jp/01TsujiLab/Education/StructMetalMater/>)

[Study outside of class (preparation and review)]

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

[Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35070 LJ75				
<b>Course title (and course title in English)</b>	材料強度物性 (材) Physics of Strength of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KISHIDA KIYOUSUKE	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
(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 boundaies and crystal plasticity of polycrystals [1 week] (7) Feedback [1 week]					
<b>[Course requirements]</b>					
Physics of Crystal Properties and Imperfections					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on a written examination. Daily reports may be considered in grading determination.					
<b>[Textbooks]</b>					
Hand out materials will be provided during the lecture.					
<b>[References, etc.]</b>					
( <b>Reference books</b> ) 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 P.M. Anderson, J.P. Hirth and J. Lothe 『Theory of Dislocations, 3rd ed.』 ( Cambridge University Press, Continue to 材料強度物性 (材) (2)					

## 材料強度物性（材）(2)

2017 ) ISBN:0521864364

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』 (内田老鶴園) ISBN:978-4-7536-5090-3

### [Study outside of class (preparation and review)]

To review contents covered in the previous lecture.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

### [Essential courses]

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 45071 LJ71				
<b>Course title (and course title in English)</b>	固体物性学 (機) Physics of Solids	<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, NAKAJIMA KAORU		
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 固体物性学 (機) (2)					

**固体物性学（機）(2)**

**[References, etc.]**

**( Reference books )**

quotIntroduction to solid state physicsquot by Charles Kittel isbn{{9780471415268}, international ed. isbn{{0471680575}}

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 45073 LJ75 U-ENG25 45073 LJ57 U-ENG25 45073 LJ71				
<b>Course title (and course title in English)</b>	統計熱力学 Statistical Thermodynamics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, MATSUMOTO MITSUHIRO Graduate School of Engineering Professor, INOUE YASUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
<ul style="list-style-type: none"> <li>- Understanding the relation between macroscopic variables and microscopic states.</li> <li>- Scientific view of various phenomena in science and engineering based on statistics.</li> </ul>					
<b>[Course schedule and contents]</b>					
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-8th weeks: Quantum statistics (Bose-Einstein vs. Fermi-Dirac) 9th-10th weeks: Introduction to solid state physics 11th week: Photons and phonons 12th week: Polymer and other classical systems 13th week: Application to informatics 14th week: Examination 15th week: Feedback class					
<b>[Course requirements]</b>					
Basic knowledge of thermodynamics, calculus, statistics, analytical mechanics, and quantum physics will be useful.					
<b>[Evaluation methods and policy]</b>					
<ul style="list-style-type: none"> <li>- Written examination</li> <li>- Paper assignment</li> </ul>					
Continue to 統計熱力学(2)					

## 統計熱力学(2)

### [Textbooks]

Lecture notes will be provided.

### [References, etc.]

#### ( Reference books )

Introduced during class

### [Study outside 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.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45073 LJ75 U-ENG25 45073 LJ57 U-ENG25 45073 LJ71				
<b>Course title (and course title in English)</b>	統計熱力学 (材工ネ) Statistical Thermodynamics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
The goals of this lecture are both to understand fundamental idea of Statistical Thermodynamics and to study typical applications to condensed matter physics.					
<b>[Course schedule and contents]</b>					
<p>Outlines, 1time, Basic ideas of Statistical Thermodynamics, thermal equilibrium, fundamentals of Statistics, means of measurements, ergodic theory.</p> <p>Thermodynamic functions, 1time, Thermodynamic laws, thermodynamic functions, Legendre transform, Maxwell relations, Gibbs-Helmholtz equation, thermodynamic variation, phase equilibrium.</p> <p>Ideal systems, 4times, Phase space of movement, Liouville's theorem, micro canonical ensemble, Partition function, relation between Helmholtz free energy and Partition function, Principle of Boltzmann, simple applications of microcanonical ensemble (ideal gas, elastic of gum)</p> <p>, 1time,</p> <p>Canonical ensemble, 2times, Distribution with the maximum probability, Partition function, the 3rd law of thermodynamics, Gibbs's paradox, grand canonical ensemble.</p> <p>Quantum statistics, 2times, Grand canonical ensemble of quantum statistics, Fermion and Boson, Bose-Einstein statistics, Fermi-Dirac statistics, ideal Fermi gas, electron specific heat, ideal Bose gas, Bose-Einstein condensation.</p> <p>Typical applications, 4times, Systems with two levels, Schottky type specific heat, Statistics of photons, Planck's equation, one dimensional harmonic oscillation, Einstein model and specific heat of solid states.</p> <p>Evaluation of goals, 1time, Understanding of typical applications of statistical thermodynamics and submission of homeworks.</p>					
<b>[Course requirements]</b>					
Students are roughly expected to have mastered basics of mathematics, dynamics, elementary quantum mechanics, thermodynamics and statistics.					
----- Continue to 統計熱力学 (材工ネ) (2) -----					

## 統計熱力学 (材エネ) (2)

### [Evaluation methods and policy]

Situation of voluntary submission of some reports and score of exam are totally evaluated.

### [Textbooks]

The textbook is not appointed. Writing on the blackboard is performed in every lecture.

### [References, etc.]

#### ( Reference books )

- 1 . 原島 鮮 : 「熱力学・統計力学」培風館, isbn{{9784563021399}}
- 2 . N.スミス (小林宏・岩橋槇夫訳) : 「統計熱力学入門 - 演習によるアプローチ - 」東京化学同人, isbn{{4807903225}}
- 3 . 市村 浩 : 「統計力学」裳華房, isbn{{4785321342}}
- 4 . 市村 浩 : 「熱学演習 統計力学」裳華房, isbn{{4785321350}}
- 5 . キッテル : 「熱物理学」丸善, isbn{{9784621027271}}
- 6 . 沼居貴陽 : 「熱物理学・統計物理学演習」丸善, isbn{{4621048570}}
- 7 . W.グライナー, L.ナイゼ, H.シュテッカー (伊藤伸泰, 青木圭子訳) : 「熱力学・統計力学」シュプリンガー, isbn{{9784431100577}}
- 8 . 久保亮五 : 「ゴム弾性」裳華房 isbn{{478532807X}}

### [Study outside of class (preparation and review)]

#### ( Other information (office hours, etc.) )

2nd year students may understand this lecture if they catch on basics of physics.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45087 LJ71				
<b>Course title (and course title in English)</b>	品質管理 Quality Control	<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI Graduate School of Engineering Professor,IZUI KAZUHIRO Part-time Lecturer,Kikkawa Toyotsugu		
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course deals with the basics of quality control methodologies and reliability engineering techniques.					
<b>[Course objectives]</b>					
The goal is to understand the concept of numerical and strategic approaches of quality control techniques.					
<b>[Course schedule and contents]</b>					
Introduction,1time, Statistics and hypothesis testing,2times, Statistical process control,2times, Design of experiments,2times, Analysis of variance,2times, Application of design of experiments,2times, Reliability,4times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
The regular examination, in-class examinations and reports are taken into account.					
<b>[Textbooks]</b>					
Not used					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
Homework problems are assigned.					
( Other information (office hours, etc.) )					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>		U-ENG25 35096 LJ57 U-ENG25 35096 LJ68			
<b>Course title (and course title in English)</b>	生物物理学 Molecular Biophysics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU Institute for Integrated Radiation and Nuclear Science Professor, TANAKA HIROKI Institute for Integrated Radiation and Nuclear Science Associate Professor, SAKURAI YOSHINORI Institute for Integrated Radiation and Nuclear Science Assistant Professor, TAKATA, Takushi Institute for Integrated Radiation and Nuclear Science Assistant Professor, Kondo Natsuko Institute for Integrated Radiation and Nuclear Science Assistant Professor, SANADA YU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,2times, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time, ,1time,					
<b>[Course requirements]</b>					
None					
----- Continue to 生物物理学(2) -----					

生物物理学(2)

[Evaluation methods and policy]

[Textbooks]

[References, etc.]

( Reference books )

[Study outside of class (preparation and review)]

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

[Essential courses]

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 45099 LJ71			
<b>Course title (and course title in English)</b>	精密加工学 (機) Precision Machining		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor,KOUNO DAISUKE Graduate School of Engineering Professor,HIRAYAMA TOMOKO Graduate School of Engineering Associate Professor,ADACHI MASATO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>This course explains the concept of accuracy required for functional components, as well as methods for measurement and machining to achieve such accuracy. Particular emphasis is placed on precision measurement techniques related to machining processes, machine tools, and surface characteristics of components.</p> <p>In addition, advanced and specialized manufacturing methods, such as Additive Manufacturing, are introduced. Through exercises, web-based learning, and discussions, students will learn how to apply the content covered in this course.</p>					
<b>[Course objectives]</b>					
<p>Students will understand the fundamentals of material removal processes, various measurement techniques, and machine tools that form the basis of precision machining.</p> <p>Students will understand the relationship between machining and measurement and will be able to explain the mechanisms of precision machining processes.</p>					
<b>[Course schedule and contents]</b>					
(Instructors: Hirayama, Adachi)					
<p>1. Accuracy and Measurement (1 session): An overview of the accuracy required for components and methods for measuring it.</p> <p>2. Overview of Material Removal Processes (1 session): An outline of machining processes as a whole, with a focus on polishing processes.</p> <p>3. Relationship Between Surface Characteristics and Mechanical Performance (1 session): Surface characteristics and the properties of contact and sliding components.</p> <p>4. Precision Measurement of Surface Characteristics (1 session): Principles of various microscopes and instruments used for measuring surface characteristics.</p> <p>5#82117. Precision Measurement Exercises (3 sessions): Practical precision measurement of surface characteristics. Results obtained using different methods are compared to understand their features and differences.</p>					
----- <b>Continue to 精密加工学 (機) (2)</b>					

## 精密加工学（機）(2)

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(Instructor: Kono)

### 8. Machining and Measurement (1 session):

Principles of improving machining accuracy based on measurement.

### 9. Cutting Processes (1 session):

Fundamentals of cutting processes.

### 10#821112. Machine Tools (3 sessions):

Basic structures, components, and motion accuracy of machine tools.

### 13. Additive Manufacturing (1 session):

Principles and applications of Additive Manufacturing.

### 14. Various Machining Methods (1 session):

Explanation of machining methods not covered in other sessions, such as electrical discharge machining and beam machining.

### 15. Summary and Feedback (1 session)

## [Course requirements]

Knowledge of machine design and manufacturing is required.

It is desirable that students have taken Machine Shop Practice or an equivalent practical course.

## [Evaluation methods and policy]

Evaluation consists of two parts:

First half: 50 points (reports)

Second half: 50 points (reports)

In addition to summary reports for the first and second halves of the course, reports may be assigned during individual classes. Reports are evaluated based on the degree of achievement of the learning outcomes.

## [Textbooks]

Not used

## [References, etc.]

### ( Reference books )

Introduced during class

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Continue to 精密加工学（機）(3)

精密加工学（機）(3)

**[Study outside of class (preparation and review)]**

Students are required to review the materials distributed after each lecture.  
To deepen understanding, students should also complete the assignments given during class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35102 LJ75			
<b>Course title (and course title in English)</b>	材料電気化学 (材) Electrochemistry of Materials Processing		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, MURASE KUNIAKI Graduate School of Engineering Professor, FUKAMI KAZUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
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 the 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.					
----- Continue to 材料電気化学 (材) (2)					

## 材料電気化学 (材) (2)

### [Course requirements]

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

### [Evaluation methods and policy]

(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.

### [Textbooks]

A course booklet written in Japanese will be given out at the first lecture.

### [References, etc.]

( Reference books )

### [Study outside of class (preparation and review)]

Reports given in the lectures will return after checking.  
Brush up according to the reports returned.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45107 SJ57 U-ENG25 45107 SJ28 U-ENG25 45107 SJ77			
<b>Course title (and course title in English)</b>	原子炉基礎演習・実験（原） Basic Nuclear Reactor Exercise and Experiments		<b>Instructor's name, job title, and department of affiliation</b>	Institute for Integrated Radiation and Nuclear Science Associate Professor, YASUNORI KITAMURA Institute for Integrated Radiation and Nuclear Science Professor, UNESAKI HIRONOBU Institute for Integrated Radiation and Nuclear Science Associate Professor, PIYON CHIYORUHO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.3,4	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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).					
<b>[Course objectives]</b>					
Understanding nuclear characteristics and safety system of nuclear reactor through reactor physics experiments					
<b>[Course schedule and contents]</b>					
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 caribration experiment 4) neutron flux measurement experiment 5) operation of nuclear reactor					
<b>[Course requirements]</b>					
Basic knowledge about reactor physic					
<b>[Evaluation methods and policy]</b>					
reports before and after experiments					
<b>[Textbooks]</b>					
Korean version is available					
<b>[References, etc.]</b>					
( Reference books ) Introduced during class					
----- Continue to 原子炉基礎演習・実験（原）(2) -----					

原子炉基礎演習・実験(原)(2)

**[Study outside of class (preparation and review)]**

Before experiment, several reports related to reactor physics should be submitted.

**( Other information (office hours, etc.) )**

English course for this experiment is opened.

