Computer Software 1 (2.0credits) (計算機ソフトウェア第１)

Course Type	Basic Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	1 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Toshiro MATSUMOTO Professor	Takayuki TOKOROYAMA Associate Professor	Yasumasa ITO Associate Professor

●Course Purpose

Computer simulations of various physical phenomena are often required in engineering. Therefore, learning computation algorithm and programming language are important. In this lecture, basics of computer programming with Fortran language is learned in order to acquire the basics of software development of numerical calculation using a computer, because in many of the numerical simulations of various physical phenomena, Fortran is used for developing the software. In the class, the students are going to attend the lectures based on given handouts and practice to write basic programs for various example problems and demonstrate the created programs. The students have to

The students' target of this class is acquiring the following knowledge and skills:

Understanding the elements of the Fortran language and being able to write simple programs

Breaking down the problems to be computed into simple computational steps

Understanding algorithms of numerical analyses and developing simple programs of numerical analysis

Applying Fortran programming to automating of data processing consisting of multiple procedures.

●Prerequisite Subjects

Mathematics I, II (Calculus, Linear Algebra)

●Course Topics

1. Basics of programming (editor, compiler, file, programing languages, compilation, execution)
2. Basics of Fortran language grammar

2.1 Structure of a Fortran program

2.1 Read/write statements

2.2 Variables and types

2.3 Computation using integer numbers

2.4 Computation using real numbers and intrinsic procedures

2.5 Conditional statement

2.6 Loop

2.7 Array

2.8 Function and subroutine

3. Programming exercises through examples

●Textbook

Printed handouts will be provided.

●Additional Reading

The FORTRAN 90/95, Hayato Togawa, Saiensu-sha, (in Japanese)

●Grade Assessment

Evaluated with equal weight on every goal. The score will be totally evaluated based on the weight balance of 50% for term examination, 25% for reports, and 25% for effort and attitude in the class. The pass line is 60%.

●Notes

No limitation is given.

●Contacting Faculty

The break after the class and the office hour are used for answering the questions.

Computer Software 2 (2.0credits) (計算機ソフトウェア第２)

Course Type	Basic Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	1 Autumn Semester	
Elective/Compulsory	Compulsory	
Lecturer	Masahiro Arai Professor	Yasumasa ITO Associate Professor

●Course Purpose

Students study C programming on personal computors and some of the basic techniques for numerical analysis.
Goals-%-
1. Students can understand C program.
2. Students can make C program.
3. Students can understand the basic techniques for numerical analysis and make computor program for that.

●Prerequisite Subjects

Computer Software 1
Mathematics (Differentiation,Integration,Linear algebra)

●Course Topics

1. Introduction of C language
2. Introductory program
3. Data Type specifications and data structures
The lectures of each week will be proceeded according to the following schedule.

4. Branch handling
5. Repeating process
6. Array
7. Pointers
8. Function
9. Input/Output for the files
10. Advanced programing (1)
11. Advanced programing (2)

Before taking each lecture, read the relevant text and read through the example program.

●Textbook

Shinban, Meikai C-Gengo, Nyumon-Hen, Boyo Shibata, SoftBank

●Additional Reading

The C Programming Language Numerical Recipes in C.Cambridge University Press

●Grade Assessment

Basically, the score is evaluated by the final exam (or the final exam and the intermediate exam), and the score of the assignment report is added as needed. S, A, B, C ratings are given according to the point. Note that at least 80% of attendance is required to get the credit.

●Notes

nothing special

●Contacting Faculty

In the teacher's office, questions are accepted as appropriate.
Contact address: masahiro.arai@nagoya-u.ac.jp, ext. 3294

Mathematics I and Tutorial (3.0credits) (数学１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	1 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Shigeru SUNADA Professor	Shintarou ITOU Associate Professor	IsakariHiroshi Assistant Professor
	DAISUKE Ichihara Assistant Professor		

●Course Purpose

After studying fundamental mathematics and fundamental physics, you will learn the mathematics required for studying specialized subjects in mechanical engineering. The purpose of this lecture is to systematically acquire knowledge of differential equation and vector analysis, and to understand the connection between the theory and application problems.

The goal is to understand the following items.

1. Understand the fundamental matters about 1st order differential equations and solve them
2. Understand the fundamental matters about 2nd and higher order differential equations and solve them
3. Understand the fundamental matters about simultaneous differential equations and solve them
4. Understand the basics and arithmetic methods of vectors, and solve basic problems.
5. Understand vector functions and apply them to specific application problems.
6. Understand differential and integral operations on vector and scalar fields, and solve basic problems.

●Prerequisite Subjects

Calculus I, Calculus II, Linear Algebra I, Linear Algebra II, Mechanics I, Mechanics II, Electromagnetics I

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Mathematics II and Tutorial (3.0credits) (数学２及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Kenji FUKUZAWA Professor	Koichi TAJI Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

Following Mathematics 1, in order to acquire basic skills to study specialized subjects and exercises, the aim is to learn application the Fourier analysis, which is an important method in engineering, its application to basic partial differential equations, and Laplace transform and its application to ordinary differential equations. At the same time, the purpose is to learn mathematical concepts and connections between theory and applications that appear in concrete problems.

Achievement target
1. Understand and calculate the basics of Fourier series expansion and Fourier transform / inverse transform.
2. Derive simple PDEs and find their solutions.
3. Understand the basics of the Laplace transform and apply it to solving ordinary differential equations.

●Prerequisite Subjects

Fundamental Mathematics I,II,III,IV and V:Mathematics 1 with Exercises

●Course Topics

1.Fourier Series and its Properties
2.Fourier Transform
3.Introduction of Partial Differential Equations
4.Solution method for Partial Differential Equations
5.Lapalace Transform and its Basic Properties
6.Solution method for Ordinary Differential Equations
7.DFT and FFT

Read the relevant part in the textbook before each class, solve the problems in the textbook and review the exercises after the class.

●Textbook

●Additional Reading

●Grade Assessment

Writing Examination (100%). The pass line is 60%. However, students who submit less than 80% of the exercises may not be eligible for the examination.

●Notes

Mathematics 1 and exercises are recommended.

●Contacting Faculty

For general lectures, contact Prof. Fukuzawa or Prof. Taji. For exercises, contact the instructor and TA. If you have any questions outside of these hours, please contact the Professors or instructor by e-mail in advance.

Mechanics of Materials 1 with Exercises (2.5credits) (材料力学第１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Masahiro Arai Professor	Ju Yang Professor	Keita GOTO Assistant Professor
	Yasuhiro KIMURA Assistant Professor		

●Course Purpose

This course introduces the foundations of mechanics of materials involved with the deformation and internal stress of structures and solid materials to students taking this course. The aim of this course is to help students acquire an understanding of the fundamental principles of the relationship between stress and strain through the exercises including tensile stress, bending stress, and thermal stress regarding a bar and beam.Through this lecture, you can learn the basics of solid mechanics, strength design and rigidity design in mechanical engineering and aerospace engineering.

●Prerequisite Subjects

Mechanics I, Mechanics II

●Course Topics

The lectures of each week will be proceeded according to the following schedule.1. Stress and strain2. Tension and compression3. Material stress-strain diagram4. Truss5. Thermal stress6. Shear force and bending moment of beam7. Bending stress of the beam8. Deflection of the beam9. Rod torsionAt the lecture, read the text of the item in advance and read the examples.

●Textbook

"Zukai Hajimeteno Zairyo Rikigaku", Masahiro Arai, Kodansha, ISBN 9784061557970"JSME textbook series Mechanics of Materials", JSME, Maruzen, ISBN 9784888981583

●Additional Reading

“Mechanics of Materials”, Ichiro Nakahara, Yokendo“Kisokaramanaberu Zairyo Rikigaku”, Syoetsu Ito, Morikita

●Grade Assessment

Basically, the score is evaluated by the final exam (or the final exam and the intermediate exam), and the score of the assignment report is added as needed. S, A, B, C ratings are given according to the point. Note that at least 80% of attendance is required to get the credit.

●Notes

No special conditions are required for this lecture

●Contacting Faculty

It corresponds suitably free time of before/after the lecture.masahiro.arai@nagoya-u.jp, ex.3294ju@mech.nagoya-u.ac.jp, ex.4672

Mechanics of Materials 2 with Exercises (2.5credits) (材料力学第２及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Takeo MATSUMOTO Professor	Eijiro MAEDA Associate Professor	Dai OKUMURA Professor

●Course Purpose

In this course, the basics of stress, strain and deformation in mechanics of materials will be lectured.
The aims of this course:
1. Study compound stress and energy methods
2. Study buckling of bars, bending of beams and torsion of shafts
3. Study analysis of rigid frame structures
4. Study analysis of thin-walled pressure vessels

●Prerequisite Subjects

●Course Topics

1. Compound stress
2. Energy methods
3. Buckling of bars
4. L-shaped beam structures
5. Rigid frame structures
6. Thin-walled pressure vessels

Read the part of the textbook before each class. After the class, solve the examples and end-of-chapter problems. Submit reprts on request.

●Textbook

●Additional Reading

Reference books are introduced during class as needed.

●Grade Assessment

The total score is evaluated based on examinations and reports.

●Notes

●Contacting Faculty

Fundamentals of Fluid Mechanics with Exercises (2.5credits) (流体力学基礎及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Yasuhiko SAKAI Professor	Hiroki YAMAGUCHI Associate Professor	Koji IWANO Assistant Professor

●Course Purpose

To understand the fundamental characteristics of fluid motion and learn the physical law for the ideal fluid motion by the Newton Mechanics.

Achievement Objectives:
1. to understand the properties of fluids and the principle of hydrostatics, and be able to make related calculations.
2. to understand the momentum equation of ideal fluid and the energy conservation law, and be able to make related calculations.
3. to understand the momentum law and be able to make practical calculations.
4. to understand the dimensional analysis and similarity law and be able to make related practical calculations.

●Prerequisite Subjects

Mechanics I, II
Calculus I, II
Linear Algebra I, II
Mathematics 1 with Exercises

●Course Topics

1. Units and Properties of Fluid
2. Hydrostatics
3. Fundamental Equations for Ideal Fluid
4. Momentum Theory
5. Dimensional Analysis and Similarity Law

Submit report of specified exercise after each class. Read the text book before each class.

●Textbook

Fandamentals of Fluid Dynamics Vol.1, 2 (K. Nakabayashi et al., Corona Publishing, 1993) ISBN:9784339040470, 9784339040487

●Additional Reading

Exercises on Fluid Engineering (Yoshino,A., Kikuyama,K., Miyata,M. and Yamashita,S., Kyoritsu Shuppan, 1989) ISBN: 4320080505
Fluid Mechanics (JSME Text Series, ed: Japan Society for Mechanical Engineers, Maruzen, 2005) ISBN: 9784888981194

●Grade Assessment

Achievement will be evaluated by Term Examination and Reports for Exercises.
Term Examination 80%, Reports for Exercises 20%. The full mark is 100 points, and the passing mark is 60 points or more. The result for the absentee of the term examination is handled as "absence".

●Notes

There are no requirements.
This course will be taught in Japanese.

●Contacting Faculty

After the classes or exercises.

Viscous Fluid Dynamics with Exercises (2.5credits) (粘性流体力学及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Yasuhiko SAKAI Professor	Kouji NAGATA Professor	Yasumasa ITO Associate Professor
	Tomoaki WATANABE Assistant Professor		

●Course Purpose

Aims and goals of this course are to learn and understand
1. governing equations for viscous fluid dynamics and their exact or approximated solutions in several types of flows,
2. various fluid dynamical phenomena appearing in viscous flows such as boundary layers, separation, losses in pipelines, fluid forces acting on an object, etc.

●Prerequisite Subjects

Fundamental fluid mechanics with exercises

●Course Topics

1. Governing equations for viscous fluids
2. Exact solution of Navier-Stokes equations
3. Boundary layer theory
4. Fundamentals in turbulent flows
5. Wall turbulenc
6. Losses in pipelines
7. Fluid forces acting on an object (drag force, lift force)

Exercises are given every week. Part of the questions are solved in the class and the rest is assigned as homework.

●Textbook

Fundamentals of Fluid Dynamics Vol.1 and Vol.2 by K. Nakabayashi et al. (Corona Publishing)

●Additional Reading

Exercises on Fluids Engineering by Yoshino, A., Kikuyama, K., Miyata, M. and Yamashita, S., (Kyoritsu Shuppan)

Fluid Mechanics, JSME Text Series (ed: Japan Society for Mechanical Engineers, Maruzen)

●Grade Assessment

Regular examination (80%) and reports at the exercise class (20%). The minimum requirement to get the credits is comprehension of the basic phenomena in viscous flows.

The passing mark is 60 points out of the full mark: 100 points. The absentee of the term examination is treated as "absentee".