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 15110 LJ77 U-ENG25 15110 LJ71				
<b>Course title (and course title in English)</b>	物理工学総論 A Introduction to Engineering Science A			<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,HIRAYAMA TOMOKO	
					Graduate School of Engineering Professor,SHIMADA TAKAHIRO	
<b>Target year</b>		1st year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese	
<b>[Overview and purpose of the course]</b>						
<b>[Course objectives]</b>						
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Continue to 物理工学総論 A (2)						

物理工学総論 A (2)

**[Course schedule and contents]**

,10times,  
,4times,  
,1time,

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 15111 LJ77 U-ENG25 15111 LJ75 U-ENG25 15111 LJ28			
<b>Course title (and course title in English)</b>	物理工学総論 B Introduction to Engineering Science B		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TSUJI NOBUHIRO	
				Graduate School of Engineering Professor, UDA TETSUYA	
				Graduate School of Engineering Professor, MURASE KUNIAKI	
				Graduate School of Engineering Associate Professor, ICHII TAKASHI	
				Graduate School of Engineering Associate Professor, YUGE KORETAKA	
				Graduate School of Energy Science Professor, MIYAKE MASAO	
				Graduate School of Energy Science Associate Professor, IKENOUE TAKUMI	
				Graduate School of Engineering Senior Lecturer, NARITA EMI	
				Graduate School of Engineering Professor, SAITOU MANABU	
				Graduate School of Engineering Professor, SASAKI TAKAYUKI	
				Graduate School of Engineering Professor, HINOKI TATSUYA	
<b>Target year</b>	1st year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.5	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,5times, ,4times, ,4times, ,1time,					
Continue to 物理工学総論 B (2)					

物理工学総論 B (2)

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35115 LJ72 U-ENG25 35115 LJ53			
<b>Course title (and course title in English)</b>	加速器工学 (原) Particle Accelerators		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,3times, ,2times, ,2times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 加速器工学 (原) (2)					

加速器工学 (原) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35116 LJ60 U-ENG25 35116 LJ77			
<b>Course title (and course title in English)</b>	放射化学 (工ネ原) Radiochemistry		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SASAKI TAKAYUKI Graduate School of Engineering Associate Professor,TAISHI KOBAYASHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Lectures on the use of radionuclides, recycling of spent fuel and disposal of radioactive waste, physicochemical fundamentals related to the reactivity of radioactive materials, and essential analytical methods for material state analysis.					
<b>[Course objectives]</b>					
The course objective is to develop an understanding of the physicochemical properties and reactivity of radioactive materials, and to learn the latest research and engineering applications based on these principles.					
<b>[Course schedule and contents]</b>					
The main contents of each class session are as follows:					
<ol style="list-style-type: none"> <li>1) Atoms, nuclei, and isotopes</li> <li>2) Mass, decay and half-life, radiation equilibrium</li> <li>3) Nuclide, Dating, Tracer Chemistry</li> <li>4) Dilution analysis, NAA, Cross section, Applied use (analysis, source)</li> <li>5-6) Nuclear Fuel Cycle (Cycle Engineering: Nuclear Fuel, Refining, Compounding)</li> <li>7) Outline of Geological Disposal (Advection Dispersion Diffusion,Chemical Equilibrium)</li> <li>8) Actinide Chemistry (Analysis, Spectroscopy)</li> <li>9) Environmental Radioactivity</li> <li>10-11)Chemical Thermodynamics(complexation,solubility)</li> <li>12) Electrochemistry (redox, electric double layer)</li> <li>13) Reprocessing (extraction equilibrium, extractant, countercurrent distribution)</li> <li>14) Waste treatment (ion exchange reaction, membrane equilibrium)</li> <li>15) Feedback; confirmation of learning achievement</li> </ol>					
<b>[Course requirements]</b>					
N/A					
----- Continue to 放射化学 (工ネ原) (2)					

## 放射化学 (工ネ原) (2)

### [Evaluation methods and policy]

Grading is based on the score of the periodic evaluations. Students will be evaluated based on their demonstrated understanding of the physicochemical properties and reactivity of radioactive materials and the engineering processes involved.

### [Textbooks]

Other materials are not specified. Handouts, etc. will be distributed during lectures.

### [References, etc.]

#### ( Reference books )

Other, Radiochemistry and Nuclear Chemistry, 4th ed., G. R. Choppin et al., Elsevier (2013) isbn{9780124058972};

Nuclear Chemical Engineering, 2nd Ed., M. Benedict et al., McGraw-Hill (1981) isbn{0070045313}, etc.

### [Study outside of class (preparation and review)]

Focusing on reviewing lecture content and exercises is advisable.

### ( Other information (office hours, etc.) )

Attend as needed. Some materials may be omitted or added depending on the number of classes in the relevant year.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35118 LJ75				
<b>Course title (and course title in English)</b>	エネルギー・材料熱化学 1 (材エネ) Thermochemistry for Energy and Materials Science 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, HASEGAWA MASAKATSU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course will provide fundamentals of thermochemistry, which will be necessary to think about environmental-friendly materials production / recycling processes.					
<b>[Course objectives]</b>					
Students will be able to calculate thermochemical properties of pure substances, mixtures and solutions, and use phase diagrams.					
<b>[Course schedule and contents]</b>					
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)					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Results are evaluated by a term-end examination. However, there are cases where the results of the quizzes in the lectures are considered.					
<b>[Textbooks]</b>					
Instructed during class					
<b>[References, etc.]</b>					
( <b>Reference books</b> ) 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					
----- Continue to エネルギー・材料熱化学 1 (材エネ) (2)					

エネルギー・材料熱化学 1 (材エネ) (2)

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**( Related URLs )**

<http://www.lupin.mtl.kyoto-u.ac.jp/class.html>

**[Study outside of class (preparation and review)]**

In order to be useful for review, quizzes submitted will be returned after checking.

**( Other information (office hours, etc.) )**

Please bring a scientific calculator and a ruler.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35119 LJ75				
<b>Course title (and course title in English)</b>	エネルギー・材料熱化学2 (材エネ) Thermochemistry for Energy and Materials Science 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, HASEGAWA MASAKATSU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course will provide fundamentals of thermochemistry, which will be necessary to think about environmental-friendly materials production / recycling processes.					
<b>[Course objectives]</b>					
Students will be able to calculate thermochemical properties of pure substances, mixtures and solutions, and use phase diagrams.					
<b>[Course schedule and contents]</b>					
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)					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Results are evaluated by a term-end examination. However, there are cases where the results of the quizzes in the lectures are considered.					
Continue to エネルギー・材料熱化学2 (材エネ) (2)					

エネルギー・材料熱化学2 (材エネ) (2)

**[Textbooks]**

Instructed during class

**[References, 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>

**[Study outside of class (preparation and review)]**

In order to be useful for review, quizzes submitted will be returned after checking.

( **Other information (office hours, etc.)** )

Please bring a scientific calculator and a ruler.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35121 LJ75				
<b>Course title (and course title in English)</b>	固体電子論 (材) Electon Theory of Solids		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, KUROKAWA SHIYUU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>This course focuses on the electron theory of solids and its applications. First, we review the concept of energy bands and the basics of band theory. Next, we discuss the fact that the electronic properties of solids such as metals and semiconductors can be explained by thinking in terms of band structure. Next, we gain an understanding of semiconductor properties based on information about bands. We also discuss the main structural characteristics of actual electronic devices such as p-n junctions. Finally, we explain the electronic states and electronic defect states of surfaces/interfaces with interrupted solid periodic potential.</p>					
<b>[Course objectives]</b>					
<p>Understand concepts that are important in discussing electrons in solids (refer to syllabus). Understand general information concerning the electronic properties of metal and semiconductors.</p>					
<b>[Course schedule and contents]</b>					
<p>Energy bands, 4 classes: Review free electron theory, the influence of periodic potential, the occurrence of energy gaps, Bloch ' s theorem, one-dimensional energy bands, reduced zones, expanded zones, periodic zone schemes, reciprocal lattices and Brillouin zones.</p> <p>Fermi surfaces and band structure of metal, 3 classes: Three-dimensional lattice Fermi surfaces and energy band diagrams, differences between metal and insulators, band structure of metal, rigid band model, Hume-Rothery rules.</p> <p>Semiconductors, 4 classes: Movement of Bloch electrons in electric fields, concept of effective mass, movement of electron holes, Fermi level and carrier density, intrinsic semiconductors, extrinsic semiconductors, p-n junctions, carrier diffusion, operating principles of transistors.</p> <p>Surface/interface/defect electronic states, 2 classes: Notation of electron arrangement in crystal surfaces, band structure of surfaces, work functions, surface electronic states.</p> <p>Latest topics, 1 class: Discuss the latest research and technologies related to the content of the course. Review the course overall and confirm the degree of learning attainment.</p>					
<b>[Course requirements]</b>					
<p>Students should have completed the solid state physics course offered by the Department of Physical Science and Engineering.</p>					
<p>----- Continue to 固体電子論 (材) (2)</p>					

## 固体電子論（材）(2)

### [Evaluation methods and policy]

Final test, quizzes

### [Textbooks]

Printouts will be provided

### [References, etc.]

#### ( Reference books )

『固体物理学入門（上）（下）』（丸善）ISBN:9784621076538  
志賀正幸 『材料科学者のための固体電子論入門』 ISBN:9784753655533

### [Study outside of class (preparation and review)]

do exercises at course printouts

### ( Other information (office hours, etc.) )

In addition, course printouts will be distributed

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35124 SJ77 U-ENG25 35124 SJ71				
<b>Course title (and course title in English)</b>	インターンシップ (機) Internship		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NAGATA KOJI Graduate School of Engineering Professor,IWAI HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
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).					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Credits (2) are approved based on the summary report (50%) and presentation (50%) about the internship activities.					
<b>[Textbooks]</b>					
Not used					
----- Continue to インターンシップ (機) (2)					

インターンシップ (機) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Consult with the internship host location.

**( Other information (office hours, 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.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35124 SJ77 U-ENG25 35124 SJ71			
<b>Course title (and course title in English)</b>	インターンシップ (原) Internship		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
” ”					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to インターンシップ (原) (2)					

インターンシップ (原) (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course that includes off-campus training classes.

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35125 LE48 U-ENG25 35125 LE77			
<b>Course title (and course title in English)</b>	物理工学英語 (原) English for Engineering Science		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Professor,SAITOU MANABU Graduate School of Engineering Associate Professor,TSUCHIDA HIDETSUGU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese and English
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,14times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 25127 LJ71				
<b>Course title (and course title in English)</b>	機械設計製作 (機工ネ宇) Design and Manufacturing Processes		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI Graduate School of Engineering Associate Professor,ADACHI MASATO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
In lectures, students are taught how production efficiency and production cost in machine production correlate with dimension and shape accuracy, quality, life span, and performance of a product. In addition, lectures explain the processing principles and practice of various processing methods used during production in machine manufacturing.					
<b>[Course objectives]</b>					
To acquire basic and general knowledge about the structure of machines, design of systems, and manufacturing methods.					
<b>[Course schedule and contents]</b>					
Mechanisms of machine products & outline of machine manufacturing, 3 sessions, an outline is given on the mechanisms of machine products. In addition, the relationship between the function, shape and precision required for machine products, and how these qualities relate to manufacturing cost are explained, and an overview is given on the methods used to process parts and the procedure for these methods. Manufacture of semi-finished materials, 4 sessions, the principles and practice of processing methods such as casting, forging, welding, and fabricating sheet metal for the manufacture of semi-finished materials are described, and an explanation is given on which methods are suited for manufacturing the semi-finished materials of different parts. Methods of finish processing, 7 sessions, the principles and practice of the process in which machine parts are manufactured by applying finish processing (represented by cutting, grinding, and abrasive machining) to semi-finished materials are described, and an explanation is given on which methods of finish processing should be applied to the semi-finished materials of different parts. Confirmation of learning achieved, 1 session					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation is based on performance in teaching sessions and an end-of-term examination. As a general rule, the examination makes up 80% of the final grade, while performance in teaching sessions makes up 20%.					
----- Continue to 機械設計製作 (機工ネ宇) (2) -----					

機械設計製作（機工ネ宇）(2)

**[Textbooks]**

Not used

**[References, etc.]**

**( Reference books )**

Chichiwa, K. (ed.), Kikai seisaku-hou tsuuron-jou, (University of Tokyo Press, 1982) ISBN: 4130650343

**[Study outside of class (preparation and review)]**

Report assignments may be assigned.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35128 LJ77				
<b>Course title (and course title in English)</b>	システム工学 (エネ原) Systems Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, KAWANABE HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
<ul style="list-style-type: none"> <li>- To understand a variety of method and characteristics of system analysis.</li> <li>- To acquire the basic knowledge to optimize the energy systems.</li> </ul>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>4. Decision-making problem(2): Lectures on a modeling of decision-making process and method for optimization.</p> <p>5. System reliability analysis(2): Lectures on a system design and reliability analysis method.</p> <p>6. Application for a energy system(2): Systems engineering method is applied to thermal and power plants.</p>					
<b>[Course requirements]</b>					
None					
----- Continue to システム工学 (エネ原) (2)					

システム工学（エネ原）(2)

**[Evaluation methods and policy]**

Evaluate by report(s) and examination.

**[Textbooks]**

Instructed during class

**[References, etc.]**

**( Reference books )**

Introduced during class

**[Study outside of class (preparation and review)]**

Instruct in class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35129 LJ75			
<b>Course title (and course title in English)</b>	構造物性学 (材) Structural Properties of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TSUJI NOBUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
The properties of metals and alloys strongly depend on their microstructures, which are controlled by processing. We give the lecture on formation mechanism on micro- and nano-structures in metals and alloys from the atomistic viewpoints and thermodynamics. Through the lecture, how to control or utilize practical materials are studied.					
<b>[Course objectives]</b>					
To study relationship between microstructures and properties in metals and alloys. To understand formation mechanism of microstructures through each phase transformation and its control.					
<b>[Course schedule and contents]</b>					
(1) Thermodynamics and phase diagram in alloy systems [7 weeks] (2) Thermodynamics and atomic diffusion [1-2 weeks] (3) Phase transformation through diffusion [5-6 weeks] (4) Feedback [1 week]					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on a written examination. In some cases, reports and quizzes are considered.					
<b>[Textbooks]</b>					
Utilizing resumes provided in the lecture.					
----- Continue to 構造物性学 (材) (2)					

構造物性学 (材) (2)

**[References, etc.]**

**( Reference books )**

Introduced during class

**[Study outside of class (preparation and review)]**

To review contents in the last time before the lecture.

See lecture videos if necessary.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25133 LJ75			
<b>Course title (and course title in English)</b>	物質科学基礎 (材) Fundamentals of Materials Science		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, MURASE KUNIAKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Primarily based on solid-state chemistry, this course covers the notation outline and analytical techniques for solid substances. These techniques form the foundation of materials science and materials engineering.					
<b>[Course objectives]</b>					
A basic knowledge of physics, chemistry, mathematics, etc., is required to study materials science and materials engineering. In this course, students will learn the basic technical terms and develop the fundamental concepts necessary for subsequent advanced courses in materials science and materials engineering.					
<b>[Course schedule and contents]</b>					
Substances and materials, 1 time, Three states of matter; Amorphous and glasses; Liquid crystal; Materials structures and properties in our surrounding living environment. Fundamentals of crystal structures, 3 times, Close packing and holes; Crystal structure of metals; Point symmetry and space symmetry; Lattice and unit structure; Crystal system and Bravais lattice; Depiction of lattice plane and lattice direction; Fractional coordinates. Fundamentals of chemical bond theory, 2 times, Electronic configuration and shielding; Size of atoms and ions; Covalency and ionicity; Definition of electronegativity. Inorganic solid-state materials, 3 times, Structure of important ionic crystals; Stoichiometry and lattice defects; Ionic conduction and solid electrolytes; Crystal field and optical properties of d-block elements. Fundamentals of diffraction crystallography, 5 times, Generation and properties of X-ray; Fundamentals of X-ray scattering and diffraction (Bragg condition, structure factor, extinction rule); Powder X-ray diffractometry; Laue method Self-assessment of achievement, 1 time, Review of the course contents					
<b>[Course requirements]</b>					
Knowledge of physics and chemistry for the entrance examination of Kyoto University.					
----- Continue to 物質科学基礎 (材) (2)					

## 物質科学基礎 (材) (2)

### [Evaluation methods and policy]

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

### [Textbooks]

This course does not require a textbook. A course booklet will be distributed at the first lecture.

### [References, 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)

### [Study outside of class (preparation and review)]

Take-home assignments and their suggested answers should be used effectively for preparation and review.

#### ( Other information (office hours, etc.) )

Not available

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25134 LJ75			
<b>Course title (and course title in English)</b>	材料統計物理学 (材) Statistical Physics of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TABATA YOSHIKAZU Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
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,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
Continue to 材料統計物理学 (材) (2)					

材料統計物理学 (材) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25135 LJ75				
<b>Course title (and course title in English)</b>	材料科学基礎 1 (材) Fundamentals of Materials Science 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KISHIDA KIYOUSUKE Graduate School of Engineering Professor, SEKO ATSUTO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Focusing primarily on metallic crystals, this course first develops an understanding of solid structures based on electronic states and interatomic interactions. Building on this foundation, it examines the fundamental properties of crystal defects and the properties of crystalline solid materials governed by them, with particular emphasis on chemical bonding theory and mechanical strength.					
<b>[Course objectives]</b>					
The objective of this course is to acquire a fundamental understanding of crystals and lattice defects, as well as the basic concepts necessary for understanding chemical bonding theory and mechanical properties.					
<b>[Course schedule and contents]</b>					
(1) Description of electrons based on quantum mechanics 【1 week】 (2) Methods for solving the Schroedinger equation 【2 weeks】 (3) Electronic structure of atoms 【2 weeks】 (4) Electronic structure of molecules and crystals 【2 weeks】 (5) Mid-term exam 【1 week】 (6) Deformation of crystalline materials 【2 weeks】 (7) Plastic deformation of single crystals of metallic materials 【2 weeks】 (8) Plastic deformation of polycrystalline metals 【2 weeks】 (9) Deformation twinning and creep deformation 【1 week】					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
A end-term examination will be a main part of grading determination. Mid-term exam and daily reports may be considered in grading determination. The allocation of marks is 50 for each Kishida's and Seko's part. The students will fail as zero if they do not submit any reports.					
Continue to 材料科学基礎 1 (材) (2)					

材料科学基礎 1 (材) (2)

**[Textbooks]**

Utilizing resumes provided in the lecture.

**[References, etc.]**

**( Reference books )**

Introduced during class

**[Study outside of class (preparation and review)]**

To review contents in the last time before the lecture.  
See lecture videos if necessary.

**( Other information (office hours, 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.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25136 LJ75				
<b>Course title (and course title in English)</b>	材料科学基礎 2 (材工ネ) Fundamentals of Materials Science 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor,ICHII TAKASHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This lecture focuses on symmetry, tensor and elastodynamics that are of importance for materials science.					
<b>[Course objectives]</b>					
To understand the role of symmetry, tensor and elastodynamics on materials science.					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
Fundamentals of thermodynamics					
<b>[Evaluation methods and policy]</b>					
Grading is due to the term-end examination. The record of attendance may be taken into account.					
<b>[Textbooks]</b>					
Handouts will be given in lectures.					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 35139 LJ76				
<b>Course title (and course title in English)</b>	エネルギー化学 1 (エネ原) Energy Chemistry 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MATSUMOTO KAZUHIKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
The lecturer teaches fundamental matters in inorganic chemistry related to energy conversion and storage. In particular, atomic structure, molecular structure and bonding, and the structures of simple compounds will be lectured. Exercises are periodically assigned to deepen understanding.					
<b>[Course objectives]</b>					
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					
<b>[Course schedule and contents]</b>					
1. Atomic structure, 3 times, Hydrogenic atoms, many-electron atoms 2. Molecular structure and bonding, 3 times Lewis structures, valence bond theory, molecular orbital theory, structure and bond properties 3. The structures of simple compounds, 4 times the description of the structures of solids, the structures of metals and alloys, ionic solids, The energies of ionic bonding, defects and nonstoichiometry, the electronic structures of solids 4. Exercise and commentry, 4 times 5. Summary and feedback, once					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Assessment will be based on the combined total of marks from weekly quizzes and practical assignments (40%) and the final examination (60%). A total of 60% or above is required to pass.					
<b>[Textbooks]</b>					
Shriver amp Atkins#039 Inorganic Chemistry, the 6th ed., Oxford University Press.					
<b>[References, etc.]</b>					
( 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)

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**[Study outside of class (preparation and review)]**

Thoroughly read the textbook and review reports and practical assignments.

**( Other information (office hours, etc.) )**

Exercises are periodically assigned to deepen understanding.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35140 LJ76				
<b>Course title (and course title in English)</b>	エネルギー化学 2 (エネ原) Energy Chemistry 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MATSUMOTO KAZUHIKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
The lecturer teaches fundamental matters in inorganic chemistry related to energy conversion and storage. In particular, acids and bases, oxidation and reduction, molecular symmetry, and coordination compounds will be lectured. Exercises are periodically assigned to deepen understanding.					
<b>[Course objectives]</b>					
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					
<b>[Course schedule and contents]</b>					
1. Acids and bases, 3 times Bronsted acidity, Lewis acidity and basicity, nonaqueous electrolytes, applications of acid based chemistry 2. Oxidation and Reduction, 3 times, reduction potentials, redox stability, diagrammatic presentation of potential data, chemical extraction of the elements 3. Molecular symmetry, 2 times, an introduction to symmetry analysis, applications of symmetry, symmetries of molecular orbitals, representations 4. An introduction to coordination chemistry, 2 times language of coordination chemistry, constitution and geometry, isomerism and chirality, thermodynamics of complex formation 5. Exercises and commentary, 4 times 6. Summary and feedback, once					
<b>[Course requirements]</b>					
Students are supposed to understand the lecture "Energy Chemistry 1".					
<b>[Evaluation methods and policy]</b>					
Assessment will be based on the combined total of marks from weekly quizzes and practical assignments (40%) and the final examination (60%). A total of 60% or above is required to pass.					
<b>[Textbooks]</b>					
Shriver & Atkins; Inorganic Chemistry (6th Ed.) ISBN 9784807908981 which is used in Energy Chemistry 1. isbn{ } {9784807908981}					
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)

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**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Thoroughly read the textbook and review reports and practical assignments.

**( Other information (office hours, etc.) )**

Exercises are periodically assigned to deepen understanding.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 25142 LJ77 U-ENG25 25142 LJ71				
<b>Course title (and course title in English)</b>	流体力学 1 (機) Fluid Dynamics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NAGATA KOJI Graduate School of Engineering Associate Professor,Watanabe Tomoaki	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
Understanding of the principle of fluid flow.					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
N/A					
<b>[Evaluation methods and policy]</b>					
Term-end exam					
<b>[Textbooks]</b>					
Instructed during class					
----- Continue to 流体力学 1 (機) (2)					

流体力学 1 (機) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Instructed during class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25142 LJ77 U-ENG25 25142 LJ71			
<b>Course title (and course title in English)</b>	流体力学 1 (工ネ原宇) Fluid Dynamics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,OOWADA TAKU Graduate School of Engineering Senior Lecturer,SUGIMOTO HIROSHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
<p>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.</p> <p>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.</p> <p>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.</p> <p>Presentation,1time,Based on the exercise, students presents their methods of intrusion detection using machine learning, and discuss it with other students and instructors.</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
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Continue to 流体力学 1 (工ネ原宇) (2)					

流体力学 1 (工ネ原宇) (2)

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**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35143 LJ71 U-ENG25 35143 LJ77			
<b>Course title (and course title in English)</b>	流体力学 2 (機) Fluid Dynamics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NAGATA KOJI Graduate School of Engineering Associate Professor,Watanabe Tomoaki	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,4times, ,2times, ,3times, ,1time, ,2times, , 1 times,					
<b>[Course requirements]</b>					
Fluid Dynamics 1					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 流体力学 2 (機) (2)					

## 流体力学 2 (機) (2)

### [References, etc.]

#### ( Reference books )

G. K. Batchelor, An Introduction to Fluid Dynamics (Cambridge University Press, 1967). isbn{{052104118X}}, (同, 2000) isbn{{9780521663960}}

### [Study outside of class (preparation and review)]

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35143 LJ71 U-ENG25 35143 LJ77			
<b>Course title (and course title in English)</b>	流体力学 2 (工ネ宇) Fluid Dynamics 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,OOWADA TAKU Graduate School of Engineering Senior Lecturer,SUGIMOTO HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,3times, ,3times, ,6times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>		U-ENG25 45144 LJ71			
<b>Course title (and course title in English)</b>	マイクロ加工学 (機エネ) Microfabrication		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, YOKOKAWA RYUUJI Graduate School of Engineering Associate Professor, HIROTANI JUN Graduate School of Engineering Associate Professor, FUJIMOTO KAZUYA	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
This course covers microfabrication technology for MEMS as well as semiconducors.					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,2times, ,3times, ,2times, ,2times, ,2times, ,2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to マイクロ加工学 (機エネ) (2)					

マイクロ加工学（機エネ）(2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45145 LJ77			
<b>Course title (and course title in English)</b>	航空宇宙工学演義 ( 宇 ) Engineering Exercise in Aeronautics and Astronautics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor, TAKATA SHIGERU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.3,4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
”					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
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Continue to 航空宇宙工学演義 ( 宇 ) (2)					