(Grading)
S:100-90, A:89-80, B:79-70, C:69-60, F:59-0

●Notes

Derivation and integration, vector analysis. It is desired to have taken the Fundamentals of fluid dynamics with exercises.

●Contacting Faculty

During and after the classes.

Thermodynamics with Exercises (2.5credits) (熱力学及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Hosei NAGANO Professor	"YAMAMOTO Kazuhiro" Associate Professor	Ryo YOSHIIE Associate Professor
	Ai UENO Assistant Professor	Hiroki WATANABE Assistant Professor	

●Course Purpose

This subject gives an introduction to thermodynamics and its application to Mechanical and Aerospace Engineering.

●Prerequisite Subjects

Mathematics, Chemistry

●Course Topics

1.Thermal Equilibrium and Temperature
2.The First Law of Thermodynamics
3.The Second Law of Thermodinamics
4.Entropy
5.Thermodynamic Functions
6.Phase Equilibrium and Chemical Equilibrium
7.Kinetic Theory and Statistical Mechanics

●Textbook

Thermodynamics (in Japanese) JSME Textbook series, JSME.

●Additional Reading

●Grade Assessment

Examination and Reports of Homework

100-90 point: S, 89-80 point: A, 79-70 point: B, 69-60 point: C, less than 59 pint: F

●Notes

●Contacting Faculty

If you have any questioins, ask away in class, or contact uprightly after lecture, by telephone or e-mail.

Contact address
Prof. Kasahara ext:4404, e-mail:kasahara@nuae
Prof. Nagano ext:4470e-mail:nagano@mech

Heat Transfer Engineering with Exercises (2.5credits) (伝熱工学及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Ichiro NARUSE Professor	Hosei NAGANO Professor	Ai UENO Assistant Professor
	Yasuaki UEKI Associate Professor		

●Course Purpose

Learning the fundamental theory on conductive, convective and radiative heat transfers, and their applications like heat exchangers.Aim* Understanding steady and unsteady conductive heat transfer by Fourier's law* Explaining the principle of forced and natural convection* Explaining the phenomena of surface radiative heat transfer by understanding fundamentals on radiaton laws* Learning design of heat exchanger

●Prerequisite Subjects

Thermodynamics with Exercises Energy Conversion Engineering Fluid Mechanics 1 with Exercise Fluid Mechanics 2 Mathematics 1 and 2 with Exercises

●Course Topics

1. Introduction on mechanisms of heat transfer2. Conductive heat transfer Fourier's law and equation of thermal conduction/ Steady conductive heat transfer/Unsteady conductive heat transfer3.Convective heat transfer Forced convective heat transfer/Natural convective heat transfer/Overall heat transfer4. Thermal Radiation Fundamental laws for thermal radiation/Emissivity and angle factor/Enclosure theory 5. Heat exchanger Parallel flow/Counter flow/NTU

●Textbook

JSME Textbook Series "Heat Transfer"ISBN978-4-88898-120-0

●Additional Reading

●Grade Assessment

Examination(80%) and practice/reports(20%)60-69: C70-79: B80-89: A90-: S

●Notes

Attending the lecture and its tutorial and submitting the homework assigned during the lecture

●Contacting Faculty

Send your questions by E-mail.

Kinematics of Machines (2.0credits) (機構学)

Course Type	Basic Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	2 Autumn Semester	
Elective/Compulsory	Compulsory	
Lecturer	Yoji YAMADA Professor	Yasuhisa Hasegawa Professor

●Course Purpose

The course deals with various kinds of mechanisms used in mechanical systems, and their motion analysis methodologies. First, we review kinematics of rigid body as a basis of motion analysis of machinery, and overview the methodology for basic elements of mechanism. Second, we study typical transmission mechanisms including gears and friction wheels. Amongst them have we link mechanisms, we introduce kinematics for more complicated mechanisms such as a serial link robot manipulator. In addition, we develop statics of the manipulator for analyzing forces acting on it.
As above, the objective of the class is to learn kinematics through "the mechanism" that is the imperative construct of many machines and wear underlying knowledge to be useful in designing various machine systems, a basis of the mechanical engineering.

●Prerequisite Subjects

Calculus and , Vector and linear algebra, Mechanics and .

●Course Topics

Contents:
1.Basic concepts and terminology of mechanisms
2.Kinematics of mechanisms (translational/rotational motion, instantaneous center, velocity and acceleration)
3.Various transmission mechanisms(friction wheel, cam, gear, belt pulley)
4.Linkage mechanism 5.Robot kinematics (homogeneous transformation, statics)

●Textbook

(Class A)
Printed materials will be handed out.
(Class B)
Kinematics of Machinery, Horikita PublishingISBN 9784627665217

●Additional Reading

1.For detailed information on generic and conventional issues on mechanisms:
1)Yoshihiko Yasuda: Study of Mechanism, revised edition, Corona Publishing Co., Ltd., 2005, ISBN 978-4-339-04069-2
2)Japan Society of Mechanical Engineers: Kinematics of Machinery, Maruzen Co., Ltd., 2008, ISBN 978-4-88898-167-5
3)Hamilton H. MabieCharles F. ReinholtzMechanisms and Dynamics of MachineryJohn, Wiley, and Sons, Inc.1987ISBN 13-978-0-471-80237-2
4)Asok Kumar Mallik, Amitabha Ghosh, Gunter Dittrich: Kinematic Analysis and Sythesis of Mechanisms, CRC Press Inc., 1994, ISBN 0-8493-9121-0

2.Robotics-related books are useful to refer on 3D motion analysis. For example,
1)Tsuneo Yoshikawa, Fundamentals of Robot Control, Corona Publishing Co., Ltd., 1988, ISBN 978-4-339-04130-9
2)Tsai, Lung-WenRobot analysisthe mechanics of serial and parallel manipulatorsJohn, Wiley, and Sons, Inc.1987ISBN 0-471-32593-7

●Grade Assessment

(Class A)
Each student taking the course will be evaluated by the reports on homework assignment handed in (55%) and the results of {mid-term, final} Examinations (45%).
(Class B)
Each student taking the course will be evaluated by reports and score of final examination.

●Notes

It is desirable to have finished courses as differential calculus and integral calculus I, linear algebra I, theory of functions of complex variables, vector mathematics, dynamics I and analytical mechanics. However, the necessary contents will be reviewed in the class.

●Contacting Faculty

(Class A)
Prof. Yamada will welcome and handle questions in the class. After the class, the teaching assistant (TA) will work as an initial contact for the staff to solve questions of the questioner.
E-mail: yamada-yoji@mech.nagoya-u.ac.jp
(Class B)
Please contact to hasegawa@mein.nagoya-u.ac.jp, if you have any question.

Science of Materials 1 (2.0credits) (材料科学第１)

Course Type	Basic Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	2 Autumn Semester
Elective/Compulsory	Compulsory
Lecturer	Dai OKUMURA Professor Yuki TOKU Lecturer

●Course Purpose

In this course, the microstructures in materials will be lectured form atomistic viewpoint, as well as macroscopic thermodynamics on equilibrium and reaction. Subsequently, the concept for understanding the material properties based on microscopic standpoints will be instructed. The aims of this course are the following-%- 1. Understand internal state of materials like crystal structure and microstructure, and be able to explain them. 2. Understand defects in crystals like lattice defects, dislocations, and grain boundaries, and be able to explain them. 3. Understand the thermodynamics on equilibrium and reaction, and be able to explain them.

●Prerequisite Subjects

NA

●Course Topics

1. Outline of the Materials Science 2. Electronic structure in atoms and inter-atomic forces 3. Configuration of atoms, and crystal structures 4. Point, line and plane defects in crystal structures 5. Thermodynamics and phase equilibrium 6. Phase diagrams for two-component systems 7. Kinetics of reaction, diffusion, and phase transformation

Read the part of the textbook before each class. After the class, solve the examples and end-of-chapter problems. Submit reports on request.

●Textbook

Principles of Engineering Materials,by C.R.Barret,W.D.Nix and A.S.Tetelman

●Additional Reading

Reference books are introduced during class as needed.

●Grade Assessment

Equivalent weight for every aims. The score will be totally evaluated under the weight balance of 80% for terminal examination and 20% for attitude for the class. The pass line is 60%. Contact address-%- dai.okumura@mae.nagoya-u.ac.jp, ext. 2671, toku@mech.nagoya-u.ac.jp, ext. 4673

●Notes

NA

●Contacting Faculty

Anytime.

Analytical Mechanics and Tutorial (2.5credits) (解析力学及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Akinori YOSHIMURA Associate Professor	Hisataka MARUYAMA Associate Professor	Shinya SAKUMA Assistant Professor
	Kohei YAMAGUCHI Assistant Professor		

●Course Purpose

In this subject, the students, who had learned the mechanics based upon the Newton's equation of motion, study the Hamilton's principle,from which the Lagrange's equation of motion and the Hamilton's canonical equation are derived. Introducing generalized momentum they study the way how to treat motions of complex systems including many degrees of freedom

Goals:
1.To understand and explain principle of virtual work and Hamilton's principle.
2. To understand Lagrange's equations of motion, and to solve specific problems.
3. To understand and explain Hamilton's canonical equations and canonical transformation.
4. To understand and explain general theory of the vibration.

●Prerequisite Subjects

Calculus I,
Calculus II,
Linear Algebra I,
Linear Algebra II,
Mechanics 1,
Mechanics 2, and
Mathematics I and Tutorial

●Course Topics

1.Principle of virtual work and D'alambert's principle
2.Hamilton's principle and Law of least action
3.Lagrange's equation of motion
4.Hamilton's canonical equation
5.Canonical transformation
6.Theory of oscillations in linear systems
7.Introduction to quantum mechanics

Report will be assigned in each exercise class. Students must submit the reports at the beginning of the next exercise class.

●Textbook

Mechanics 2 - Analytical Dynamics - : A. Harashima (Syokabo)
ISBN-10: 4785320125

Supplement materials will be distributed if necessary.

●Additional Reading

Analytical Dynamics for Engineering Students: T Kawabe (Shokabo)
Mechanics 1 : A. Harashima (Syokabo)

Classical Mechanics : .H.Goldstein(Addison-Wesley)

●Grade Assessment

Attainment of the goals Examination(80%) and Reports of Homework(20%)

10090 point: S8980 point: A7970 point: B6960 point: Cless than 59 pint: F

●Notes

It is desirable (but not required) that students have got credits of following lectures:
Calculus I,
Calculus II,
Linear Algebra I,
Linear Algebra II,
Mechanics 1,
Mechanics 2,
Mathematics I and Tutorial.

●Contacting Faculty

If you have any questioins, ask away in class, or contact uprightly after lecture, by telephone or e-mail.
Contact address
Associate Prof. Maruyama ext: 5026, e-mail: hisataka@mech
Associate Prof. Yoshimura ext: 4407, e-mail: akinori.yoshimura@mae

Vibration Engineering 1 with Exercises (2.5credits) (振動工学第１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Tsuyoshi INOUE Professor	ShogoOKAMOTO Associate Professor	Shota YABUI Assistant Professor

●Course Purpose

In this lecture, students will learn the fundamentals of vibration engineering required for dynamic design and structural analysis of machines. The purpose of this course is to develop practical skills by solving many practice problems.

The goal of this lecture is to be able to do the following:
1. Capture the vibration phenomena of various machines using one-degree-of-freedom system or multi-degree-of-freedom system
2. Understand its vibrational properties and predict possible vibration phenomena

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Vibration Engineering 2 with Exercises (2.5credits) (振動工学第２及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Tsuyoshi INOUE Professor	ShogoOKAMOTO Associate Professor	Shota YABUI Assistant Professor

●Course Purpose

The purpose of this lecture is to deepen the understanding of the fundamentals and their applications of Lagrangian equation, vibration in continuos body, self-excited vibration, rotating body vibration and nonlinear vibration.

The goal of this lecture is to be able to do the following:

1. Capture the vibration phenomena of various machines using continuous body
2. Understand its vibrational properties and predict possible vibration phenomena
3. Understand fundamentals of self-excited vibration
4. Understand fundamentals of vibration of rotating body
5. Understand fundamentals of nonlinear vibration

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Control Engineering 1 with Exercises (2.5credits) (制御工学第１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Shunichi AZUMA Professor	ARIIZUMI Ryo Assistant Professor	Tadayoshi AOYAMA Associate Professor

●Course Purpose

This course presents the analysis and control methods of dynamical systems on frequency domain. Students will obtain basic knowledge of feedback control systems.

●Prerequisite Subjects

●Course Topics

1.Outline of the control system design(Classic control theory) 2.Modeling of the control system 3.Characteristic analysis 4.Frequency response and Bode diagram 5.Stability algorithms and stability margins 6.Control system design

●Textbook

●Additional Reading

●Grade Assessment

Examination and Exercise

●Notes

●Contacting Faculty

Control Engineering 2 with Exercises (2.5credits) (制御工学第２及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Toru ASAI Associate Professor	Daisuke TSUBAKINO Lecturer	ARIIZUMI Ryo Assistant Professor

●Course Purpose

This course deals with analysis and synthesis of linear control systems in time domain by the state space method.

By the end of the course, students should be able to do the following:
1. understand the concept of controllability and observability,
2. design regulators using the pole assignment, and
3. design observers.

●Prerequisite Subjects

Control Engineering 1 with Exercises, Linear Algebra I, II, Calculus I, II, Mathematics I and Tutorial

●Course Topics

1. Introduction
2. Modeling; state equations, solutions of state equations and its stability, state equations and transfer functions
3. Analysis of control systems; controllability and observability, system's structure, realization problem
4. Regulator; state feedback and pole assignment
5. Observer; full order observer, minimal order observer

Exercises are included in the class. Submitted answer sheets are graded and returned. Homework is assigned several times.

●Textbook

T. Yoshikawa and J. Imura, "Modern Control Theory", Corona Publishing (in Japanese)

●Additional Reading

M. Ito, "Automatic Control (II)", Shokodo (in Japanese)
Y. Hayakawa et al., "Systems and Control", Ohmsha (in Japanese)

●Grade Assessment

Grading will be decided based on regular assignments, exercises, and written examination(s).

●Notes

There is no specific requirement for registration, but it is preferable that students are familiar with basic concepts regarding matrices.

●Contacting Faculty

Questions are accepted during the lecture or a break after the lecture. Students can also ask questions by email.

Electric Circuits Engineering with Exercises (2.5credits) (電気回路工学及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	2 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Tatsuya SUZUKI Professor	Junpei SAKURAI Associate Professor	Hiroyuki OKUDA Assistant Professor
	Chiemi OKA Assistant Professor		

●Course Purpose

The aim is to understand the characteristics of fundamental circuit elements and to study various analytical methods for electrical circuits.

Goals and objectives

1. Able to use symbolic analysis at AC circuits
2. Able to analyze linear network by mesh current method
3. Able to use various theorem at circuit analysis

●Prerequisite Subjects

Electromagnetics 1 with Exercises, Linear algebra I

●Course Topics

1. Direct-current circuit analysis
2. Alternating-current circuit analysis
   In particular, Analysis using complex number, Important theorems in circuit,
   Two-terminal-pair circuit are focused
3. Transient response analysis
4. Analogy between electrical systems and mechanical systems

Read carefully the textbook before attending each class. After each class, solving the exercises in the textbook is highly recommended. Submission of the report after each class is mandatory.

●Textbook

Fundamentals of Electrical Circuit I (in Japanese), Arima and Iwasaki(Morikita Pub.Co.)

●Additional Reading

Fundamentals of Electrical Circuit(in Japanese), Amamiya(Ohm Pub.Co.) Electric Circuits, McGraw-Hill Book Co.

●Grade Assessment

Evaluation is based on the written examination and report at each class. You need more than mark of 60 out of 100 points. If the fundamental topics are successfully understood, credit will be awarded. Higher grade will be provided depending on the level of understood topics.

●Notes

Nothing particular.

●Contacting Faculty

After each class or contact to:

Pro. Suzuki Ext. 2700, t_suzuki@nuem.nagoya-u.ac.jp
Assist. Prof. Okuda Ext. 2779,h_okuda@nuem.nagoya-u.ac.jp
Assoc. Prof. Sakurai Ext. 5289, junpei.sakurai@mae.nagoya-u.ac.jp
Assist. Prof. Oka Ext. 5031,chiemi.oka@mae.nagoya-u.ac.jp

Manufacturing Processes 1 with Exercises (2.5credits) (加工学第１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Eiji SHAMOTO Professor	Noritsugu UMEHARA Professor	Takehiro HAYASAKA Assistant Professor
	MotoyukiMURASHIMA Assistant Professor		

●Course Purpose

This course introduces machining processes, i.e. cutting and abrasive processes, and non-traditional machining processes, which are widely utilized in manufacturing of various industrial products. The goals of this course are to obtain basic knowledge about the processes and related phenomena and to understand their theory and mechanisms.

●Prerequisite Subjects

Material science, Solid mechanics, Mechanical design

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Introduction to Mechanical and Aerospace Engineering (2.0credits) (機械・航空宇宙工学序論)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	1 Spring Semester		
Elective/Compulsory	Elective		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

1. Provide mechanical and aerospace engineering around current themes of research within the recent research and news2. Provide relevant introductory talks on applying to engineering regards to higher level3. Provide public speaking and outreach training for early career researchers and PhD students4. Provide opportunities be made aware of other relevant research field

●Prerequisite Subjects

Computer Software, Specialized subject in mechanical and aerospace engineering

●Course Topics

Provide specialized topic in mechanical and aerospace engineering, including current research and news provided by each research area.Before the lecture, read the next contents introduced by the text. After the lecture, submit report related with every topic.

●Textbook

Use the handouts given at each lecture

●Additional Reading

Information on related research paper is provided

●Grade Assessment

Scores are 10090 points for S, 8980 points for A, 7970 points for B, 6960 points for Cunder 59 points for F, by reports

●Notes

No conditions given

●Contacting Faculty

All answers will be given for questions

Dynamic System Control Theory (2.0credits) (動的システム論)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Shunichi AZUMA Professor

●Course Purpose

This course presents fundamental theory for stability of nonlinear systems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Solid Mechanics (2.0credits) (固体力学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Akinori YOSHIMURA Associate Professor

●Course Purpose

To study fundamental theories of mechanics of solids. This class teaches a fundamental theory for structural analyses of machines, airplanes, space structures.
The class provides to students the theoretical foundation for precise analysis of the structure of the machines.
Goals
1. To understand and explain equations of equilibrium, relationship between displacements and strains, compatibility of strain components, Hooke's Law, boundary conditions for three-dimensional elastic body.
2. To understand and use energy methods
3. To understand and use a method to solve two-dimensional problems by using Airy stress function
4. To understand and explain derivation of governing equations and boundary conditions for bending of plates. And to solve problems of bending of rectangular plates.
5. To understand and explain elasto-plastic constitutive equation.

●Prerequisite Subjects

Mechanics I
Mechanics II
Analytical Mechanics with Exercises
Mechanics of Materials 1 with Exercises
Mechanics of Materials 2 with Exercises

●Course Topics

1. Stress and Strain (Three-dimensional General Theory), Relationship between Stress and Strain (Equations of Elasticity)
2. Energy Methods
3. Two-Dimensional Problems
4. Bending of Plates
5. Elasto-plastic constitutive equations

This lecture starts from the fundamental theory for analyzing the mechanics of the solid, such as stress tensor, strain tensor, and equilibrium (Chapter 1). Then, as a general method for solving the problem of the solids, the energy method will be introduced (Chapter 2).

After that, the methods for solving specific problems, such as plane stress and plane strain theory (Chapter 3) and plate theory (Chapter 4), will be discussed.

Finally, in the Chapters 5, elasto-plastic constitutive equation will be discussed. It is useful for analysis of realistic materials.

Every class provides exercise problems, and the answer will be shown at the beginning of the next class. Small quiz will be assigned after every class, and students must answer it via NUCT system.

Solid Mechanics (2.0credits) (固体力学)

●Textbook

Not specified.
Materials will be distributed in the class.

●Additional Reading

Theory of Elasticity, by Shigeo Kobayashi, et al.(Baifukan)
Introduction to Linear Elasticity by Yasuhide Shindo (Corona Publishing)
Elasticity by P.C. Chou and N.J. Pagano

●Grade Assessment

Attainment of the goals will be evaluated on the basis of examination.
Students must score no less than 60 points out of 100 points to get credit.
100-90:S, 89-80:A, 79-70:B, 69-60:C, <59:F

●Notes

It is desirable (but not required) that students have got credits of following lectures:
Mechanics I,
Mechanics II,
Analytical Mechanics with Exercises,
Mechanics of Materials 1 with Exercises, and
Mechanics of Materials 2 with Exercises.

●Contacting Faculty

Students may ask questions during and after the class. If students want to discuss on the other time, please make an appointment via email.
Questions via email are also welcome.
email: akinori.yoshimura@mae.
(Add nagoya-u.ac.jp)

Science of Materials 2 (2.0credits) (材料科学第２)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Spring Semester	
Elective/Compulsory	Elective	
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor

●Course Purpose

Mechanical properties of metallic materials are lectured from the view point of internal structures such as dislocations. First, various strength characteristics of metallic materials are overviewed. Then, such characteristics, as well as hardening mechanisms, are described on the basis of internal structures.

Goals and objectives.
1.Explain plastic deformation of metallic materials with the object of dislocation theory.
2.Explain energy, slip system and increase of dislocation.
3.Explain the relationship between yeild and dislocation.
4.Explain the strengthening mechanism such as strain hardening and recover with the object of microscopic view.

●Prerequisite Subjects

Science of Materials 1, Strength of Materials

●Course Topics

1. Strength characteristics of solids
2. Ideal strength of crystalline solids and dislocation movements
3. Energy of dislocations and stable Burgers vector
4. Slip planes and slip systems
5. Relation between dislocation movement and plastic deformation
6. Multiplication of dislocations
7. Yielding phenomena and dislocations
8. Various hardening mechanisms
9. Strain hardening and recovery
10. Deformation mechanisms at high temperatures
11. Term end examination

Read carefully the textbook before attending each class.

●Textbook

The Principles of Engineering Materials, Part 2, by C.R. Barrett, et al.

●Additional Reading

Ed. Hiroshi Kimura"Concept of material strength"
Ed. Masaharu Kato "Introduction od dislocation"

●Grade Assessment

Students must submit a report on every lecture.
Credit is given for the scores of the reports.
No examination (option)
The applicant can take a final examination. The examination score is given priority over the above-mentioned score.

Score:100-95:A+, 94-80:A, 79-70:B, 69-65:C, 64-60:C-, Less than 59:F

Qualifying standard
Able to explain the relationship between crystallography, mechanical strength and dislocation.

●Notes

No requirements for the registration.

●Contacting Faculty

Answer after the lecture.
Contact information:

Professor Hata
Ext:5223
E-mail: hata@mech.nagoya-u.ac.jp

Associate Professor Sakurai
Ext:5289
E-mail: junpei.sakurai@mae.nagoya-u.ac.jp

Strength and Fracture of Materials (2.0credits) (材料強度学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Ju Yang Professor

●Course Purpose

To study strength,fracture and fatigue of materials and structures based on mechanics and materials science Objectives 1. Understand the micromechanisms of strengthening based on dislocation mechanics 2.Uundestand fracture mechanics 3.Understand micromechanisms of fatigue nad fracture

●Prerequisite Subjects

Mechanics of materials with Exercises, Materials Science 1

●Course Topics

1.Failure and fracture of structures 2.Strength of materials 3.Plastic deformation of solids 4.Strengthening mechanisms 5.Fundamentals of fracture mechanics 6.Fracture toughness 7.Britle fracture and ductile fracture 8.Fatigue 9.Environmental material strength 10.High temerature materialstrength

●Textbook

Note of lecture will be handed out

●Additional Reading

Strength and Fracture of Materials K. Tanaka

●Grade Assessment

Term end examination (80%) and reports (20%)

●Notes

No conditions for taking the course

●Contacting Faculty

Any time

Finite Element Method (2.0credits) (有限要素法)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Toshiro MATSUMOTO Professor

●Course Purpose

When mechanical structures are designed, their physical behaviors must be calculated in advance. Since the actual design objects have complicated structures, their analytical solutions in mathematical representation cannot be obtained. Therefore, some numerical methods are needed for the simulation of the related physical behavior. The finite element method (FEM) is widely used in various engineering field, and the students study the physical modelling of the phenomena, constructing the corresponding mathematical models, computational algorithms of FEM, and how to develop the computer code. The studentsThe class is given based on the handouts and the students cope with the assignments for formulating FEM and example numerical demonstrations.By finishing this class, the students are targeted to have the capability of doing the following skills:1. Developing the physical model2. Developing the mathematical model corresponding to the physical model3. Formulation of the finite element method4. Developing a simple finite element code

●Prerequisite Subjects

Mathematics I, II (Calculus, Linear Algebra), Vector Analysis, Elasticity

●Course Topics

1. Formulation of time-harmonic vibration of a straight rod2. Derivation of governing differential equation and boundary condition3. Integral form in a weighted-residual3.1 Weighted-residual form 3.2 Derivation of weak form by integration by parts4. Discretization and shape function4.1 Discretization of domain of weak form into elements 4.2 Interpolation of unknown function with shape functions4.3 Interpolation of weight function with shape functions4.4 Derivation of stiffness matrix, equivalent nodal force vector, and mass matrix5. Entire computation algorithm6. FEM demonstration through examples7. Formulation of FEM for two-dimensional problem

●Textbook

Handouts are used.