航空宇宙工学演義 ( 宇 ) (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35147 LJ75				
<b>Course title (and course title in English)</b>	固体物性論 (材工ネ) Condensed Matter Physics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NAKAMURA HIROYUKI Graduate School of Engineering Associate Professor, TABATA YOSHIKAZU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Basic concept of magnetic and superconducting properties of matters.					
<b>[Course objectives]</b>					
Understanding of basic concept of magnetic and superconducting properties of matters.					
<b>[Course schedule and contents]</b>					
Review of electromagnetism, 2times, magnetic field, definition and detection of vector potential, Hamiltonian for charged particle in electromagnetic field, etc. Magnetism and superconductivity, 12 times, angular momentum of electron, spin and exchange interaction, atomic magnetism and effect of crystal field, magnetic moment in crystals, molecular field model, interatomic exchange interaction, metallic magnetism, magnetization process, magnetic anisotropy, phase transitions, magnetic measurements, etc. Assessment, 1time, Assessment					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on a final examination.					
<b>[Textbooks]</b>					
Not used					
----- Continue to 固体物性論 (材工ネ) (2)					

固体物性論 (材工ネ) (2)

**[References, 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

**[Study outside of class (preparation and review)]**

Basics of quantum mechanics and statistical mechanics is necessary.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25150 LJ57 U-ENG25 25150 LJ28 U-ENG25 25150 LJ77			
<b>Course title (and course title in English)</b>	原子核工学序論 1 (原) Introduction to Nuclear Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor,SASAKI TAKAYUKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Study of basic concepts necessary for understanding the principles of various nuclear engineering studies from the physicochemical properties of atoms, nuclei, and radiation to the generation and use of energy by fission reactions.					
<b>[Course objectives]</b>					
The course objective is to understand the link between basic science and the latest research in the field of nuclear engineering, and to understand the latest advancements made in basic and applied research and future issues.					
<b>[Course schedule and contents]</b>					
Introduction to Radiation 1 1) Discovery of radiation 2) History of radiation 3) Basics of radiation 4) Interaction with substances 5) Detection of radiation 6) Generation of radiation 7) Industrial uses of radiation Energy generation and utilization 1 8) Energy situation and nuclear power 9) Basics of reactor physics 10) Reactor control 11) Reactor selection-present 12) Reactor selection-past 13) Reactor selection-next generation reactor 14) Viewpoints on nuclear energy utilization and development 15) Feedback; confirmation of learning achievement					
<b>[Course requirements]</b>					
None					
Continue to 原子核工学序論 1 (原) (2)					

## 原子核工学序論 1 (原) (2)

### [Evaluation methods and policy]

Evaluation will be based on a written periodic examination. 5 or more absences from class will result in a failing grade (feedback sessions will not be included in the attendance count). The examination will test the basic knowledge and understanding of atoms, nuclei, radiation, quantum calculations, etc. discussed in each lecture.

### [Textbooks]

Other materials are not specified. Handouts, etc. will be distributed during lectures.

### [References, etc.]

#### ( Reference books )

N/A

### [Study outside of class (preparation and review)]

Review mainly the contents of each lecture and the exercises during the lecture is advisable.

### ( Other information (office hours, etc.) )

Attend as needed. Some materials may be omitted or added depending on the number of classes in the relevant year. Attending Introduction to Nuclear Engineering 2 at the same time as this course is desirable.

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25151 LJ57 U-ENG25 25151 LJ28 U-ENG25 25151 LJ77			
<b>Course title (and course title in English)</b>	原子核工学序論 2 (原) Introduction to Nuclear Engineering 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Professor,SASAKI TAKAYUKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Study of the fundamentals of radiation properties and their control, and energy utilization and management, necessary for understanding the principles of various nuclear engineering studies.					
<b>[Course objectives]</b>					
The course objective is to understand the association between basic science and the latest research in the field of nuclear engineering, and to understand the latest advancements made to basic and applied research and future issues.					
<b>[Course schedule and contents]</b>					
Introduction to Radiation 2 1) Radiation biology 2) Medical application of radiation 3) Effects of radiation on the human body 4) Safe use of radiation 5) Radiation-related laws and regulations Energy generation and utilization 2 6) History and fundamentals of nuclear fusion 7) Fusion reactor development 8) Prediction and Control of Fusion Reactor 9) Power reactor systems 10) Ensuring safety 11) Advanced Materials Development 12) Radiation in the environment 13) Nuclear fuel cycle 14) Radioactive waste disposal 15) Feedback; confirmation of learning achievement					
<b>[Course requirements]</b>					
Attending Introduction to Nuclear Engineering 1 is desirable.					
<b>[Evaluation methods and policy]</b>					
Evaluation will be based on a written periodic examination. 5 or more absences from class will result in a failing grade (feedback sessions will not be included in the attendance count). The examination will test the					
----- Continue to 原子核工学序論 2 (原) (2)					

原子核工学序論 2 (原) (2)

basic knowledge and understanding of atoms, nuclei, radiation, quantum calculations, etc. discussed in each lecture.

**[Textbooks]**

Other materials are not specified. Handouts, etc. will be distributed during lectures.

**[References, etc.]**

( Reference books )

N/A

**[Study outside of class (preparation and review)]**

Review mainly the contents of each lecture and the exercises during the lecture is advisable.

**( Other information (office hours, etc.) )**

Exercises and report tasks will be assigned as necessary. Some materials may be omitted or added depending on the number of classes in the relevant year.

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35152 LJ77 U-ENG25 35152 LJ71			
<b>Course title (and course title in English)</b>	流体熱工学 (原) Fluid Flow and Heat Transfer		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, YOKOMINE TAKEHIKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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					
<b>[Course schedule and contents]</b>					
,1.0times, ,1.0times, ,2.0times, ,4.0times, ,1.0times, ,5.0times, , 1 .0times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Evaluation based on the written examination, but it is also rating a student#039s class performance.					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 流体熱工学 (原) (2) -----					

流体熱工学（原）(2)

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[Study outside of class (preparation and review)]

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

[Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35153 LJ71				
<b>Course title (and course title in English)</b>	伝熱工学 (機) Heat Transfer		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KUROSE RYOUICHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>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.</p>					
<b>[Course objectives]</b>					
Provide basic knowledge and deepen understanding of heat transfer phenomena (heat conduction, convective heat transfer, thermal radiation).					
<b>[Course schedule and contents]</b>					
<p>(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.</p> <p>(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.</p> <p>(5) Basic information on convective heat transfer: Formularize 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.</p> <p>(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.</p> <p>(10, 11) Convective heat transfer accompanying phase changes: With respect to boiling heat transfer, explain the</p>					
----- <b>Continue to 伝熱工学 (機) (2)</b>					

## 伝熱工学（機）(2)

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 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.

### [Course requirements]

Students are required to have completed "Thermodynamics 1" and "Fluid Dynamics 1".

### [Evaluation methods and policy]

A final examination will be held. In-class reports will be factored in.

### [Textbooks]

日本機械学会 『伝熱工学』（丸善出版）ISBN:ISBN978-4-88898-120-0

### [References, etc.]

( Reference books )

### [Study outside of class (preparation and review)]

Students are required to have completed "Thermodynamics 1" and "Fluid Dynamics 1".

### ( Other information (office hours, 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.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35154 LJ75				
<b>Course title (and course title in English)</b>	材料基礎学 2 (工ネ) Fundamentals of Materials 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, OKUMURA HIDEYUKI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,3times, ,2times, ,2times, ,2times, ,1time, ,1time, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
Text book can be bought at the society of material science, Japan at Hyakumanben near Kyoto university. <a href="http://www.jsms.jp/">http://www.jsms.jp/</a>					
Continue to 材料基礎学 2 (工ネ) (2)					

材料基礎学 2 (工ネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35155 LJ71				
<b>Course title (and course title in English)</b>	設計工学 1 Design Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, KOMORI MASAHARU Graduate School of Engineering Professor, HIRAYAMA TOMOKO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,4times, ,3times, ,3times, ,2times, ,2times, ,1time, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- <b>Continue to 設計工学 1 (2)</b>					

設計工学 1 (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35156 LJ71				
<b>Course title (and course title in English)</b>	設計工学 2 Design Engineering 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,NISHIWAKI SHINJI Graduate School of Engineering Professor,KOMORI MASA HARU Graduate School of Engineering Associate Professor,TERAKAWA TATSURO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,5times, ,3times, ,2times, ,4times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
----- Continue to 設計工学 2 (2)					

設計工学 2 (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35157 EJ28				
<b>Course title (and course title in English)</b>	エネルギー応用工学設計演習・実験 1 Design Practice and Experiments for Applied Energy Science and Engineering 1		<b>Instructor's name, job title, and department of affiliation</b>	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,IKENOUE TAKUMI Graduate School of Energy Science Associate Professor,OGAWA TAKAYA 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,HACHIYA KAN Graduate School of Energy Science Professor,Jun HAYASHI Graduate School of Energy Science Associate Professor,HORIBE NAOTO Graduate School of Energy Science Professor,MATSUMOTO KAZUHIKO Graduate School of Energy Science Professor,MIYAKE MASAO Graduate School of Energy Science Assistant Professor,HWANG JINKWANG Graduate School of Energy Science Assistant Professor,OKAZAKI YUTAKA Graduate School of Energy Science Assistant Professor,TOMIDOKORO TAKUYA Graduate School of Energy Science Senior Lecturer,KAWAI EMI Graduate School of Energy Science Associate Professor,KAWANISHI SAKIKO Graduate School of Energy Science Associate Professor,IMADERA KENJI Graduate School of Energy Science Assistant Professor,Mogi Wataru		
				<b>Target year</b>	3rd year students or above	<b>Number of credits</b>
<b>Days and periods</b>	Wed.3,4,Thu.3,4	<b>Class style</b>	Experiment (Face-to-face course)		<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>						
<b>[Course objectives]</b>						
<b>[Course schedule and contents]</b>						
,6times, ,6times, ,6times, ,6times,						
Continue to エネルギー応用工学設計演習・実験 1(2)						

エネルギー応用工学設計演習・実験 1 (2)

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35158 EJ57 U-ENG25 35158 EJ53 U-ENG25 35158 EJ77			
<b>Course title (and course title in English)</b>	原子核工学実験 1 Nuclear Engineering Laboratory 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,HOASHI EIJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	3	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.1,2,3,4	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Basic knowledge of a wide range of scientific and engineering fields (e.g. physics, chemistry, biology, electrical engineering, mechanical engineering, and materials engineering) that form the basis of nuclear engineering, as well as basic proficiency with standards related to radiation and quantum beam technologies specific to nuclear engineering. In addition, students will study experimental procedures through practical training as well as procedures for the safe handling of radioisotopes and radiation generators, methods for processing experimental data, and how to prepare scientific reports.					
<b>[Course objectives]</b>					
<ul style="list-style-type: none"> <li>• Cultivate familiarity with experimental procedures and a sense of engineering best practices.</li> <li>• Acquire basic knowledge and skills related to science and engineering with a mind towards practical application.</li> <li>• Cultivate the ability to acquire and utilize basic knowledge and technology related to nuclear engineering.</li> <li>• Learn how to conduct experiments while considering personal and environmental safety.</li> <li>• Cultivate the ability to work effectively, independently, and continuously on various tasks.</li> </ul>					
<b>[Course schedule and contents]</b>					
<p>Course will cover the following themes. Some of the themes also serve as new instruction and training regarding the handling of radioisotopes.</p> <p>The order of lectures differs for each experimental group, and the content of corresponding exercises may change.</p> <p>Lecture 1: Overview of experiments: Provide an overview of each experimental task, text distribution, pre-learning instructions and precautions, etc. will be given as necessary.</p> <p>Lecture 2: Radioactive isotope (RI) and nuclear fuel materials safety training seminar: Students will learn safe procedures for handling RIs and nuclear fuel materials.</p> <p>Lecture 3: Basics of creating engineering reports: Lecture will focus on creating experimental reports, as well as exercises to learn the basics of creating experimental reports.</p>					
----- Continue to 原子核工学実験 1 (2) -----					

## 原子核工学実験 1 (2)

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Lecture 4: Mechanical drawing: Exercises and lectures on basic aspects of mechanical drawing.

Lecture 5: Circuit meter and oscilloscope training and electronic safety training: Students will learn the operating principles and usage of analog and digital circuit meters and oscilloscope. Students also assemble various circuits and learn safe and reliable circuit manufacturing techniques.

Lecture 6: X-ray diffraction: Using a powder X-ray diffractometer, students will learn the basic properties of X-rays and gain an understanding of the relationship between diffraction patterns and crystal structures.

Lectures 7 and 8: The properties of radiation -  $\alpha$ -ray: Students will learn about the characteristics of  $\alpha$ -ray attenuation in matter and the detection method of  $\alpha$  particles using a semiconductor detector.

Lectures 9 and 10: Absorption of  $\gamma$  and  $\beta$ -rays: Students will study procedures for the safe handling of RIs through experiments on energy absorption by  $\gamma$  and  $\beta$ -ray-emitting substances.

Lectures 11 and 12: Neutron Detection: Students will focus on the principles of neutron generation and detection using a  $^{241}\text{Am}$ -Be neutron source and  $^3\text{He}$  detector, and learn about the behavior of neutrons in moderator (paraffin).

Lecture 13: Electron beams/vacuums: Students will focus on an electron beam by electric and magnetic fields to learn the functions of electrostatic and magnetic lenses and understand the fundamental principles of vacuum technology.

Lecture 14: Radiochemistry: Students will learn the safe handling of unsealed Cs-137 through milking, and the principles of its separation.