●Additional Reading

Not specified.

●Grade Assessment

The understanding of the theory and computation algorithm of FEM is evaluated through assignments and achievement test. Students can pass when the basic formulation of the weak-form of finite element method and its corresponding computational algorithm are understood. The grade is evaluated accordingly when they can formulate the finite element method for more complicated problem and can develop a finite element computer code.

●Notes

No special requirements are imposed.

●Contacting Faculty

Break after the class or during office hours

Potential Flow (2.0credits) (ポテンシャル流れ)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Koichi MORI Associate Professor

●Course Purpose

To understand the fundamental theory of potential flows that stand for incompressible and inviscid flows. The potential flow theory is the developed to analyze the lift force of aircraft.

●Prerequisite Subjects

Complex function theoryDifferential and Integral calculusFundamental fluid dynamics

●Course Topics

potential flow complex velocity potentialflow past columnconformal mappingBlasius's formulaAerodynamic force on plane plateThin foil theoryFinite wing theory

●Textbook

●Additional Reading

●Grade Assessment

Examination and Reports: Term Examination 70%, Reports for Exercises 30%, The full mark is 100 points, and the passing mark is 60 points or more. The result for the absentee of the examination and presentation is handled as "absence".100-90:S, 89-80:A, 79-70:B, 69-60:C, 59-0:F

●Notes

●Contacting Faculty

Energy Conversion Engineering (2.0credits) (エネルギー変換工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Ryo YOSHIIE Associate Professor

●Course Purpose

This course is intended to lecture on typical energy conversion systems and their applications, based on the knowledge of thermodynamics and energy resources. Achievement purpose The main subjects are thermodynamic cycles such as gasoline engine, Diesel engine, gas turbine, and steam power

●Prerequisite Subjects

Thermodynamics with Exercises

●Course Topics

1.Energy resources and conversion 2.Fuel and combustion 3.Internal combustion (Gasoline engine, Diesel engine, Gas turbine) 4.External combustion (Thermal electric power generation, Stirling engine) 5. Refrigerating cycle and heat pump 6. Fuel cell
Submit assignments, those will be given after several classes.

●Textbook

Netsu-Enerugi-sisutemu: Hideomi FUJITA, Seizou KATO (Kyouritsu Shuppan)

●Additional Reading

Materials will be introduced in the class as needed.

●Grade Assessment

Term Examination and Reports for Exercises: Grades will be based on the term examination, while scores of reports will be considered as additional points. The full mark is 100 points, and the passing mark is 60 points or more.

●Notes

No other specific requirements

●Contacting Faculty

Students may ask questions during and after the class via E-mail.
E-mail: ryo.yoshiie@mae.
(Add nagoya-u.ac.jp)

Compressible Fluid Dynamics and Exercise (2.5credits) (圧縮性流体力学及び演習)

Course Type	Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Autumn Semester	
Elective/Compulsory	Elective	
Lecturer	Akihiro SASOH Professor	Kiyoshi KINEFUCHI Associate Professor

●Course Purpose

Lectures on compressible flows with shock, compression and expansion waves, unsteady flows, supersonic flows and nozzle flows are given so that the students learn basics of compressible fluid dynamics. The criteria for achievements are (1) to understand basic of compressible fluid dynamics including shock and expansion waves, and (2) to solve related problems quantitatively.

●Prerequisite Subjects

Basics of Fluid Dynamics and Tutorial, Thermodynamics and Tutorial, Potential Flows

●Course Topics

1. Propagation of pressure waves
2. Motion of gas particles and thermodynamics
3. Basic equations of fluid dynamics
4. Discontinuity:Normal shock wave and contact surface
5. Discontinuity: Oblique shock wave and slip surface
6. Quasi-steady flow
7. Two dimensional flow
8. Unsteady, one-dimensional flow
9. Riemann problem
10. Shock tube
11. Method of characteristics: unsteady, one-dimensional flow
12. Nozzle & diffuser
13. Method of characteristics: two-dimensional flow
14. High-enthalpy wind tunnels
15. Related phenomena

●Textbook

Akihiro Sasoh, "Compressible Fluid Dynamics and Shock Waves," Corona Publ.co. ltd.

●Additional Reading

Will be introduced in the class.

●Grade Assessment

Homework assignments and examinations. Credits are issued for 60 points and higher.

●Notes

Use the textbook to complete the understanding the contents.

●Contacting Faculty

Appointment via. email is necessary.

Combustion Engineering (2.0credits) (燃焼工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	"YAMAMOTO Kazuhiro" Associate Professor

●Course Purpose

This lecture is concerned with combustion engineering.
One related topic is selected and introduced.

Objectives:
1. Provide combustion engineering around current themes of research within the recent topic and news
2. Provide relevant introductory talks on applying to engineering regards to higher level
3. Provide public speaking and outreach training for early career researchers and PhD students
4. Provide opportunities be made aware of other relevant research field

●Prerequisite Subjects

Computer Software, Fluid Mechanics, Heat Transfer

●Course Topics

1. Introduction for combustion engineering
2. Premixed Combustion and non-premixed combustion
3. Liquid combustion and internal combustion engine of automobile
4. Combustion emission (soot, NOx)
5. Combustion experiments and laser diagnostics
6. Numerical simulation
7. Recent research topic

Before the lecture, read the next contents introduced by the text. After the lecture, submit report related with every topic.

●Textbook

Use the text of combustion engineering at this lecture

●Additional Reading

Combustion Fundamentals written by R. A. Strehlow, Mc Graw Hill (for higher professional level)

●Grade Assessment

Scores are 10090 points for S, 8980 points for A, 7970 points for B, 6960 points for Cunder 59 points for F, by reports and examinations

●Notes

No conditions given.

●Contacting Faculty

All answers will be given for questions.

Automotive Engineering (2.0credits) (自動車工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	4 Spring Semester
Elective/Compulsory	Elective
Lecturer	Kouji MIZUNO Professor

●Course Purpose

Automotive engineering is a field which study the structure and motion of automobiles. In this class, students will learn about the basic theory of automotive engineering by mechanics as well as the advanced automotive technology.
The goal of this lecture is to be able to do the following at the end of class.
1. Understand car dynamics (run, stop, turn) and apply them to solve specific design problems.
2. Understand the structure and mechanism of automobiles based on mechanics, and apply them to solve specific design problems.

●Prerequisite Subjects

Mechanics

●Course Topics

1. Engine thermodynamics
2. Engine mechanics
3. Transmission
4. Vibration and ride
5. Vehicle dynamics
6. Brake
7. Crash safety
8. Vehicle research and development

●Textbook

●Additional Reading

Fundamentals of Vehicle Dynamics (Thomas Gillespie)

●Grade Assessment

Students are evaluated on the basis of report. They must score no less than 60 points out of 100 points to get credit.

●Notes

●Contacting Faculty

Mechatronics Engineering (2.0credits) (メカトロニクス工学)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Autumn Semester	
Elective/Compulsory	Elective	
Lecturer	Yasuhisa Hasegawa Professor	Tatsuya SUZUKI Professor

●Course Purpose

This course introduces basic technologies for system design including both mechanical system and its control system. For example, we will focus on microcomputer architecture, its connection to peripheral devices such as sensors and actuators, power supply device, and control algorithm.

●Prerequisite Subjects

Computer programming, information processing, digital circuit, and control theory will ease the learning.

●Course Topics

Contents:

1. Outline of mechatronics
2. Analog signal and digital signal
3. Logic circuit
4. Microcomputer
5. Programing
6. Communication with peripheral device
7. Sensor
8. Actuator
9. Power supply

●Textbook

Materials will be available through NUCT.

●Additional Reading

●Grade Assessment

Each student taking the course will be evaluated by the results of midterm exam and final exam.

●Notes

No special limitation to take this course.

●Contacting Faculty

Please contact to hasegawa@mein.nagoya-u.ac.jp, if you have any question.

Robotics (2.0credits) (ロボット工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	4 Spring Semester
Elective/Compulsory	Elective
Lecturer	Yasuhisa Hasegawa Professor

●Course Purpose

This course introduces basics of modeling, planning, and control of a robotic system, including geometry, kinematics, statics, and dynamics of a serial-link manipulator. After finishing this course, students can design a controller to regulate motion of a serial-link manipulator.

●Prerequisite Subjects

Control theory, and Kinematics of Machine

●Course Topics

Lectures will follow the same topics as the material presented in the book, so it can be read in anticipation of the lectures.

1. Introduction about various robots in the world with movies,
2. Coordinate Systems and Homogeneous Transform,
3. Robot Kinematics,
4. Jacobian,
5. Robot Dynamics,
6. Trajectory Planning,
7. Force Control,
8. Teleoperation

●Textbook

●Additional Reading

●Grade Assessment

Each student taking the course will be evaluated by reports and score of final exam.

●Notes

There is no additional prerequisite to take this course.

●Contacting Faculty

Please contact to hasegawa@mein.nagoya-u.ac.jp, if you have any question.

Numerical Analysis (2.0credits) (数値解析法)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Koichi TAJI Associate Professor

●Course Purpose

Following basic mathematics, in order to acquire basic skills of numerical analysis, the aim is to learn the basic concepts of errors in numerical computation, solving a system of linear equations, matrix eigenvalue problems, methods of solving ordinary differential equations, mathematical programming and FFT.

Achievement target
1. Understanding the basic concepts of numerical computations
2. Understanding the basic concepts of errors in numerical computation
3. Understanding the basic notions of Algorithms and applying it to programming

●Prerequisite Subjects

Fundamental Mathematics I,II,III,IV and V:Mathematics 1 and 2 with Exercises

●Course Topics

1. the basic concepts of errors in numerical computation
2. solving a system of linear equations
3. matrix eigenvalue problems
4. Algebraic equations
5. methods of solving ordinary differential equations
6. mathematical programming

Solve some problems left as exercise in the lecture

●Textbook

Showing some textbooks in the lecture if necessary

●Additional Reading

Numerical Methods with Worked Examples: Matlab Edition, 2nd ed.
Authors: C. Woodford, C. Phillips, Springer, 2012

●Grade Assessment

The score will be totally evaluated by writing Examination (60%) and several reports (40%). The pass line is 60%.

●Notes

nothing required

●Contacting Faculty

For general lectures, contactProf. Taji.
If you have any questions outside of these hours, please contact the Professor by e-mail in advance.

Manufacturing Processes 2 (2.0credits) (加工学第２)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Autumn Semester	
Elective/Compulsory	Elective	
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor

●Course Purpose

Fundamental knowledge of Haeting Process and Plastic Working in relation to Material science, Solid MechanicsHeat Transfer Engineering

Goals and objectives
1. Able to undersatand and explain crystallography, mechanichal properties and workability of industry metallic materials.
2. Able to undersatand and explain various processing method for industrial products

●Prerequisite Subjects

Material Science 2, Solid MechanicsHeat Transfer Engineering

●Course Topics

(1) Mechanical properties of materials
(2) Effect of heat treatment on microstructure and mechnical properties
(3) Industrial Materials
(4) Mechanics and Heat Transfer Engineering
(5) Heat treatment
(6) Casting
(7) Welding and bonding
(8) Powder Metallurgy
(9) Plastic Working

Read carefully the textbook and handouts before attending each class.

●Textbook

Kikai-gijutusha no tame no zairyo-kakougaku nyumon (Kyoritsu-Pub. Co., 2003). Handouts are available from NUCT web site.

●Additional Reading

Enginnering Materials (JSME, 2008)
Manudacturing Processes II- Plastic Working-(JSME,2014)

●Grade Assessment

No examination (option)
Students must submit a report on every lecture.
Credit is given for the scores of the reports.
The applicant can take a final examination. The examination score is given priority over the above-mentioned score.

Score:100-95:A+, 94-80:A, 79-70:B, 69-65:C, 64-60:C-, Less than 59:F

Qualifying standard
Able to explain the relationship between basic various theory and indiviual processing methods.

●Notes

No requirements for the registration.

●Contacting Faculty

Answer after the lecture.
Contact information:

Professor Hata
Ext5223
E-mail: hata@mech.nagoya-u.ac.jp

Associate Professor Sakurai
Ext: 5289
E-mail: junpei.sakurai@mae.nagoya-u.ac.jp

Basic Course on Biomedical Engineering (2.0credits) (生体工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	4 Spring Semester
Elective/Compulsory	Elective
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Aiming at fostering human resources who can participate in the formation of a sustainable society by fusing interdisciplinary areas focusing on core fields of mechanical engineering and aerospace engineering, developing into new manufacturing technologies including micro/nano systems.
Objective: The structure and function of the biological body are studied in terms of the engineering. Principles of measurements and medical engineering are studied. New technologies based on bio-mechanics are also studied.