Lecture 15: Report check: Confirmation of the content of students' submitted reports and provision of guidance regarding resubmission of deficient reports to confirm learning achievement.

### [Course requirements]

N/A

### [Evaluation methods and policy]

Students will prepare a report for each task, and performance will be evaluated on a scale of 1 to 3 with respect to the degree of achievement of each learning objective, and the total score is converted into a score out of 100.

Note that completing all assignments and submitting reports is a prerequisite for receiving credit.

Reports submitted late will be penalized, and messy or incomplete reports may require correction and resubmission.

### [Textbooks]

Texts and reference materials will be distributed for each experimental theme.

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Continue to 原子核工学実験 1 (3)

## 原子核工学実験 1 (3)

### [References, etc.]

#### ( Reference books )

Other materials will be introduced as needed for each experimental theme.

### [Study outside of class (preparation and review)]

Submit reports on all experimental themes within the deadline.

In addition, follow the instructions in the experiment outline description for each experiment theme.

### ( Other information (office hours, etc.) )

The method of contacting the faculty in charge of each experimental theme will be given in the instructional material for each experiment.

Taking this course together with Nuclear Engineering Experiment 2 is desirable.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

#### (1) Category

A course with practical content delivered by instructors with practical work experience

#### (2) Details of instructors ' practical work experience related to the course

- ・ RI主任者【工学部の事業所（宇治）におけるRI管理の実務経験】

#### (3) Details of practical classes delivered based on instructors ' practical work experience

- ・ RI管理の経験に基づく実務的な教育が行われている。

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35159 SJ28				
<b>Course title (and course title in English)</b>	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		<b>Instructor's name, job title, and department of affiliation</b>	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 Associate Professor,IKENOUE TAKUMI Graduate School of Energy Science Associate Professor,OGAWA TAKAYA Graduate School of Energy Science Associate Professor,KINOSHITA KATSUYUKI Graduate School of Energy Science Associate Professor,HASEGAWA MASAKATSU Graduate School of Energy Science Professor,Jun HAYASHI Graduate School of Energy Science Associate Professor,HORIBE NAOTO Graduate School of Energy Science Professor,MATSUMOTO KAZUHIKO Graduate School of Energy Science Professor,MIYAKE MASAO Graduate School of Energy Science Assistant Professor,HWANG JINKWANG Graduate School of Energy Science Assistant Professor,OKAZAKI YUTAKA Graduate School of Energy Science Assistant Professor,TOMIDOKORO TAKUYA Graduate School of Energy Science Senior Lecturer,KAWAI EMI Graduate School of Energy Science Associate Professor,KAWANISHI SAKIKO Graduate School of Energy Science Associate Professor,IMADERA KENJI Graduate School of Energy Science Assistant Professor,Mogi Wataru		
				<b>Target year</b>	3rd year students or above	<b>Number of credits</b>
<b>Days and periods</b>	Wed.3,4,Thu.3,4	<b>Class style</b>	Seminar (Face-to-face course)		<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>						
<b>[Course objectives]</b>						
Continue to エネルギー応用工学設計演習・実験 2 (2)						

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,

**[Course requirements]**

None

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35160 EJ77 U-ENG25 35160 EJ57 U-ENG25 35160 EJ53			
<b>Course title (and course title in English)</b>	原子核工学実験 2 Nuclear Engineering Laboratory 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering ALL STAFF Graduate School of Engineering Associate Professor,HOASHI EIJI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	3	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Thu.1,2,3,4	<b>Class style</b>	Experiment (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Basic knowledge of a wide range of scientific and engineering fields (e.g. physics, chemistry, biology, electrical engineering, mechanical engineering, materials engineering) that form the basis of nuclear engineering, as well as basic proficiency with standards related to radiation and quantum beam technologies specific to nuclear engineering. In addition, students will study practical experimental procedures through practical training as well as procedures for the safe handling of radioisotopes and radiation generators, methods for processing experimental data, and how to prepare scientific reports.					
<b>[Course objectives]</b>					
<ul style="list-style-type: none"> <li>• Cultivate familiarity with experimental procedures and a sense of engineering best practices.</li> <li>• Acquire basic knowledge and skills related to science and engineering with a mind towards practical application.</li> <li>• Cultivate the ability to acquire and utilize basic knowledge and technology related to nuclear engineering.</li> <li>• Learn how to conduct experiments while considering personal and environmental safety.</li> <li>• Cultivate the ability to work effectively, independently, and continuously on various tasks.</li> </ul>					
<b>[Course schedule and contents]</b>					
Course will cover the following themes. The order of lectures differs for each experimental group, and the content of corresponding exercises may change.					
Lecture 1: Overview of experiments: Provide an overview of each experimental task, text distribution, pre-learning instructions and precautions, etc. will be given as necessary.					
Lecture 2: Electronic circuits: Students will study electronic circuits utilizing resistors, capacitors, inductors, diodes, transistors, and so on together with their applications in nuclear engineering.					
Lectures 3 and 4: In-air PIXE and RBS analysis: Using electrostatic ion accelerators, students will observe the trajectory of a proton beam in the atmosphere. They will also learn elemental analysis using Particle-Induced X-ray Emission (PIXE) and Rutherford Backscattering Spectrometry (RBS).					
----- <b>Continue to 原子核工学実験 2 (2)</b>					

## 原子核工学実験 2 (2)

Lectures 5 and 6: Uranium chemistry: Lectures will focus on the separation of uranium thorium radiative equilibrium solutions (ion exchange, oxidation-reduction reaction) and will perform colorimetric quantitative analysis as study of the handling of nuclear fuel.

Lecture 7: Radiation detection: Students will attempt detection of  $\alpha$ -rays emitted from substances existing in nature by using a Ge semiconductor detector as well as the identification and quantification of emitted nuclides. Students will also deepen their understanding of radiation and radioactive materials by measuring contamination using a survey meter and by measuring the decay process of nearby radioisotopes.

Lecture 8: Slow neutron beams: Students will measure neutrons from accelerator driven neutron source using a neutron counter to learn about the properties of neutrons and their interaction with matter.

Lecture 9: Numerical experiment 1: Students will focus on the basic grammar of Python and practice data processing and graph creation using libraries.

Lecture 10: Numerical experiment 2: Students will learn a fluid simulation code and perform analysis using the created code.

Lecture 11: Numerical experiment 3: Students will learn about simulation using numerical calculation libraries.

Lectures 12 - 15: Report check: Confirmation of the content of students' submitted reports and provision of guidance regarding resubmission of deficient reports to confirm learning achievement.

### [Course requirements]

N/A

### [Evaluation methods and policy]

Students will prepare a report for each task, and performance will be evaluated on a scale of 1 to 3 with respect to the degree of achievement of each learning objective, and the total score is converted into a score out of 100.

Note that completing all assignments and submitting reports is a prerequisite for receiving credit.

Reports submitted late will be penalized, and messy or incomplete reports may require correction and resubmission.

### [Textbooks]

Texts and reference materials will be distributed for each experimental theme.

### [References, etc.]

#### ( Reference books )

Other materials will be introduced as needed for each experimental theme.

Continue to 原子核工学実験 2 (3)

## 原子核工学実験 2 (3)

### [Study outside of class (preparation and review)]

Submit reports on all experimental themes within the deadline.

In addition, follow the instructions in the experiment outline description for each experiment theme.

### ( Other information (office hours, etc.) )

The method of contacting the faculty in charge of each experimental theme will be given in the instructional material for each experiment.

Taking this course together with Nuclear Engineering Experiment 1 is desirable.

\*Please visit KULASIS to find out about office hours.

### [Courses delivered by instructors with practical work experience]

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

・ RI主任者【工学部の事業所（宇治）におけるRI管理の実務経験】

(3) Details of practical classes delivered based on instructors ' practical work experience

・ RI管理の経験に基づく実務的な教育が行われている。

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45161 LJ71				
<b>Course title (and course title in English)</b>	材料強度学 Strength and Fracture of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,HIRAKATA HIROYUKI Graduate School of Engineering Professor,SHIMADA TAKAHIRO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,3times, ,1?2times, ,1?2times, ,1?2times, ,1?2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 材料強度学(2)					

材料強度学(2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 25162 LJ57 U-ENG25 25162 LJ77 U-ENG25 25162 LJ71				
<b>Course title (and course title in English)</b>	熱力学 1 (機宇) Thermodynamics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,IWAI HIROSHI Graduate School of Engineering Associate Professor,KISHIMOTO MASASHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
0					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering,Engineering Science					

<b>Course number</b>	U-ENG25 25162 LJ57 U-ENG25 25162 LJ77 U-ENG25 25162 LJ71				
<b>Course title (and course title in English)</b>	熱力学 1 (工ネ原) Thermodynamics 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Associate Professor, HASEGAWA MASAKATSU	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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, phase transformation, free energy, phase equilibrium and the phase rule, single-component phase diagrams, etc.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
Introduction (1 class) system, phase, state quantity					
The first law of thermodynamics (2 classes) heat, work, quasi-static process, enthalpy, heat capacity/specific heat					
The second law of thermodynamics (4 classes) reversible process, heat engine, Thomson's principle, Clausius' principle, Carnot's theorem, thermodynamic temperature, Mayer's relation, Poisson's law, Carnot cycle, Clausius' inequality, entropy					
Free energy and thermodynamic equilibrium (3 classes) Helmholtz energy, Gibbs energy, Maxwell relations, Gibbs-Helmholtz equation, Joule's experiment, Joule-Thomson experiment, open system and chemical potential, conditions and stabilities of equilibrium state, Gibbs-Duhem equation					
State quantities of gas phase (1 class) ideal gas, van der Waals gas					
Phase equilibrium and transformation (1 class) Gibbs' phase rule, phase diagram of single-component system, Clapeyron-Clausius equation, critical point					
----- Continue to 熱力学 1 (工ネ原) (2)					

## 熱力学 1 (工ネ原) (2)

Gas mixture and solution (1 class)  
ideal gas mixture, ideal solution, entropy of mixing,  
elevation of boiling point, depression of freezing point

Review (1 class)

Feedback (1 class)

### [Course requirements]

None

### [Evaluation methods and policy]

Results are evaluated by a term-end examination.

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

Thermodynamics and statistical mechanics (A. Harajima, Baifukan) (in Japanese). isbn{ }{9784563021399}

### [Study outside of class (preparation and review)]

It is better to prepare and review the lecture materials posted on LMS.

### ( Other information (office hours, 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.

### [Essential courses]

Faculty of Engineering, Engineering Science



機械システム学セミナー（機）(2)

**[Evaluation methods and policy]**

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 45170 SJ71				
<b>Course title (and course title in English)</b>	マイクロ材料の加工・評価の基礎 Fabrication and Analysis of Micromaterials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,TSUCHIYA TOSHIYUKI Graduate School of Engineering Professor,SUZUKI MOTOFUMI Graduate School of Engineering Professor,YOKOKAWA RYUUI Graduate School of Engineering Associate Professor,HIROTANI JUN Graduate School of Engineering Associate Professor,FUJIMOTO KAZUYA		
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Intensive, Second semester	
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese	
<b>[Overview and purpose of the course]</b>						
<b>[Course objectives]</b>						
<b>[Course schedule and contents]</b>						
,1time, ,1time, ,1time, ,1time, ,1time, ,3times, ,3times, ,1time, ,2times, ,1time,						
<b>[Course requirements]</b>						
None						
<b>[Evaluation methods and policy]</b>						
----- Continue to マイクロ材料の加工・評価の基礎(2) -----						

マイクロ材料の加工・評価の基礎(2)

**[Textbooks]**

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 45171 LJ71				
<b>Course title (and course title in English)</b>	知能システム工学（機） Intelligent Systems Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor, KANO MANABU Graduate School of Engineering Senior Lecturer, NAKANISHI HIROAKI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,2times, ,2times, ,2times, ,2times, ,2times, ,2times, ,2-3times,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 知能システム工学（機）(2)					

知能システム工学（機）(2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>	U-ENG25 25172 LJ75				
<b>Course title (and course title in English)</b>	材料科学基礎 3 Fundamentals of Materials Science 3		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TOYOURA KAZUAKI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,1time, ,1time, ,3times, ,4times, ,4times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
isbn{ } {9784254240184}					
-----					
Continue to 材料科学基礎 3 (2)					

材料科学基礎 3 (2)

**[References, etc.]**

**( Reference books )**

isbn{{9784563067120}} isbn{{9784563067137}}

D.A.Porter and K.E.Easterling: Phase Transformations in Metals and Alloys isbn{{0412450305}}

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35173 LJ75			
<b>Course title (and course title in English)</b>	材料組織学 Fundamentals of Microstructure of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HIDEYUKI YASUDA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Mon.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
Physical and chemical properties of materials depend on not only lattice structure and composition but also microstructure. In this lecture, the microstructure evolution during phase transformation (i.e. solidification) will be explained by using thermodynamics and kinetics (atomic diffusion, thermal energy transport and momentum transport). Students study the fundamentals of microstructure evolution (nucleation, growth mechanism, solute partition, microstructure selection, dendritic growth, eutectic growth and equilibrium / non-equilibrium processes).					
<b>[Course objectives]</b>					
1. To understand relationship between microstructure evolution and thermodynamics / kinetics. 2. To be able to use thermodynamics and kinetics for understanding microstructure in materials.					
<b>[Course schedule and contents]</b>					
1. Introduction (1): fundamentals of thermodynamics and kinetics, which are required for understanding this class 2. Nucleation (1): classical nucleation theory and curvature effect 3. Interface morphology (1): interface morphology (atomic scale), macroscopic interface shape 4. Growing interface (3): local equilibrium at interface, solute partition, stability of interface 5. Dendritic growth (2): mechanism of dendritic growth, selection mechanism 6. Solute partition and segregation (2): solute partition at interface, segregation (non-uniform distribution of solutes) 7. Eutectic growth (1): cooperative growth (eutectic growth) of multiple phases, selection of microstructure 8. Non-equilibrium phase transformation (1): rapid solidification, non-equilibrium and metastable phases 9. Microstructure evolution (2): relationship between microstructure evolution and phase diagram, selection rules in phase transformation 10. Learning achievement evaluation, and feedback (1)					
<b>[Course requirements]</b>					
Fundamentals of Microstructure of Materials 1,2 and 3					
<b>[Evaluation methods and policy]</b>					
Evaluation method: Evaluation will be based on one written examination at the end of semester. Evaluation standard: The result of a written examination should be 60 and above out of 100. (60 and above:					
----- <b>Continue to 材料組織学(2)</b>					

**材料組織学(2)**

Passed, 59 and below: Failed)  
Evaluation may include short reports.