Targets:
1.Understand the structure and function of the Biological body in terms of the engineering
2.Understand the biological measurement, principle of medical engineering and artificial organ
3.Understand the good quality bio-medical materials

●Prerequisite Subjects

Basic Course on Biomedical Engineering, Mechatronics Engineering

●Course Topics

1. Fundamental Bio-mechanics
2. Sensory organ and nerve
3. Cell
4. Muscles
5. Organ of respiration
6. Circulatory organ
7. Digestive organ
8. Skelton
9. Bio-measurement 1
10.Bio-measurement 2
11.Medical Engineering
12.Bio-medical Materials
13.Artifical organ
14.New technology for Bioengineering 1
15.New technology for Bioengineering 2

At the end of each lecture, a report related to the lecture is imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

Bio-mechanical Engineering, JSME

●Grade Assessment

The degree of acquisition of basic knowledge of bioengineering is evaluated by reports in each class and is reflected on grades.

●Notes

No course requirements

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Analog Electronic Circuit (2.0credits) (電子回路)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Spring Semester	
Elective/Compulsory	Elective	
Lecturer	Toru ASAI Associate Professor	Shintarou ITOU Associate Professor

●Course Purpose

Aiming at practical applications of analog electronic circuits, study the basic operation and learn application of analog electronic circuits.
Goals are understanding:
1. Basic theory of semiconductor and analog circuits
2. Small signal equivalent circuits
3. Fundamental amplifiers using a transistor
4. Fundamental amplifiers using an operational amplifier

●Prerequisite Subjects

Electrical Circuits Engineering
Control Engineering I and Exercise

●Course Topics

1.Basic theory of analog circuits
2.Semiconductor
3.Small signal equivalent circuits
4.Fundamental amplifiers
5.Principle and stability of negative feedback amplifiers
Solve problems as a report after each lecture. Read a textbook, handouts, and your notebook before and after a lecture. Confirm to eliminate unclear points of your returned report.

●Textbook

K. Miyairi ed. and K. Abe, Analog Electronic Circuits: A Primer (Kyoritsu Publishing, in Japanese)

●Additional Reading

Yoshihumi Amamiya, Modern Electronic Circuit (Ohm-sha, in Japanese)
Yukio Ishibashi, Analog Electronic Circuit (Baifukan, in Japanese)

●Grade Assessment

Students will be evaluated on the examinations. Total score is 100, and credit will be awarded to those students who score 60 marks or more. It is necessary to understand the basics of electronic circuit.

●Notes

There are no special notes.

●Contacting Faculty

Questions are mainly accepted in the lectures and just after the lectures. It is also accepted if students reserved time by email.

Digital Circuit (2.0credits) (ディジタル回路)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Part-time Faculty

●Course Purpose
An introduction to the design of digital circuits with emphasis on the usage of digital integrated circuit devices.

●Prerequisite Subjects
Electrical Circuit, Analog Electronic Circuit

●Course Topics
1. Basic knowledge of electronic parts (resistor, condenser, inductor, diode, and transistor)
2. Numerical expression in logic circuits (binary number, hexadecimal number, and BCD code)
3. Fundamentals of logic circuits (basic gate circuits, positive and negative logic, NAND gate, Boolean algebra, logic function, combinational logic, fundamentals on flip-flop, finite-state machine)
4. Basics of digital integrated circuits (TTL IC, C-MOS IC, interface between C-MOS and TTL IC, and specific functions of gate IC)
5. Applications of digital circuits (flip-flop, latch, counter, numerical display, encoder and decoder, analog switch, and multivibrator)

●Textbook
Fundamentals of Electronic Circuits for Mechatronics (New Edition), Kenji Nishibori (Corona Publishing Co. in Japanese)

●Additional Reading
Digital Circuit, Masahiro Goshima (Suurikougaku-sha Co.,Ltd. in Japanese)

●Grade Assessment
Written examination and written reports. More than 60 out of 100 points is required.

●Notes
No requirement

●Contacting Faculty
Questions are welcomed during and after the lecture.

Actuator Engineering (2.0credits) (アクチュエータ工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Masahiro Oh-oka Professor

●Course Purpose

In this class, we will learn various actuators used on robotics and mechatronics, and principle and application related to them. In order to understand advanced studies progressed at present, we will watch several videos presented by University of Tokyo, TIT, Keio University and Nagoya University, etc. Objectives 1. Understanding principles of actuators 2. Understanding technologies used for actuators 3. Understanding advanced actuators

●Prerequisite Subjects

Basic mathematics and physics

●Course Topics

1. Introduction 2. Principle and characteristics of DC motors 3. Electronic control of DC motor 4. Principle and characteristics of induction motors 5. Electronic control of induction motors 6. Synchronous motor, stepping motor and linear motor 7. Static electric actuators (report 1) 8. Spherical motors 9. Pneumatic and hydraulic actuators 10. Electro-rheological actuators 11. Piezoelectric actuators 12 Ultrasonic sonic motor and shape memory alloy actuators 13. Mechano-chemical actuators (report 2) 14 Production method and control theory for actuators 15. Applications of advanced actuators

●Textbook

Actuator engineering, complied by congress on actuator systems (Yokendo)

●Additional Reading

●Grade Assessment

Scoring decided by reports (2 times) and exam. Scoring balance is report1 : report2 : exam. = 1 : 1 : 4. The requirement for passing mark is over score C.

●Notes

●Contacting Faculty

http://ns1.ohka.cs.is.nagoya-u.ac.jp/
Response for questions: accept after class or appropriate time.
Email address: ohka@i.nagoya-u.ac.jp

Optimal Control (2.0credits) (最適制御論)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Susumu HARA Professor

●Course Purpose

This lecture aims obtaining skills of Optimal Control taking its applications into account including review of previous control lectures. The target of the lecture is cultivating the linear optimal control systems design ability.

●Prerequisite Subjects

Control Engineering 1 with Exercises, Control Engineering 2 with Exercises

●Course Topics

1. System Description, 2. Responses and Stability, 3. Coordinate Transfer, 4. Controllability and Observability, 5. Optimal Regulator, 6. Servo System, 7. State Observer
Once every few times, this lecture imposes the report based on recent contents.

●Textbook

Y. Mori, Intelligible Modern Control Theory, Morikita Publishing, (2013), (in Japanese)

●Additional Reading

References are instructed as needed.

●Grade Assessment

Examination (60%) and Homework (40%) on Linear Optimal Control Systems Design.
Pass level of achievement: 60% or more.

●Notes

It is desirable that students understand the contents of previous control lectures.

●Contacting Faculty

Questions are mainly accepted in the lectures and just after the lectures. It is also accepted if students reserved time by email.

Sensing Engineering (2.0credits) (センシング工学)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

Study on fundamentals and sensing technologies, using many examples
To understand fundamentals to applications of sensing technology and learn optical and digital image processings.
Achievement Objectives:
1. to understand the components of sensing systems.
2. to understand the sensing data processing.
3. to understand the measurement mechanisms of sensing devices.
4. to understand the optical and digital image processing.

●Prerequisite Subjects

Fundamentals of Measurements

●Course Topics

1. Fundamentals of Sensing Technology
2. Sensing Devices
3. Optical processing
4. Digital image processing

Submit report after each class. Read the text book before each class.

●Textbook

Sensing Technology (in Japanese), Tomohide Niimi, Corona Pub. (1992) ISBN:9784339043938

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Achievement will be evaluated by Term Examination and Reports for Exercises.
Term Examination 80%, Reports for Exercises 20%. The full mark is 100 points, and the passing mark is 60 points or more. The result for the absentee of the term examination is handled as "absence".

●Notes

There are no requirements.
This course will be taught in Japanese.

●Contacting Faculty

After the classes.

Signal Processing (2.0credits) (信号処理)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Masahiro Oh-oka Professor

●Course Purpose

Signal processing techniques are widely used in analysis and synthesis for control systems,mechanical systems,speech signals,radar signals,etc.This lecture focuses on the fundamentals of digital signal processing.

●Prerequisite Subjects

Mathematics I with Exercises Mathematics 2 with Exercises Control Engineering 1 with Exercises Control Engineering 2

●Course Topics

1. Abstract 2. Signal processing 3. Basic Mathematics 4. Fourier series 5. FFT 6. Fourier transformation 1 7. Fourier transformation 2 (report 1) 8. Application of Fourier transformation 9. Linear system 10. Z-transformation 11. Discrete-time signal system 12. Sampling and window 13. Filters 14. Digital filters (report 2) 15. Exercises. Before lecture, down load texts on NUCT and read them.

●Textbook

●Additional Reading

●Grade Assessment

Scoring is decided by two reports and written examination. Scoring balance is report1 : report2 : exam. = 1 : 1 : 4. The requirement for passing mark is over score C.

●Notes

●Contacting Faculty

Via e-mail, ohka@is.nagoya-u.ac.jp
Lecture notes: NUCT or http://ns1.ohka.cs.is.nagoya-u.ac.jp/new_page_8.htm

Fundamentals of Design (2.0credits) (設計基礎論)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	2 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Seiichi HATA Professor Yuki TOKU Lecturer

●Course Purpose

To learn fundamental knowledge about scheme of engineering design for machines and structures. The analytical technique needed for the machine design is learnt on the basis of the understanding of various material characteristics which are required for the selection of materials.

Goals

1. The basic concept of the machine design should be able to be understood, and to be explained.
2. An appropriate material can be selected for the given design parameter.
3. The machine element corresponding to the working period can be designed.
4. Working period corresponding to the operating condition can be evaluated.

●Prerequisite Subjects

Mechanics of Materials with Exercises

●Course Topics

1. Methodology of mechanical design.
2. Overview of mechanical materials.
3. Basics of strength design.
4. Production design and related matters.

●Textbook

Printed literature is prepared, and distributed using NUCT etc.

●Additional Reading

(Textbook in Japanese only)

●Grade Assessment

No examination (option)

Students must submit a report on lecture.

Credit is given for the scores of the reports.

The applicant can take a final examination. The examination score is given priority over the above-mentioned score.

●Notes

No requirements for the registration.

●Contacting Faculty

Anytime.

E-mail address: seiichi.hata@mae.nagoya-u.ac.jp
toku@mech.nagoya-u.ac.jp

Ext: 5223(Prof. Hata), 4673(Prof. Toku)

Fundamentals of Information (2.0credits) (情報基礎論)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	2 Autumn Semester	
Elective/Compulsory	Elective	
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor

●Course Purpose

The purpose is to acquire basic knowledge of information engineering dealing with information form / transmission, information processing, and information storage.

To understand the basic knowledge of information engineering, such as the definition and properties of information amount, information source / channel model, coding of information source / channel, etc., and to be able to use their basic usage in information transmission.

●Prerequisite Subjects

Knowledge of probability and statistics at high school level

●Course Topics

1.Information science
2.Amount of information and entropy
3.Information source and coding
4.Communication channel and its coding
5. Applications

Read the relevant part in the textbook before each class, solve the problems in the textbook after the class. Also, answer the given report task.

●Textbook

Johoriron Nyumon (Introduction of Information Theory) (CORONA Publishing,in Japanese)

●Additional Reading

Johoriron (Information Theory) (Shokodo,in Japanese) Joho no hanashi (A talk on Information) (Nikkagiren,in Japanese)

●Grade Assessment

Written examination. Pass if you can solve the basic problem of information engineering.

●Notes

No course requirements

●Contacting Faculty

Accept after class

Fundamentals of Measurements (2.0credits) (計測基礎論)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Takashi NAKAMURA Endowed Professor

●Course Purpose

Instrumentation is base and basic of science and engineering.
It is lectured that not only theories in textbook but also issues in actual measurement, data processing, signal processing, and data acquisition.

Goal:
1) Basic skills
To be able to use technical terms about instrumentation.
To understand theory of errors, data processing, measurement method, signal processing, and rudimentary knowledge in connection with instrumentation.
2) Practical skills
To apply the rudimentary knowledge for performing actual measurement.
3) Creativity, Total ability
To be able to select suitable sensor, measuring circuits, signal processingand data processing for performing actual measurement.

●Prerequisite Subjects

Basic subjects of curriculum

●Course Topics

1.Outline(systematization of measurement etc.)
2.Unit and standard
3.Error and precision, accuracy
4.Basics of data processing
5.Basics of sensor and sensing
6.Signal measurement
7.Data acquisition and signal processing
8.Latest measurement technology

●Textbook

Fundamentals of measurement systems engineering
Kazue Nishihara et.al, (Morikita Publishing Co., Ltd.)