**[Textbooks]**

松原英一郎他 『金属材料組織学』 (朝倉書店) ISBN:9784254240184

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

Students are required to carry out a review of class.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering,Engineering Science

<b>Course number</b>		U-ENG25 35174 LJ53 U-ENG25 35174 LJ72			
<b>Course title (and course title in English)</b>	放射線計測学 Radiation Detection and Measurement		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
放射線（イオンや電子などの荷電粒子線、X線やγ線などの光子線、中性子線）の計測法について、放射線と物質との相互作用、計測に用いる各種放射線検出器の動作原理や計測技術等を述べる。本講義の目的は、様々な分野への放射線利用において放射線計測の重要性を理解することである。					
<b>[Course objectives]</b>					
放射線の性質及び物質との相互作用に関する基本的事項と放射線検出器の基本的な動作原理や測定技術を理解することにより、放射線の安全な取扱い等について修得する。					
<b>[Course schedule and contents]</b>					
<p>（１）放射線計測の概要【1週】 本講義の全体的な概要を説明する。具体的には、放射線の性質、放射線計測の概要（測定の種類や計測回路の基本構成）、検出器の概要及び放射線計測で用いる単位などについて説明する。</p> <p>（２）光子線の性質【1週】 光子線（X線・γ線）の性質及び物質との相互作用（相互作用過程とその断面積、減衰など）に関連した基本的事項を説明する。</p> <p>（３）荷電粒子線の性質【1週】 荷電粒子（イオン、電子）の性質及び物質との相互作用（相互作用過程、エネルギー損失、飛程など）に関連した基本的事項を説明する。</p> <p>（４）中性子線の性質【1週】 中性子の性質、物質との相互作用（相互作用過程、核反応など）に関連した基本的事項を説明する。</p> <p>（５）放射線検出器【4週】 放射線検出器（ガス入り検出器、半導体検出器、シンチレーション検出器、その他の検出器）の基本的な動作原理を述べるとともに、放射線の種類に応じた検出器の検出原理及び基本特性等を解説する。</p> <p>（６）放射線計測技術【1週】 放射線計測の基本構成（放射線のエネルギー計測や時間計測をする場合の構成など）、計測回路（モジュールの種類とその役割）及び計測回路の信号処理などについて説明する。</p>					
----- Continue to 放射線計測学(2)					

## 放射線計測学(2)

### (7) 放射線のスペクトルの測定【2週】

荷電粒子線、 $\gamma$ 線、中性子線などのエネルギースペクトルの代表的な測定法について説明する。

### (8) 放射線計測の定量【1週】

放射線計測の定量に関わる基本的事項について解説する。具体的には、絶対測定と相対測定との違い、検出効率、立体角などを説明する。

### (9) 放射線計測における統計【2週】

放射線計測に用いる統計学（確率分布及び誤差伝播など）を説明する。

### (10) 総括【1週】

本講義の全体のまとめを行うとともに、放射線計測を基礎とした放射線の安全な取扱いについて考察する。

## [Course requirements]

原子物理学

## [Evaluation methods and policy]

筆記試験で成績（100点満点）を評価する。

## [Textbooks]

特に定めない

## [References, etc.]

### (Reference books)

ニコラス・ツルファニディス著 阪井英次訳 放射線計測の理論と演習（上、下巻）現代工学社など  
ibid{{TW86012413}} ibid{{BB01056431}}

## [Study outside of class (preparation and review)]

講義中に配布する演習問題及び参考書等を用いて行う。

## (Other information (office hours, etc.))

必要に応じてプリントを配布する。

\*Please visit KULASIS to find out about office hours.

## [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25175 LJ75			
<b>Course title (and course title in English)</b>	材料熱力学 (材) Thermodynamics of Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, UDA TETSUYA	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>化学ポテンシャルの概念を中心に熱力学の概要を復習し、多成分・多相平衡時に、化学ポテンシャルが満たすべき条件を授業する。各温度での相平衡関係の軌跡として、温度-組成の状態図を説明する。授業の後半では、電極とイオンを含む系の熱力学的な考え方を紹介する。さらに、三元系の化学ポテンシャル図の一般的な考え方と、電位-pH図を紹介する。</p>					
<b>[Course objectives]</b>					
<p>相平衡を化学ポテンシャルを用いて思考できるようになること。温度-組成の状態図とギブズエネルギー曲線の関係を理解すること。ラウール基準、ヘンリー基準の標準状態に習熟すること。電位-pH図などの化学ポテンシャル図の考え方に習熟すること。</p>					
<b>[Course schedule and contents]</b>					
<p>熱力学の基礎&lt;4回&gt;内部エネルギー、エンタルピー、比熱、エントロピーと第2法則、自由エネルギーと変化の方向性</p> <p>化学ポテンシャル&lt;3回&gt;示量変数、示強変数、特に、化学ポテンシャル、組成-dG図と化学ポテンシャル、ギブズの相律、相平衡、理想溶体、ヘンリー基準、ラウール基準、標準状態と活量、溶体モデルの相平衡</p> <p>状態図&lt;1回&gt;状態図とギブズエネルギー曲線の関係、二元系における種々の不変反応、実在系の状態図</p> <p>電極とイオンの平衡論&lt;2回&gt;電極電位、起電力、イオンの標準状態、標準水素電極</p> <p>化学ポテンシャル図(電位-pH図)&lt;3回&gt;三元系の化学ポテンシャル図、電位-pH図</p> <p>レポート課題解答と概説&lt;1回&gt;</p> <p>フィードバック&lt;1回&gt;</p>					
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Continue to 材料熱力学 (材) (2)					

## 材料熱力学（材）(2)

### [Course requirements]

None

### [Evaluation methods and policy]

以下の要素で評価する。(1) 定期試験（筆記）(2) レポートの提出(13回)及び平常点。定期試験の点数割合は60%程度とする。出席は毎回とる。

### [Textbooks]

Not used

### [References, etc.]

#### ( Reference books )

粟倉泰弘 他 『金属物理化学』(日本金属学会) ISBN:4889030115

D.R.Gaskell 『Introduction to the Thermodynamics of Materials』 ISBN:9781591690436

### [Study outside of class (preparation and review)]

第一回の授業で配布するレジメを必ず目を通してから授業を受けること。  
授業後は、宿題を毎回提出のこと

### ( Other information (office hours, etc.) )

できるだけ授業後に質問してください。その他の場合には、授業で知らせるメールアドレスでアポイントをしてください。

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35200 LJ75				
<b>Course title (and course title in English)</b>	高分子材料概論 (材) Introduction to Polymer Materials		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer,SAWAMOTO MITSUO Graduate School of Engineering Associate Professor,YUGE KORETAKA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,3times, ,4times, ,4times, ,2times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- Continue to 高分子材料概論 (材) (2)					

高分子材料概論 (材) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35203 LJ77 U-ENG25 35203 LJ52 U-ENG25 35203 LJ28			
<b>Course title (and course title in English)</b>	原子炉物理学 (原) Nuclear Reactor Physics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, HINOKI TATSUYA	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Fri.1	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,4times, ,4times, ,3times, ,3times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
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Continue to 原子炉物理学 (原) (2)					

原子炉物理学 (原) (2)

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Courses delivered by instructors with practical work experience]**

(1) Category

A course with practical content delivered by instructors with practical work experience

(2) Details of instructors ' practical work experience related to the course

(3) Details of practical classes delivered based on instructors ' practical work experience

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35233 LJ75				
<b>Course title (and course title in English)</b>	結晶回折学 (材) Xray Diffraction		<b>Instructor's name, job title, and department of affiliation</b>	Part-time Lecturer, OKUDA HIROSHI	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Fri.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
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.					
<b>[Course schedule and contents]</b>					
<p>Basic properties of x-rays, 3 times, 1. X-rays 2. Continuous x-rays 3. Characteristic x-rays 4. X-ray absorption 5. X-ray filter 6. Generation of x-rays</p> <p>Crystallography, 3 times, 1. One dimensional crystal symmetry 2. 7 crystal systems and 14 Bravais lattices 3. Practical examples of crystals 4. Body-centered cubic, face-centered cubic and hexagonal close-packed lattices 6. Crystalline structures of several compounds</p> <p>Description of crystal planes and directions, 1 time, 1. Description of lattice planes and directions 2. Stereo projection</p> <p>Diffraction by crystals, 3 times, 1. Diffraction by crystalline lattice 2. Bragg conditions and scattering angle 3. Calculation of structure factors</p> <p>Diffraction by a powder sample, 1 time, 1. Principle of diffractometer 2. X-ray diffraction by powder sample</p> <p>Structural analyses of cubic systems, 1 time, 1. Determination of a lattice parameter in cubic systems 2. Determination of Bravais lattices in cubic systems</p> <p>Reciprocal lattice and diffraction condition, 3 times, 1. Definition of reciprocal lattices 2. Reciprocal lattice and real lattice 3. Reciprocal lattice and diffraction condition</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
The course will be evaluated from the scores of a midterm examination (40%) and a final examination (60%).					
Continue to 結晶回折学 (材) (2)					

結晶回折学 (材) (2)

**[Textbooks]**

Instructed during class

**[References, etc.]**

( Reference books )

**[Study outside 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.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25300 LJ77 U-ENG25 25300 LJ71			
<b>Course title (and course title in English)</b>	エレクトロニクス入門 (機宇) 情報 Introduction to Electronics		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor, HASHIMOTO MASANORI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Mon.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
In this course, students will learn about the basic characteristics of electronic circuits, digital circuits that are indispensable in today's information society, and computer architecture as hardware for running programs.					
<b>[Course objectives]</b>					
In this course, students will learn the minimum level of electronic circuits required for research in the Department of Physics and the Department of Computer Science, and as researchers and engineers.					
<b>[Course schedule and contents]</b>					
The order and number of lectures for each topic are not fixed, and are subject to change by the lecturer depending on the lecture policy of the instructor and the background and understanding of the students.					
<ul style="list-style-type: none"> <li>* Fundamentals of Electronic Circuits (3 classes) Learn DC, AC, and transient analysis.</li> <li>* Amplification Circuits (1 class) Learn about amplification circuits using operational amplifiers.</li> <li>* Fundamentals of digital logic circuits (1 class) Learn fundamentals of logic circuits including Boolean algebra, Karnaugh diagrams, etc.</li> <li>* Sequential circuits (1 class) Learn how to construct circuits with internal states.</li> <li>* Circuit Delay (1 class) Learn about what determines the operating speed of a circuit.</li> <li>* Digital representation of numbers (1 class) Learn how to represent numbers including floating point format, which is often used in scientific and technological calculations.</li> <li>* Arithmetic logic circuits (1 class) Learn about the structure of arithmetic circuits for digitally represented numbers.</li> <li>* Overview of computer architecture (1 class) Learn about the configuration of computers, the hardware that executes programs.</li> <li>* Machine language (1 class) Learn about the relationship between high-level languages such as C and instructions that can be interpreted by hardware.</li> <li>* Composition of computer architecture (2 classes) Learn about the composition and operation of computers, using a processor that can execute simple instructions as an example.</li> <li>* Integrated circuit manufacturing process (1 class)</li> <li>* Feedback (1 class)</li> </ul>					
Translated with <a href="http://www.DeepL.com/Translator">www.DeepL.com/Translator</a> (free version)					
Continue to エレクトロニクス入門 (機宇) 情報 (2)					

エレクトロニクス入門(機宇) 情報 (2)

**[Course requirements]**

Students who do not specialize in electrical and electronic engineering can take this course if they have some prior knowledge of high school physics.