●Additional Reading

Measurement and insturmentation (a textbook in English and Japanese)/Wei Gao, et al. , Asakura Shoten.
ISDN: 9784254201659
NCID: BB23401748

●Grade Assessment

Examination(60 %) and reports(40 %)
More than rating C

●Notes

Nothing particular

●Contacting Faculty

E-mail: takashi.nakamura@mae.nagoya-u.ac.jp

Machine Tool Engineering (2.0credits) (工作機械工学)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Elective		
Lecturer	Eiji SHAMOTO Professor	Takashi NAKAMURA Endowed Professor	Part-time Faculty

●Course Purpose

Machine tools to make machines are called “mother machine”, and almost all mechanical parts are shaped directly or indirectly by copying machine tool motion. Therefore, machining accuracy cannot be better than motion accuracy of machine tools (Copying Principle), and performance and manufacturing cost of various machines depend on machine tool performance. The goals of this course are to obtain knowledge about main structures and components of machine tools, principles and theories to realize high accuracy, high stiffness, and high efficiency of machine tools, phenomena related to machining process and machine tool motion.

●Prerequisite Subjects

Basic subjects of curriculum

●Course Topics

1. Components of machine tool, motion accuracy and numerical control 1-1 History and classification of machine tool, guideway, motor control (PWM), encoder 1-2 Abbe’s principle, principle of narrow guide, stick slip 1-3 Thermal deformation and its measures, dynamic stiffness and vibration 1-4 Servomechanism and numerical control2. LASER machining 2-1 Principle of LASER oscillation 2-2 Fundamentals of LASER, classification of LASER 2-3 Fundamentals of LASER machining 2-4 Leading edge of LASER machining3. Practice and leading edge of research and development related to machine tool 3-1 Machine tool tribology 3-2 Intelligent machine tool technology 3-3 Machining technology on recent machine tools 3-4 Leading edge of machine tool technology Read through pre-distributed prints before lecture

●Textbook

Prints will be distributed as needed.

●Additional Reading

Yusuf Altintas: “Manufacturing AutomationMetal Cutting Mechanics, Machine Tool Vibrations, and CNC Design”, Cambridge University PressEasily understanding LASER Principle/Hiroshi KUROSAWAOptronics Co.ISBN: 9784902312492NCID: BB06153253

●Grade Assessment

Examination and reports

●Notes

no prerequisite

●Contacting Faculty

SHAMOTO Eiji (Ex. 2705, shamoto@nagoya-u.jp)NAKAMURA Takashi (Ex. 2708, takashi.nakamura@mae.nagoya-u.ac.jp)

Aerospace Vehicle Dynamics 1 (2.0credits) (航空宇宙機力学第１)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Spring Semester
Elective/Compulsory	Elective
Lecturer	Shigeru SUNADA Professor

●Course Purpose

The aim of this class is understanding the aerodynamic characteristics of an airplane and its stability and control. After attending the classes, you will be able to explain about the aerodynamic forces and moments acting on an airplane and about the motions of the airplane.

●Prerequisite Subjects

Aerodynamics, Propulsion engineering, Control engineering

●Course Topics

Contents of the classes: (1)Aerodynamics about an airplane,(2)Longitudinal motion of an airplane,(3) LateralDirectional motion of an airplane. Before attending a class, you should read a chapter in a textbook which will be treated in the class.

●Textbook

Introduction of airplane design, Ryoji Katayanagi, Nikkan Kogyo Shimbun

●Additional Reading

Introduction of airplane design 2, Ryoji Katayanagi, NikkanKougyouShimbun

●Grade Assessment

Your final grade will be calculated according to the following process: Reports (30%) and term-end examination(70%)

●Notes

The course has no specific prerequisites.

●Contacting Faculty

At a teacher's office. Appointment by email is required.

Aerospace Vehicle Dynamics 2 (2.0credits) (航空宇宙機力学第２)

Course Type	Specialized Courses
Class Format	Lecture
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Takaya INAMORI Associate Professor

●Course Purpose

This lecture introduces attitude and orbit dynamics of spacecraft.

The goal of this lecture:
1. Derive the three-dimensional attitude dynamics equation for a rigid body in a body coordinate system.
2. Understand the characteristics of rigid body rotation including spin motion from the derived attitude dynamics equation.
3. Derive the trajectory of the mass motion in the two-body problem.
4. Understand the orbit design of interplanetary spacecraft based on the two-body problem.

●Prerequisite Subjects

Dynamics1, Dynamics2

●Course Topics

1. Spacecraft attitude dynamics
1-1. Attitude dynamics equation
1-2. Attitude expression
1-3. Attitude disturbance torque
1-4. Passive attitude stabilization
1-5. Spin dynamics

2. Spacecraft orbit dynamics
2-1. Orbit dynamics equation
2-2. Orbit design
2-3. Orbit transfer
2-4. Trajectory planning
2-5. Relative orbit (Rendezvous, Formation flight)
In the lecture, students will submit their related studies in a report.

●Textbook

Related materials will be distributed in this lecture.

●Additional Reading

Peter C. Hughes , Spacecraft Attitude Dynamics, 2004.
James R. Wertz and Wiley J. Larson, Space Mission Analysis and Design (SMAD) - 3rd Ed, 1999.
Wertz, James R. Spacecraft Attitude Determination and Control, 1978.

●Grade Assessment

The level of achievements is evaluated through reports and the final exam. For credit, students must achieve the level to deal with elementary problems correctly in the report and the final exam. At least 80% attendance is also required.

●Notes

The course has no specific prerequisites.

●Contacting Faculty

Questions will be accepted after the lecture.

Aerospace Propulsion (2.0credits) (航空宇宙推進工学)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Autumn Semester		
Elective/Compulsory	Elective		
Lecturer	Jiro KASAHARA Professor	Akihiro SASOH Professor	Kiyoshi KINEFUCHI Associate Professor
	Part-time Faculty		

●Course Purpose

This subject gives an introduction to aerospace propulsion and its application to Mechanical and Aerospace Engineering.

●Prerequisite Subjects

Mathematics, Physics, Chemistry, Thermodynamics, Compressible Fluid DynamicsCombustion Engineering

●Course Topics

1. Principle of Jet Propulsion
2. Fluid Dynamics and Thermodynamics
3. Thrust and Efficiency
4. Thermodynamics for jet engines
5. Brayton cycle
6. Regenerative cycle
7. Dynamics of rockets 1
8. Dynamics of rockets 2
9. Space transportation system and effciency
10. Solid rocket motor 1
11. Solid rocket motor 2
12. Liquid rocket engine 1
13. Liquid rocket engine 2
14. Fundamentals of electric discharge and plasma
15. Electric propulsion

●Textbook

N/A

●Additional Reading

Aircraft Propulsion, Second Edition, Saeed Farokhi, Wiley
Rocket Propulsion Elements, Ninth Edition, George P. Satton, Oscar Biblarz, Wiley
Mechanics and Thermodynamics of Propulsion, Second Edition, Phillip Hill, Addison-Wesley
Modern Engineering For Design of Liquid-Propellant Rocket Engines, Dieter K. Huzel, David H. Huang, AIAA

●Grade Assessment

Examination and Reports of Homework

100-90 point: S, 89-80 point: A, 79-70 point: B, 69-60 point: C, less than 59 pint: F

●Notes

●Contacting Faculty

If you have any questions, ask away in class, or contact uprightly after lecture, by telephone or e-mail.

Contact address

Aerospace Propulsion (2.0credits) (航空宇宙推進工学)

Prof. Sasoh ext:4402, e-mail:akihiro.sasoh@mae
Prof. Kasahara ext:4404, e-mail:kasahara@nuae
Prof. Kinefuchi ext:4413, e-mail:kiyoshi.kinefuchi@mae

Aerospace Structural Engineering (2.0credits) (航空宇宙構造工学)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	3 Autumn Semester	
Elective/Compulsory	Elective	
Lecturer	Akinori YOSHIMURA Associate Professor	Part-time Faculty

●Course Purpose

This lecture teaches the foundation of the method of structural design of aerospace structures, and foundation of the process technology.
Characteristics of metal and composite materials widely used in aerospace field will be introduced from the viewpoint of a designer or manufacturer and problems on strength and stiffness of air/spacecraft.
This lecture provides to the students knowledge of the basic design method for aerospace structure, and of the process technology.

Goals
1. To understand fundamentals of metal materials used in aerospace structure and manufacturing process of them
2. To understand fundamentals of composite materials used in aerospace structure and manufacturing process of them
3. To understand fundamentals of design and strength analysis of aerospace structure.

●Prerequisite Subjects

Mechanics of Materials 1 with Exercises,
Mechanics of Materials 2 with Exercises,
Science of Materials 1,
Science of Materials 2,
Solid Mechanics,
Vibration Engineering 1 with Exercises, and
Vibration Engineering 2 with Exercises

●Course Topics

Students learn about requirement of parts of aerospacecraft, engines, satellites, and rockets, variety and thermomechanical properties and production method of existing materials, properties, design and strength analysis of aerospace structures, and so on.
This lecture consists of following topics;
1. Structural materials in aerospace field,
2. Aerospace metal materials,
3. Manufacturing process of metal parts,
4. Composite materials for Aerospace,
5. Fibers and resins of composite materials,
6. Manufacturing process of composite parts,
7. Aerospace structural design,
8. Strength analysis of aerospace structure
Reports or tests will be assigned in each class. Students must submit in time.

●Textbook

Materials will be distributed at the class.

●Additional Reading

Not specified. It will be introduced in the class, if necessary.

●Grade Assessment

Attainment of the goals will be evaluated based on the reports and homework assigned in the class. Students must score no less than 60 points out of 100 points to get credit.
100-90:S, 89-80:A, 79-70:B, 69-60:C, <59:F

●Notes

It is desirable (but not required) that students have got credits of following lectures:
Mechanics of Materials 1 with Exercises,
Mechanics of Materials 2 with Exercises,
Science of Materials 1,
Science of Materials 2,
Solid Mechanics,
Vibration Engineering 1 with Exercises, and
Vibration Engineering 2 with Exercises.

●Contacting Faculty

Students may ask questions during and after the class. Questions via email are also welcome.
email: akinori.yoshimura@mae.
(Add nagoya-u.ac.jp)

Aerospace Plane Systems (2.0credits) (航空宇宙機システム)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	4 Spring Semester		
Elective/Compulsory	Elective		
Lecturer	Ken Matsuoka Lecturer	Takaya INAMORI Associate Professor	Part-time Faculty

●Course Purpose

The aim of the course is to provide an opportunity for students to learn design methods, flight control systems, and equipments for aerospace systems from engineers and researchers who have been involved in practical aerospace systems design.

The objective of this course is to understand
1. elementary part of the spacecraft subsystem.
2. procedure of conceptual design of spacecraft.
3. basic design of aircraft.
4. procedure of conceptual design of aircraft.
5. basic design of helicopter.

●Prerequisite Subjects

Aerospace Vehicle Dynamics 1, Aerospace Vehicle Dynamics 2

●Course Topics

1. Spacecraft design
1.1 Satellite Overview, Orbit & Attitude
1.2 Power subsystem and electrical design
1.3 Satellite Communication and Information Processing
1.4 Thermal structure subsystem
1.5 Satellite weight / configuration, equipment layout, and sizing

2. Aircraft design
2.1 Overview of commercial aircraft
2.2 Aircraft development
2.3 Product planning / concept design
2.4 Conceptual Design / Basic Design / Detailed Design
2.5 Manufacturing
2.6 Ensuring flight safety of aircraft

3. Helicopter design
3.1 Helicopter engineering 1
3.2 Helicopter engineering 2

In the lecture, students will submit their related studies in a report.

●Textbook

Related materials will be distributed in this lecture.

●Additional Reading

James R. Wertz and Wiley J. Larson, Space Mission Analysis and Design (SMAD) - 3rd Ed, 1999.
Wertz, James R. Spacecraft Attitude Determination and Control, 1978.

●Grade Assessment

The level of achievements is evaluated through reports. For credit, students must achieve the level to deal with elementary problems correctly in the report. At least 80% attendance is also required.

●Notes

The course has no specific prerequisites.

●Contacting Faculty

Questions will be accepted after the lecture.

Aircraft Engine Systems (2.0credits) (航空原動機システム)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	4 Spring Semester	
Elective/Compulsory	Elective	
Lecturer	Jiro KASAHARA Professor	Part-time Faculty

●Course Purpose
This subject gives an introduction of gas turbine engine systems for aircraft.

●Prerequisite Subjects
Thermodynamics, Fluid Dynamics, Aerospace Propulsion

●Course Topics
1. History of jet engine
2. Fundamentals of Fluid and Thermodynamics
3. Cycle analysis and performance 1
4. Cycle analysis and performance 2
5. Axial compressor 1
6. Axial compressor 2
7. Axial turbine 1
8. Axial turbine 2
9. Combustor 1
10. Combustor 2
11. Centrifugal Compressor
12. Design method for gas turbine engines for aircraft 1
13. Design method for gas turbine engines for aircraft 2
14. Design method for gas turbine engines for aircraft 3
15. Design method for gas turbine engines for aircraft 4

●Textbook

●Additional Reading
Aircraft Propulsion, Second Edition, Saeed Farokhi, Wiley
Mechanics and Thermodynamics of Propulsion, Second Edition, Phillip Hill, Addison-Wesley

●Grade Assessment
Examination and Reports of Homework

100-90 point: S, 89-80 point: A, 79-70 point: B, 69-60 point: C, less than 59 pint: F

●Notes

●Contacting Faculty
If you have any questioins, ask away in class, or contact uprightly after lecture, by telephone or e-mail.

Contact address
Prof. Kasahara ext:4404, e-mail:kasahara@nuae

Thermal-Fluids Mechanical Systems (1.0credits) (熱流体機械システム)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Autumn Semester		
Elective/Compulsory	Elective		
Lecturer	Part-time Faculty	Part-time Faculty	Part-time Faculty

●Course Purpose

To learn the fundamentals and applications of thermal-fluids mechanical systems (turbomachinery, combustion instrument, heat transfer device), and develop interest and knowledge in these fields.

●Prerequisite Subjects

Fundamentals of Fluid Mechanics with Exercises,Themodynamics with Exercises,Viscous Fluid Dynamics with Exercises,Heat Transfer Engineering with Exercises,Energy Conversion Engineering,Potential Flow

●Course Topics

An intensive course on thermal-fluids mechanical systems.

●Textbook

No textbook but supplemental materials are provided and introduced.

●Additional Reading

References will be introduced in the course

●Grade Assessment

Examination or Reports(Grading)S:100-90, A:89-80, B:79-70, C:69-60, F:59-0

●Notes

No requirement

●Contacting Faculty

After the classes

Mechanical and Aerospace Engineering Seminar (1.0credits) (機械・航空宇宙システム研修)

Course Type	Specialized Courses		
Class Format	Practice		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Autumn Semester		
Elective/Compulsory	Elective		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Learn the methods of literature search, writing papers, making and giving presentation, and questions and answers.

Objectives
1.Able to serch literature and make regime.
2.Able to make and give presentation and question and answers appropriately.

●Prerequisite Subjects

Specialized fundamental subjects

●Course Topics

Participate in selected research groups. Investigate and search the papers in a given research field, and summarize the contents of the paper.
In addition, you give presentation and dicuss about the contents of the paper.

●Textbook

Confirm to the supervisor

●Additional Reading

Confirm to the supervisor

●Grade Assessment

Submit report and presentation.
When you achieve the subjects, you will pass.

●Notes

No conditions given

●Contacting Faculty

All answers will be given for questions

Design Practice 1 (1.0credits) (設計製図第１)

Course Type	Specialized Courses	
Class Format	Exercise	
Course Name	Department of Mechanical and Aerospace Engineering	
Starts 1	2 Spring Semester	
Elective/Compulsory	Compulsory	
Lecturer	Norikazu SUZUKI Associate Professor	Takayuki TOKOROYAMA Associate Professor

●Course Purpose

Mechanical drawing is a fundamental subject, which connects mechanical design and manufacturing, in production technology educations. This course provides the basic of Graphic science, and two-dimensional mechanical drawings. Students learn how to make a mechanical drawing by CAD (Computer Aided Design) software through several projects. The students also study three-dimensional graphics design (3D-CAD) and manufacturing automation (CAM; Computer Aided Manufacturing). Tool path data for machining are created by utilizing CAM software, and mechanical structures are fabricated in practice with NC programs by using a vertical machining center. Through this course, students can learn the basics of mechanical engineering.The goal of this lecture is to be able to:1. Learn the basics of mechanical drawing standards including GD&T.2. Based on mechanical drawing standard, a 3D image can be appropriately represented as 2D projections. Conversely, 3D images can be reconstructed from 2D projections.3. Based on mechanical drawing standard, the projections of machine parts can be selected properly and dimensions, tolerances, and surface integrities are appropriately represented.4. Three-dimensional shapes can be modeled using 3D CAD software.5. Understand tool path generation using CAM software and learn the process of manufacturing machine parts by milling operation.6. Draw simple mechanical parts based on design constraints.

●Prerequisite Subjects

Graphic Science:Mechanisms and Kinematics

●Course Topics

(1) Lecture for fundamental of mechanical drawing Fundamentals of Graphic scienceGeneral principles of presentation and projection methods Indications of dimensions Indications of major mechanical parts (screws, springs, gears, and rolling bearings) Size and geometrical tolerances Indications of surface quality (2) Design practice by means of CAD Drawing based on “third angle projection” Indication of “Dimensions” Indication of “size tolerance, geometrical tolerance and surface quality” Three dimensional modelling Design of an assembly part based on a drawing of a courter part (3) Manufacturing automation practice by means of CAM CAM operation practice Manufacturing practice utilizing a vertical machining centerMultiple assignments will be shown on the web and explained during class. Work on the assignment within and outside of class hours and submit it by the designated method within the deadlines. For basic assignments, feedback of evaluation results will be provided. It is necessary to re-submit the assignment with reference to the evaluation results and work to pass it within the deadline.

●Textbook

All important materials are distributed at a lecture room. “Manual of Engineering Drawing, Elsevier, C.H. Simmons et al.” is recommended as a reference textbook. All Important information about CAD projects, schedule, due date, evaluations, urgent guidance, are distributed via following website.
http://mx45.cadcam.etech.engg.nagoya-u.ac.jp/

●Additional Reading

Manual of Engineering Drawing, Fourth Edition: Technical Product Specification and Documentation to British and International Standard (ISBN-10: 0080966527 ISBN-13: 978-0080966526)ISO Handbook Technical drawings Volume 2, Part 2: Mechanical engineering drawings (ISBN 92-67-10371-7)

●Grade Assessment

Comprehension of the achievement level is totally evaluated based on grade of the submitted drawings and participations of the practical trainings.The credit will be accepted if the basic problems can be handled properly among the primary practices that ask for an understanding of drafting standards. Also, participation in all hands-on training is mandatory. If the advanced problems can be handled appropriately, they will be reflected as a better grade accordingly.

●Notes

No course requirements.

●Contacting Faculty

Responses to associated questions are given after lectures or during CAD practices. Faculty contact information is also listed in following website; http://mx45.cadcam.etech.engg.nagoya-u.ac.jp/

Design Practice 2 (1.0credits) (設計製図第２)

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Toru TAKAHASHI Associate Professor	Tadayoshi AOYAMA Associate Professor	Part-time Faculty

●Course Purpose

In this course, the students have a practice of designing and drawing a four-dgeree-of-freedom (4 DOF) multi-joint robot manipulator. Among a broad range of knowledge and skills to design and create a robot, this course focuses on the structural design of robots and gives lectures about the principles of mechanical elements (such as motor and bearing) and how to select them in accordance with an individual application; some of the lectures are provided by the employees working for researches and developments of mechanical devices in the world-leading companies. Using the acquired knowledge, each student conducts the design calculation for the individual 4-DOF robot which is assumed to perform a specified task. Finally, considering disassembling, clearance, etc., the students draw their robots. The purpose of this course is to achieve the knowledge and skills to enable the structural design of any mechanical devices. If the students learn control theories, mechatronics, etc. together with this course, they would have the fundamental abilities to design and create robots.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Design Practice 3 (1.0credits) (設計製図第３)

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Seiichi HATA Professor	Susumu HARA Professor	Toru ASAI Associate Professor
	Eijiro MAEDA Associate Professor		

●Course Purpose

Through this course, students are supposed to experience and establish the foundation of the whole process of making things based on specialized courses in the second and third years. By finishing the course, the following skills will be acquired:
1. Understand the purpose of the given problem and breakdown it into small sub-problems.
2. For each sub-problem, appropriate solutions, such as physics, design drawing and programming, can be selected and performed.
3. Present the products to others.

●Prerequisite Subjects

Graphic Science, Design Practice 1, Design Practice 2, Fundamentals of Design

●Course Topics

1. Overview of Design Practice 3rd
2. Theme explanation
4. Introduction to system design
5. Introduction to mechanical design
6. Introduction to mechatronics design
7. Introduction to processing method
8. Design and manufacturing by group
9. Demonstration of production

Students will need to work outside the course hours if necessary.

●Textbook

All important materials are distributed at a lecture room.

●Additional Reading

Manual of Engineering Drawing, Elsevier, C.H. Simmons et al.
ISO Handbook Technical drawings Volume 2, Part 2: Mechanical engineering drawings (ISBN 92-67-10371-7)

●Grade Assessment

Grade will be evaluated based on the quality of the final presentation and the final report, with particular emphasis on the abilities to problem understanding and analysis, active learning and problem-solving.

●Notes

Active participation is strongly anticipated.

●Contacting Faculty

Basically, it corresponds during practice or after lecture.
The professor's contact information is conveyed in the initial lecture.

Design Practice 4 (1.0credits) (設計製図第４)

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	4 Spring Semester		
Elective/Compulsory	Elective		
Lecturer	Noritsugu UMEHARA Professor	Jiro KASAHARA Professor	Shigeru SUNADA Professor
	Susumu HARA Professor		

●Course Purpose

Lectures and practical design of mechanical engineering and aerospace components and systems design.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Creative Design and Fabrication (2.0credits) (創造設計製作)

Course Type	Specialized Courses
Class Format	Exercise
Course Name	Department of Mechanical and Aerospace Engineering
Starts 1	2 Autumn Semester
Elective/Compulsory	Elective
Lecturer	Hisataka MARUYAMA Part-time Faculty Associate Professor

●Course Purpose

Aiming at fostering human resources who can participate in the formation of a sustainable society by fusing interdisciplinary areas focusing on core fields of mechanical engineering and aerospace engineering, developing into new manufacturing technologies including micro/nano systems.The objective of this lecture is to acquire the creative design skills required as a mechanical and aerospace engineer by experiencing a consistent process from conception, design, production, and demonstration on a given theme.

●Prerequisite Subjects

Computer Software 2, Kinematics of Machines

●Course Topics

1.Lecture on creativity2.Design and Fabrication of Miniature Flying Robot (Personel work)3.Design and Fabrication of Line Trace Robot (Group work)4.Presentation and demonstrationThe reports on the concept, design, and fabrication of robots for each theme are imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of creative design skills is evaluated by presentation and demonstration in each theme and is reflected on grades.

●Notes

No course requirements

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Exp. and Workshop Practice in Mech. and Aerospace Eng. 1 (1.0credits) (機械・航空宇宙工学実験第１)

Course Type	Specialized Courses		
Class Format	Experiment		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose
Experience various physical phenomena based by concept and rules in specialized fundamental subjects and their application.

Objective
1. Able to understand and explain the various physical phenomena
2. Able to understand the measuremnt principle and use experimental set up appropriately

●Prerequisite Subjects
Specialized fundamental subjects

●Course Topics
Experiment some themes and submit a report for each theme.
Experimental themes will be announced before each period strats.

●Textbook
Provid experiment guidbook

●Additional Reading
Confim the reference in the guidbooks.

●Grade Assessment
Submit report:
You need more than mark of 60 out of 100 points.

●Notes
No conditions given

●Contacting Faculty
All answers will be given for questions

Exp. and Workshop Practice in Mech. and Aerospace Eng. 2 (1.0credits) (機械・航空宇宙工学実験第２)

Course Type	Specialized Courses		
Class Format	Experiment		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Objective

1. Able to understand and explain the various physical phenomena
2. Able to understand the measuremnt principle and use experimental set up appropriately

●Prerequisite Subjects

Specialized fundamental subjects

●Course Topics

Experiment some themes and submit a report for each theme.
Experimental themes will be announced before each period strats.

●Textbook

Provide experiment guidbook

●Additional Reading

Confim the reference in the guidbooks

●Grade Assessment

Submit report:
You need more than mark of 60 out of 100 points.

●Notes

No conditions given

●Contacting Faculty

All answers will be given for questions

Training in Industrial Plants (1.0credits) (工場実習)

Course Type	Specialized Courses		
Class Format	Practice		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring Semester		
Elective/Compulsory	Elective		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose
Students are supposed to participate in an internship offered by industries or some organizations. Through internships, students will strengthen their ability to apply fundamental academic knowledge to practical problems.

●Prerequisite Subjects
Depends on the internship program to which students apply.

●Course Topics
Students will conduct practical research work in some industries or organizations in an internship program. The participants must submit a report on their experience.

●Textbook
`Instruction for internship' will be distributed.

●Additional Reading
Not specified.

●Grade Assessment
Graded based on a report regarding the topics addressed in the internship program and documents from industries or organizations that offered the internship program.

●Notes
Not specified. Some industries or organizations might impose a requirement.

●Contacting Faculty
Accepted by an email.