**[Evaluation methods and policy]**

Multiple report assignments will be given during the course to evaluate the achievement of the objectives.

**[Textbooks]**

Not used

**[References, etc.]**

**( Reference books )**

Introduced during class

**[Study outside of class (preparation and review)]**

Students are required to review mathematical expressions using complex numbers in advance.

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 35301 LJ71 U-ENG25 35301 LJ51 U-ENG25 35301 LJ25			
<b>Course title (and course title in English)</b>	生体機械工学 Biomechanical Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Institute for Life and Medical Sciences Professor, SHINTAKU HIROFUMI Institute for Life and Medical Sciences Professor, ADACHI TAJI Graduate School of Engineering Professor, YOKOKAWA RYUUI Graduate School of Engineering Professor, INOUE YASUHIRO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>生体あるいは医療に関わる機械システム設計において、物理学に根ざした視点からの生命現象理解は生体および機械を包含したシステム全体の設計指針を得る上で重要である。そこで、生体分子、細胞および組織スケールで観察される複雑な生命現象について物理学的視点から理解し、その知見を基にして生体システムを機械工学的に操作あるいは利用する方法を学ぶ。</p>					
<b>[Course objectives]</b>					
<p>生体システムや医療機械システム等の具体的かつ身近な対象を題材とし、2回生配当である熱力学、材料力学、流体力学等の機械工学科目が生体システムの理解あるいは制御の上で重要な洞察を与えることを学ぶ。これにより、機械工学に対する俯瞰的視点を得ると共に機械工学の立場から生命現象を工学応用する能力を身につける。</p>					
<b>[Course schedule and contents]</b>					
<p>各項目には記載の週数・回数を充てる。 各項目・小項目の講義の順序、それぞれに充てる講義週数は固定したものではなく、担当者の講義方針と履修者の背景や理解の状況に応じて、講義担当者が適切に決める。 講義の進め方については適宜、指示をして、履修者が予習をできるように十分に配慮する。</p> <p>1週：生体機械工学の考え方（新宅） 生体機械工学は、生体分子、細胞から組織や器官、あるいは体全体まで、その機能と構造を物理工学の観点から解析し、得られる知見を医療や福祉に応用し、社会的な諸問題の解決に寄与する学問である。第1週は、生命現象を定量的に取り扱い、その背後にある物理の理解に必要な数理モデルの考え方、数や量の見積もり方を紹介する。</p> <p>2週 - 4週：生体機械工学と熱力学（新宅） 細胞を構成する様々な小器官は、それぞれの固有の機能を発揮できる形や構造をしている。これらの小器官の形状を考察する上で力学的・熱的平衡に注目する。細胞小器官スケールでは熱的な擾乱の取り扱いが必要であることから平衡の統計力学の手法を紹介する。ボルツマンの関係式から得られるエントロピーを用いてエントロピー最大化、自由エネルギーの最小化と熱的平衡の関係について学ぶ。さらに、系の微視的状态の実現確率とエネルギーの依存関係がボルツマン分布で記述できることを示す。</p> <p>5 - 6週：生体機械工学と材料力学（新宅）</p>					
----- Continue to 生体機械工学(2) -----					

## 生体機械工学(2)

自由結合鎖モデルを導入し、DNAのエントロピー弾性を力学的・熱的平衡を通して理解することを目指す。1次元のランダムウォークを仮定し、末端間距離の確率密度関数を導出する。そして、自由結合鎖のエントロピー弾性を特徴づけるばね定数を導出し、その特徴について議論する。また、エントロピー弾性の簡単な実験を実施する。

### 7 - 8 週：生体機械工学と流体力学（新宅）

生体分子は常に熱的な擾乱にさらされており、例えば細胞質内部においてもブラウン運動を示す。1次元のランダムウォークがブラウン運動のモデルとしても有用であることを紹介し、第一種散逸揺動定理について考察する。まずは、エントロピーを出発点に希薄溶液系における浸透圧を統計力学的な方法で導出する。その上でミクロスケールの球形粒子の拡散係数がストークス - アインシュタインの関係式として与えられることを示す。

### 9 - 10 週：生体機械工学と機械力学（新宅）

ブラウン運動のモデルとしてランジュバン方程式が有用であることを紹介し、第二種散逸揺動定理について考察する。ランジュバン方程式を用いて平均二乗変位を導出し、それがブラウン粒子の運動を特徴づけることを示す。また、速度相関から揺動力の大きさについて考察する。

### 11 - 12 週：生体機械工学と生物学（安達、井上）

受精卵から始まる個体発生を経て、体を構成する器官がどのように形作られるのか、また、成体における組織のリモデリングや再生現象を紹介し、先端的な生体機械工学の応用に必要となる幹細胞分化、形態形成、生体適応などの生物学の基礎的事項について紹介する。さらに、形態と機能の観点から、進化的に獲得された生物の形作りと構造最適化設計との類似性を解説し、力学を基礎とする機械工学の生物学への応用や、その逆として、生物に着想を得た構造設計工学への新たな展開を解説する。

### 13 週：生体機械工学による生体模倣システム（横川）

生体模倣システム（Microphysiological systems (MPS)）とは、マイクロチップ上に幹細胞や前駆細胞から誘導したミニ臓器を構築し、培養液などの送液システム、各種分析装置などをパッケージしたヒト生理機能を模倣するシステムである。ヒトiPS細胞からの形態形成や腫瘍微小環境における生化学シグナルの解析といった基礎研究、創薬や再生医療などの応用研究に展開されており、MPSの設計開発における生体機械工学からの展開を解説する。

### 14 週：生体機械工学による生体計測（新宅）

最先端科学研究では生体機能発現の構成的理解を目指し1つ1つの細胞機能を詳細に計測する1細胞解析が用いられており、そこには多くの機械工学技術が活用されている。ここでは細胞分化や細胞間相互作用の解析などの具体例を示しながら1細胞解析技術の開発設計における生体機械工学の応用を解説する。

## [Course requirements]

None

## [Evaluation methods and policy]

レポート課題（4割）、期末試験（6割）を総合して判定する。  
工学部の成績評価の方針に従って評価する。

Continue to 生体機械工学(3)

生体機械工学(3)

**[Textbooks]**

Not used

**[References, etc.]**

( Reference books )

Rob Phillips, Jane Kondev, Julie Theriot 『細胞の物理生物学』 ( 共立出版 )

David Boal 『細胞のメカニクス』 ( 森北出版 )

土井正男 『統計力学』 ( 朝倉書店 )

田崎晴明 『熱力学=現代的な視点から』 ( 培風館 )

米沢富美子 『ブラウン運動』 ( 共立出版 )

**[Study outside of class (preparation and review)]**

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 35302 LJ75				
<b>Course title (and course title in English)</b>	量子無機材料学 (材) Electronic Structures of Inorganic Materials		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SEKO ATSUTO	
<b>Target year</b>	3rd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Tue.2	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>材料の機能は電子状態に由来するため，材料設計を行う上で電子状態を把握することが重要となる。本講義では，原子，分子，固体の電子状態の理解に有用な量子化学やバンド理論について，基礎となる理論や計算手法を講述する。また，無機材料の電子状態と機能の関係について，実例を挙げて説明する。</p>					
<b>[Course objectives]</b>					
<p>量子化学およびバンド理論の基礎事項に加え，それらを材料科学における問題に応用するための方法や考え方を習得する。</p>					
<b>[Course schedule and contents]</b>					
<p>電子状態理論と材料科学,1回,材料の研究・開発における電子状態理論の役割について講述する。  電子状態理論の基礎,2回,波動関数，一電子エネルギーの性質や物理的意味，自由電子モデルについて講述する。  量子化学計算の理論と近似および手法(1),4回,変分法や摂動法等，量子化学に関わる理論や近似について講述する。  量子化学計算の理論と近似および手法(2),3回,電子状態の理解に有用な量子化学計算について，ハートリー近似およびハートリー-フォック近似を中心に講述し，適用例を紹介する。  バンド計算の理論と近似および手法,2回,固体の計算に有用なバンド計算手法について，密度汎関数理論，擬ポテンシャル，波動関数の基底関数展開を中心に講述する。  分子・固体の電子構造と化学結合,2回,分子・固体の電子構造および化学結合について講述する。  学習到達度の確認,1回,本講義で学習した内容について，到達度を確認する。</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<p>原則として定期試験で評価するが，演習・レポートの結果を加味することがある。</p>					
Continue to 量子無機材料学 (材) (2)					

## 量子無機材料学 (材) (2)

### [Textbooks]

田中功、松永克志、大場史康、世古敦人 『材料電子論入門』 (内田老鶴圃) ISBN:978-4-7536-5559-5  
プリントを配布

### [References, etc.]

#### ( Reference books )

A. ザボ, N.S. オストランド 著, 大野公男, 阪井健男, 望月祐志 訳 『新しい量子化学 電子構造の理論入門 上 』 (東京大学出版会) ISBN:9784130621113  
原田義也 『量子化学 上巻』 (裳華房) ISBN:9784785330736

#### ( Related URLs )

<http://cms.mtl.kyoto-u.ac.jp/seko.html>

### [Study outside of class (preparation and review)]

講義中に配布される課題を実施してください。

#### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 25303 LJ75			
<b>Course title (and course title in English)</b>	材料科学序論 Introduction to Materials Science and Engineering		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor,SEKO ATSUTO	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Wed.3	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>材料科学は，原子結合・結晶構造・格子欠陥などの基礎的物理概念に加え，相平衡，相変態，拡散などの熱力学・統計力学的概念を基盤とし，材料の力学的・熱的・電氣的・磁氣的性質を理解する学問である．本講義では，これら基礎科学的な原理と，金属やセラミックスなど主要材料群の挙動との関連を示しながら，材料科学において必要な基礎を確立することを目的とする．</p>					
<b>[Course objectives]</b>					
<p>材料科学における結晶構造や欠陥などの基礎概念，および力学的・熱的・電氣的・磁氣的性質の起源を理解し，金属やセラミックスなどの代表的材料の構造と特性の基礎的な説明方法を習得する．</p>					
<b>[Course schedule and contents]</b>					
<p>金属材料における凝固現象（1回）金属の凝固過程と結晶成長の基本を理解する．  金属材料における組織形成（1回）加工・熱処理による金属組織の変化を学習する．  材料科学における固体化学（1回）固体中の結合，欠陥，化学反応の基礎を学習する．  材料科学における電気化学（1回）電極反応や腐食など電気化学的性質を学習する．  材料科学における熱力学（1回）熱力学の概念を用い，材料の相平衡や反応挙動などを理解する．  材料科学における統計力学（1回）材料特性の起源を統計力学的視点から理解する．  材料科学における量子力学（1回）電子状態と物性の量子論的基礎を学習する．  材料科学における数学（1回）材料科学に必要な基本的数学手法の役割を学習する．  材料科学における表面・界面物性（2回）表面や界面構造の基礎を理解し，界面現象と材料特性・機能性の関係を学習する．  固体における磁性（2回）固体における磁性現象の基本的な原理を理解する．  固体における拡散現象（1回）固体中の物質移動とその基礎法則を学習する．  固体における力学特性（1回）固体の変形・破壊挙動の基礎を理解する．  学習到達度の確認（1回）本講義で学習した内容について，到達度を確認する．</p>					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
原則としてレポート試験により評価する．					
----- Continue to 材料科学序論(2) -----					

材料科学序論(2)

**[Textbooks]**

Instructed during class

**[References, etc.]**

**( Reference books )**

松原 英一郎・田中 功・大谷 博司・安田 秀幸・沼倉 宏・古原 忠・辻 伸泰 『金属材料組織学』(朝倉書店) ISBN:978-4-254-24018-4

**[Study outside of class (preparation and review)]**

講義中に配布される課題を実施してください。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45995 GJ77			
<b>Course title (and course title in English)</b>	特別研究 1 (機) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NISHIWAKI SHINJI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
成績評価は一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
配属研究室で指定される。					
Continue to 特別研究 1 (機) (2)					

特別研究 1 (機) (2)

**[References, 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

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45995 GJ77			
<b>Course title (and course title in English)</b>	特別研究 1 (機) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NISHIWAKI SHINJI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
物理工学科機械システム学コースが指定する、入学年次に対応する特別研究着手条件を満たしていること。					
<b>[Evaluation methods and policy]</b>					
成績評価は一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
配属研究室で指定される。					
----- Continue to 特別研究 1 (機) (2) -----					

特別研究 1 (機) (2)

**[References, 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

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45995 GJ77				
<b>Course title (and course title in English)</b>	特別研究 1 (材) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
正副指導教員の指導のもと、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。					
<b>[Course objectives]</b>					
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、研究活動の進め方を習得する。					
<b>[Course schedule and contents]</b>					
設定課題候補の選定 (3回) 先行研究の調査、報告 (6回) 設定課題候補の新規性、独創性等の検討 (6回)					
<b>[Course requirements]</b>					
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					
<b>[Evaluation methods and policy]</b>					
成績は正副指導教員が一連の研究活動の実施状況、作成した報告などに基づいて総合的に評価し材料科学コースの会議で承認する。					
<b>[Textbooks]</b>					
適宜指示する。					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
適宜指示する。					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 45995 GJ77			
<b>Course title (and course title in English)</b>	特別研究 1 (エネ) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
各区分の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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
Not used					
----- Continue to 特別研究 1 (エネ) (2)					

特別研究 1 (エネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45995 GJ77				
<b>Course title (and course title in English)</b>	特別研究 1 (原) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Professor, SAITOU MANABU Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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に主体的に取り組む。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。					
<b>[Course objectives]</b>					
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、研究手法を習得する。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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手条件を満たしていること					
<b>[Evaluation methods and policy]</b>					
成績評価は一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
Not used					
<b>[References, etc.]</b>					
( Reference books ) 各指導教員が紹介する					
<b>[Study outside of class (preparation and review)]</b>					
各指導教員の指示に従うこと					
( Other information (office hours, etc.) )					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 45995 GJ77			
<b>Course title (and course title in English)</b>	特別研究 1 ( 宇 ) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TAKATA SHIGERU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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，熱工学）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．					
<b>[Course objectives]</b>					
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．					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
物理工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ていること．					
<b>[Evaluation methods and policy]</b>					
一連の研究活動の実施状況に基づいて評価する．					
<b>[Textbooks]</b>					
Not used					
----- Continue to 特別研究 1 ( 宇 ) (2)					

特別研究 1 ( 宇 ) (2)

**[References, etc.]**

**( Reference books )**

各担当教員から研究テーマに応じて指示する .

**[Study outside 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 .

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45995 GJ77				
<b>Course title (and course title in English)</b>	特別研究 1 (材) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
正副指導教員の指導のもと、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。					
<b>[Course objectives]</b>					
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、研究活動の進め方を習得する。					
<b>[Course schedule and contents]</b>					
設定課題候補の選定 (3回) 先行研究の調査、報告 (6回) 設定課題候補の新規性、独創性等の検討 (6回)					
<b>[Course requirements]</b>					
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					
<b>[Evaluation methods and policy]</b>					
成績は正副指導教員が一連の研究活動の実施状況、作成した報告などに基づいて総合的に評価し材料科学コースの会議で承認する。					
<b>[Textbooks]</b>					
適宜指示する。					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
適宜指示する。					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 45995 GJ77			
<b>Course title (and course title in English)</b>	特別研究 1 (エネ) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
各区分の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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
Not used					
----- Continue to 特別研究 1 (エネ) (2)					

特別研究 1 (エネ) (2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45995 GJ77				
<b>Course title (and course title in English)</b>	特別研究 1 (原) Graduation Thesis 1		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Professor, SAITOU MANABU Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	4	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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に主体的に取り組む。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。					
<b>[Course objectives]</b>					
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、研究手法を習得する。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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手条件を満たしていること					
<b>[Evaluation methods and policy]</b>					
成績評価は一連の研究活動の実施状況に基づいて行う。					
<b>[Textbooks]</b>					
Not used					
<b>[References, etc.]</b>					
( Reference books ) 各指導教員が紹介する					
<b>[Study outside of class (preparation and review)]</b>					
各指導教員の指示に従うこと					
( Other information (office hours, etc.) )					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Engineering Science					

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (機) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NISHIWAKI SHINJI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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、学士発表会のための資料作成 14 回 学士発表会での発表 15 回 特別研究報告書の訂正					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
成績評価は一連の研究活動の実施状況、学士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 (機) (2)					

特別研究 2 (機) (2)

**[Textbooks]**

各研究室において指定する。

**[References, 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

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (機) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, NISHIWAKI SHINJI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>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。</p> <p>[</p>					
<b>[Course objectives]</b>					
<p>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。</p>					
<b>[Course schedule and contents]</b>					
<p>1 回 設定課題の新規性、独創性等の再検証</p> <p>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</p> <p>11 ~ 13 回 成果のまとめ、特別研究報告書の執筆、学士発表会のための資料作成</p> <p>14 回 学士発表会での発表</p> <p>15 回 特別研究報告書の訂正</p>					
<b>[Course requirements]</b>					
<p>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。</p>					
<b>[Evaluation methods and policy]</b>					
<p>成績評価は一連の研究活動の実施状況、学士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。</p>					
----- Continue to 特別研究 2 (機) (2) -----					

特別研究 2 (機) (2)

**[Textbooks]**

配属研究室で指定される。

**[References, 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

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG25 45998 GJ77				
<b>Course title (and course title in English)</b>	特別研究 2 (材) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
正副指導教員の指導のもと、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。得られた成果を客観的に評価し、論理に基づいて説明する能力を習得する。最終的に研究論文としてまとめる能力を養う。					
<b>[Course objectives]</b>					
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、研究活動の進め方を習得する。					
<b>[Course schedule and contents]</b>					
設定課題の新規性、独創性等の再検証 (1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 (7回) 成果のまとめ、中間発表のための資料作成 (2回) 特別研究中間発表会での発表 (1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 (2回) 特別研究報告書の執筆 (2回)					
上記の研究活動に加え、特別研究報告書の執筆指導を受ける。					
<b>[Course requirements]</b>					
特別研究 1 を履修済みのこと					
<b>[Evaluation methods and policy]</b>					
成績は正副指導教員が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、および特別研究報告書の内容などに基づいて総合的に評価し材料科学コースの会議で承認する。					
<b>[Textbooks]</b>					
適時指示する。					
<b>[References, etc.]</b>					
(Reference books)					
----- Continue to 特別研究 2 (材) (2) -----					

特別研究 2 (材) (2)

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**[Study outside of class (preparation and review)]**

適時指示する。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (エネ) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
各区分の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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
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。					
Continue to 特別研究 2 (エネ) (2)					

特別研究 2 (エネ) (2)

**[Textbooks]**

Not used

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (原) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Professor, SAITOU MANABU Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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に主体的に取り組む。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。					
<b>[Course objectives]</b>					
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、研究手法を習得する。					
<b>[Course schedule and contents]</b>					
1 回 設定課題の新規性、独創性等の再検証 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 11 回 成果のまとめ 12 ~ 14 回 特別研究報告書の執筆 15 回 特別研究報告会での成果発表(ポスター発表)					
<b>[Course requirements]</b>					
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手条件を満たしていること					
<b>[Evaluation methods and policy]</b>					
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。					
<b>[Textbooks]</b>					
Not used					
----- Continue to 特別研究 2 (原) (2)					

特別研究 2 (原) (2)

**[References, etc.]**

( **Reference books** )

Introduced during class

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 ( 宇 ) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, TAKATA SHIGERU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, Second semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<p>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，熱工学）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．</p>					
<b>[Course objectives]</b>					
<p>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．</p>					
<b>[Course schedule and contents]</b>					
<p>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，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</p>					
<b>[Course requirements]</b>					
<p>物理工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．</p>					
<b>[Evaluation methods and policy]</b>					
<p>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評価する．</p>					
Continue to 特別研究 2 ( 宇 ) (2)					

特別研究 2 ( 宇 ) (2)

**[Textbooks]**

Not used

**[References, etc.]**

**( Reference books )**

各担当教員から研究テーマに応じて指示する .

**[Study outside of class (preparation and review)]**

指示された参考書および学术论文等を学期をかけて読み進めること .

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (材) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Professor, FUKAMI KAZUHIRO Graduate School of Engineering Associate Professor, YUGE KORETAKA	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
正副指導教員の指導のもと、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。得られた成果を客観的に評価し、論理に基づいて説明する能力を習得する。最終的に研究論文としてまとめる能力を養う。					
<b>[Course objectives]</b>					
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、研究活動の進め方を習得する。					
<b>[Course schedule and contents]</b>					
設定課題の新規性、独創性等の再検証 (1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 (7回) 成果のまとめ、中間発表のための資料作成 (2回) 特別研究中間発表会での発表 (1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 (2回) 特別研究報告書の執筆 (2回)					
上記の研究活動に加え、特別研究報告書の執筆指導を受ける。					
<b>[Course requirements]</b>					
特別研究 1 を履修済みのこと					
<b>[Evaluation methods and policy]</b>					
成績は正副指導教員が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、および特別研究報告書の内容などに基づいて総合的に評価し材料科学コースの会議で承認する。					
<b>[Textbooks]</b>					
適時指示する。					
<b>[References, etc.]</b>					
(Reference books)					
----- Continue to 特別研究 2 (材) (2) -----					

特別研究 2 (材) (2)

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**[Study outside of class (preparation and review)]**

適時指示する。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (エネ) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Energy Science Professor, MIYAKE MASAO	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
各区分の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。					
<b>[Course objectives]</b>					
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。					
<b>[Course schedule and contents]</b>					
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					
<b>[Course requirements]</b>					
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。					
<b>[Evaluation methods and policy]</b>					
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。					
Continue to 特別研究 2 (エネ) (2)					

特別研究 2 (エネ) (2)

**[Textbooks]**

Not used

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと。

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>		U-ENG25 45998 GJ77			
<b>Course title (and course title in English)</b>	特別研究 2 (原) Graduation Thesis 2		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Faculty members Graduate School of Engineering Professor, SAITOU MANABU Graduate School of Engineering Associate Professor, TSUCHIDA HIDETSUGU	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	6	<b>Year/semesters</b>	2026/Intensive, First semester
<b>Days and periods</b>	Intensive	<b>Class style</b>	Seminar (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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に主体的に取り組む。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。					
<b>[Course objectives]</b>					
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、研究手法を習得する。					
<b>[Course schedule and contents]</b>					
1 回 設定課題の新規性、独創性等の再検証 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 11 回 成果のまとめ 12 ~ 14 回 特別研究報告書の執筆 15 回 特別研究報告会での成果発表(ポスター発表)					
<b>[Course requirements]</b>					
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手条件を満たしていること					
<b>[Evaluation methods and policy]</b>					
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。					
<b>[Textbooks]</b>					
Not used					
----- Continue to 特別研究 2 (原) (2)					

特別研究 2 (原) (2)

**[References, etc.]**

( **Reference books** )

Introduced during class

**[Study outside of class (preparation and review)]**

各指導教員の指示に従うこと

( **Other information (office hours, etc.)** )

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Engineering Science

<b>Course number</b>	U-ENG26 16063 LJ72				
<b>Course title (and course title in English)</b>	電気回路基礎論 Fundamentals of Circuit Theory		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Engineering Program-Specific Professor,HISAKADO TAKASHI	
<b>Target year</b>	1st year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Tue.5	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
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.					
<b>[Course objectives]</b>					
Students are expected to learn the transient analysis by differential equation and steady state analysis by phasor.					
<b>[Course schedule and contents]</b>					
DC circuit,3times,We introduce Kirchhoff's current law and Kirchhoff's voltage law, Ohm's 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.					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
Reports and examinations					
<b>[Textbooks]</b>					
奥村浩士 『エーヌ電気回路理論入門』 (朝倉書店) ISBN:4254227469					
----- Continue to 電気回路基礎論(2)					

## 電気回路基礎論(2)

### [References, etc.]

( Reference books )

### [Study outside of class (preparation and review)]

After the lesson, solve problems in the text.

### ( Other information (office hours, etc.) )

\*Please visit KULASIS to find out about office hours.

### [Essential courses]

Faculty of Engineering,Electrical and Electronic Engineering

<b>Course number</b>	U-ENG29 39025 LJ10 U-ENG29 39025 LJ55				
<b>Course title (and course title in English)</b>	数值解析 Numerical Analysis		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor,FUJIWARA HIROSHI	
<b>Target year</b>	2nd year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/Second semester
<b>Days and periods</b>	Wed.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,6times, ,3times, ,4times, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
<b>[References, etc.]</b>					
( Reference books )					
<b>[Study outside of class (preparation and review)]</b>					
<b>( Other information (office hours, etc.) )</b>					
*Please visit KULASIS to find out about office hours.					
<b>[Essential courses]</b>					
Faculty of Engineering, Informatics and Mathematical Science					

<b>Course number</b>		U-ENG29 49118 LJ55 U-ENG29 49118 LJ10			
<b>Course title (and course title in English)</b>	数理解析 Analysis in Mathematical Sciences		<b>Instructor's name, job title, and department of affiliation</b>	Graduate School of Informatics Professor,FUJIWARA HIROSHI	
<b>Target year</b>	4th year students or above	<b>Number of credits</b>	2	<b>Year/semesters</b>	2026/First semester
<b>Days and periods</b>	Thu.4	<b>Class style</b>	Lecture (Face-to-face course)	<b>Language of instruction</b>	Japanese
<b>[Overview and purpose of the course]</b>					
<b>[Course objectives]</b>					
<b>[Course schedule and contents]</b>					
,1time, ,5times, ,3times, ,2times, ,1time, ,1time, ,1time, ,1time,					
<b>[Course requirements]</b>					
None					
<b>[Evaluation methods and policy]</b>					
<b>[Textbooks]</b>					
----- <b>Continue to 数理解析(2)</b>					

数理解析(2)

**[References, etc.]**

( Reference books )

**[Study outside of class (preparation and review)]**

**( Other information (office hours, etc.) )**

\*Please visit KULASIS to find out about office hours.

**[Essential courses]**

Faculty of Engineering, Informatics and Mathematical Science