Technical Visits in Industrial Plants (1.0credits) (工場見学)

Course Type	Specialized Courses		
Class Format	Practice		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	3 Spring and Autumn Semester		
Elective/Compulsory	Elective		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

This course is intended to provide students with an opportunity to learn how academic knowledge taught in the university is used in industries.
The students are supposed to attend several technical visits to industrial plants.

●Prerequisite Subjects

Depends on the industries to be visited.

●Course Topics

Students participate in technical visits in several industries.

Submission of a report after each visit is mandatory.

●Textbook

Not specified.

●Additional Reading

Not specified.

●Grade Assessment

Graded based on the reports. Requirements regarding the participation will be announced in the orientation.

●Notes

Not specified.

●Contacting Faculty

Questions will be accepted during each visit.
Regarding questions about participation in technical visits, students should send an email to a faculty member in charge.

Graduation Thesis A (5.0credits) (卒業研究A)

Course Type	Specialized Courses		
Class Format	Experiment and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	4 Spring Semester		
Elective/Compulsory	Compulsory		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Through graduation research, the purposes are to learn how to proceed with research and how to present research.

The achievement goals
1. Able to set research theme, and have research plans.
2. Able to do experiment, summurize the results and discuss.

●Prerequisite Subjects

The required background for each research group is different, so confirm with your supervisor.

●Course Topics

1. Setting research theme
2. Investigation of background
3. Planning of experimental process
4. Experiment
5. Summurize experimental results
6. Writing graduation thesis
7. Making presentation of graduation thesis
8. Graduation thesis presentation

●Textbook

Confirm with your supervisor.

●Additional Reading

Confirm with your supervisor.

●Grade Assessment

Submit graduation thesis to supervisor by the designated date.
Make a presentation of graduation thesis.

If graduation thesis and presentation are deemed appropriate to be given a bachelor, you pass.

●Notes

Satisfy graduation research implementation requirements specified by the department.

●Contacting Faculty

Always

Graduation Thesis B (5.0credits) (卒業研究Ｂ)

Course Type	Specialized Courses		
Class Format	Experiment and Exercise		
Course Name	Department of Mechanical and Aerospace Engineering		
Starts 1	4 Autumn Semester		
Elective/Compulsory	Compulsory		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Through graduation research, the purpose is to learn how to proceed with research and how to present research content.

The achievement goals are as follows.
1. Able to summarize research, and write a graduation thesis.
2. Able to make presentation of your research as a graduation thesis.

●Prerequisite Subjects

The background required for each research group is different, so confirm with your supervisor.

●Course Topics

1. Setting research theme
2. Investigation of background
3. Planning of experimental method
4. Experiment
5. Summurize experimental results
6. Writing graduation thesis
7. Making presentation of graduation thesis
8. Graduation thesis presentation

●Textbook

Confirm with your supervisor.

●Additional Reading

Confirm with your supervisor.

●Grade Assessment

Submit graduation thesis to supervisor by the designated date.
Make a presentation of graduation thesis

If graduation thesis and presentation are deemed appropriate to be given a bachelor, you pass.

●Notes

Satisfy graduation research implementation requirements specified by the department.

●Contacting Faculty

Appropriately

Outline of Engineering 1 (1.0credits) (工学概論第１)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Materials Science and Engineering	Department of Physical Science and Engineering
	Department of Energy Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Part-time Faculty		

●Course Purpose

Based upon the wide and deep experiences, alumini and/or aluminae of Nagoya University, who work the hub of society,give future perspectives, foster internal and external active personality and propose guideline for their further study.

●Prerequisite Subjects

Because it is a common subject not to affect a specialized subject, I do not appoint the subject to become the background.

●Course Topics

Experience every time own as "do your best younger student" a senior playing an active part in the social center I perform a class on the basis of this. In all eight times of classes, I perform orientation and the lecture by seven outside lecturers. What I check about a lecturer and a title released before a class of every time beforehand. After a lecture, conduct an additional investigation depending on the need including contents and the phrase handled in a lecture. In addition, submit it as you impose the report problem about lecture contents every time.

●Textbook

I distribute a slide or the print which the person in charge of each time lecturer uses as a lecture document.

●Additional Reading

Instructions will be given as necessary in class

●Grade Assessment

I evaluate an acquirement degree for the accomplishment by a report. I keep lecture contents of every time under control, and it is said that I pass if I can collect own thought and lets results reflect it according to the depth of the contents which were able to learn it such as the grasp of lecture contents, a guideline for the future dream, study of oneself.

●Notes

There are no prerequisites

●Contacting Faculty

I cope after a lecture every time. Or ask the staff of the educational affairs section.

Outline of Engineering 2 (1.0credits) (工学概論第２)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Materials Science and Engineering	Department of Physical Science and Engineering
	Department of Energy Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	4 Spring Semester	4 Spring Semester	4 Spring Semester
	4 Spring Semester	4 Spring Semester	4 Spring Semester
	4 Spring Semester	4 Spring Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Part-time Faculty		

●Course Purpose

In the world, the social formation of the low-carbon model becomes the problem in the face of the issue of global warming. I grasp a summary of the energy supply and demand of Japan by this lecture and am intended that I understand the trend of the energy saving and renewable energy technology and introduction promotion plan. In addition, I comment on "a basic engery plan" to become the guideline of the energy policy of our country.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Outline of Engineering 3 (2.0credits) (工学概論第３)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Materials Science and Engineering	Department of Physical Science and Engineering
	Department of Energy Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester	4 Autumn Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Kiyohisa NISHIYAMA Lecturer	Emanuel LELEITO Lecturer	Gang ZENG Lecturer

●Course Purpose

This course will introduces the history, the current state and future prospects of R&D (research and development) in various sectors related to the field of engineering in Japan. The course will expose you to a wide range of issues being tackled by engineers in different fields, with the aim of motivating and preparing you to pursue your research interest. You will have an opportunity to explore basic concepts and real world applications, and to do a mini research tasks leading to a final presentation. Apart from the engineering field related knowledge, this lecture will also help you develop the following skills:
Cross-disciplinary Communication skills
Communication across language barriers (English/Japanese)
Online search and research skills for information gathering
Presentation skills

●Prerequisite Subjects

You do not require any background knowledge to join this class. Each lecturer will provide the basic knowledge that might be needed to understand the lecture topics.

●Course Topics

This class consists of “omnibus-style” lectures on the following topics.

1. Science, Technology and Innovations in Embedded Computing Systems (Gang ZENG)
- This lecture gives an overview of the embedded computing systems related technologies in Japan. In particular, the latest innovations on the low-energy and automotive applications will be introduced.
- The students are asked to participate in group discussion to share their ideas and thoughts about energy conservation and future automobiles.
2. The innovative factors of technologies in Japan (Kiyohisa NISHIYAMA)
- This lecture provides the participants with the concept of 40 innovation principles. Some Japanese technologies are broken down into the combination of the principles as examples.
- The students each are asked to analyse a technology of interest found in Japan. The students will be able to grab the concepts of any technological innovations after completing this lecture.
3. Science, Technology and Innovation for Disaster Risk Reduction (Emanuel LELEITO)
- This lecture gives students an overview of the Scientific and Technology Innovations that have contributed to Japan’s leading role in Disaster Risk Reduction (DRR).
- DRR related discussions and presentation in class will help students exercise their creative thinking and problem solving skills.

Each lecturer will give you assignments to read in preparation for each of the lectures.

●Textbook

Lecture materials will be distributed in class during each lecture.

●Additional Reading

Lecture materials will be distributed in class during each lecture.

●Grade Assessment

Credits will be awarded to those students who score over 60 out of 100 based on the following evaluation criteria:

1) Reports (60%): Each lecturer will ask you to prepare and submit reports to valuate your understanding of the topics taught. The reports will be worth 60% of the total score.
2) Presentation (40%): You will be asked to do a final presentation based on one or a combination of the topics taught. The presentation will require that you to do independent online research to gather necessary information and present the topic in a 3-5 minute video. Your understanding of the topic as well as the effectiveness of your presentation will be evaluated. The presentation is worth 40% of the total score.

●Notes

The students are required to actively participate in class discussions, submit reports and presentations on time.

●Contacting Faculty

Questions are received during or after class time. Lecturers will provide contact information during class orientation.

Outline of Engineering 4 (3.0credits) (工学概論第４)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Materials Science and Engineering	Department of Physical Science and Engineering
	Department of Energy Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Part-time Faculty	Yukio ISHIDA Designated Professor	

●Course Purpose

Elementary ClassThis course is intended to teach Japanese to students who have not learnt Japanese before or who have learned only a very little. Basic Japanese which is necessary for daily life in Japan will be taught.
The students study the fundamentals of grammar and basic conversational expressions. The students are requested to communicate in daily life using simple expressions.
Intermediate ClassThis course is intended to teach Japanese to students who already learned Japanese of Elementary level. The aims of this study are to obtain the ability necessary to explain their experiences concretely.
The students are requested to communicate in their study in Japanese. Depending on the students' Japanese ability, the advanced class will also be prepared.

●Prerequisite Subjects

Elementary ClassNone
Intermediate ClassElementary Japanese

●Course Topics

Elementary Class1.Pronunciation of Japanese 2.Structure of Japanese sentences 3.Fundamental vocabulary and expressions 4.Conversation practice 5.Listening practice, Students must read the part which they will study in the next lecture.
Intermediate Class1 Grammar, 2 Conversation, 3 Opinion delivery, 4 Reading comprehension, 5 Listening practice, The students must momorize the most important sentences which they will study in the next lecture.

●Textbook

Elementary ClassNIHONGO Breakthrough, From suruival to communication in Japanese, JAL Academy, ASK Publishing Co.Ltd.

Intermediate Classweekly J ： 6

●Additional Reading

I introduce it to progress appropriately

●Grade Assessment

Elementary ClassAttendance 20Class performance and assignments 20Interview test and examination30, Presentation 30
In each item (except attendance), the ability of comversation is an important check point.

Intermediate ClassAttendance 20Class performance and assignments 10Interview test 20Written examination20, Presentation 30.
In each item (except attendance), the ability of correct expressions is an important check point.
These scores are summed and evaluated. The students with the evaluation S, A, B, or C can pass this subject.

●Notes

This subject is open for NUSIP students.

●Contacting Faculty

Ext. 6797 ishida@nuem.nagoya-u.ac.jp

Technical Writing (2.0credits) (テクニカルライティング)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Materials Science and Engineering	Department of Physical Science and Engineering	Department of Energy Science and Engineering
	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering	Civil Engineering
	Architecture		
Starts 1	4 Spring Semester	4 Spring Semester	4 Spring Semester
	4 Spring Semester	4 Spring Semester	4 Spring Semester
	4 Spring Semester		
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective		
Lecturer	Kiyohisa NISHIYAMA Lecturer	Gang ZENG Lecturer	Emanuel LELEITO Lecturer

●Course Purpose

This course is to learn the logical thinking and the method of expression for sending scientific and technical contents to others in English and learn how to apply these methods to technical writing and presentation in English.

What you will get in this course:
1. Understand logical thinking and structure issues.
2. Understand and write the document structure that leads to problem solving.
3. Write abstracts of scientific and technical papers in English.
4. Apply the above methods to presentations and debates in English.

●Prerequisite Subjects

This course will be taught from the basics, background subjects are not specified.

●Course Topics

1. Logical thinking
1.1 Logical thinking
1.2 Structuring logic
1.3 Problem Solving
2. Writing skill
2.1 Understanding document structure
2.2 Organizing document structure
2.3 Writing abstracts in English
3. Presentation skill
3.1 Creating slides in English
3.2 Presentation and Q & A in English
3.3 Discussion in English

Students are required to read related contents of next lecture in advance. Reports will be assigned after each lecture, which should be completed independently by searching necessary information. Reports and final presentation will be used for evaluation.

●Textbook

No textbook is specified. Lecture materials will be distributed in each class.

●Additional Reading

2019
2018
, 2016
A Manual for Writers of Research Papers, Theses, and Dissertations: Chicago Style for Students and Researchers (Chicago Guides to Writing, Editing, and Publishing) - Kate L. Turabian, Revised by Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams, Joseph Bizup, William T. FitzGerald and the University of Chicago Press Editorial Staff.

●Grade Assessment

Evaluation will be conducted based on reports and final presentation. Credits will be awarded to those students who can write abstract and present idea using basic skills.

●Notes

No course requirements.

●Contacting Faculty

Questions will be accepted in the classroom after the lecture.

Engineering Ethics (2.0credits) (工学倫理)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Materials Science and Engineering	Department of Physical Science and Engineering
	Department of Energy Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Elective/Compulsory	Elective	Elective	Elective
	Compulsory	Elective	Elective
	Elective	Elective	
Lecturer	Part-time Faculty		

●Course Purpose

All students will push forward the preparations to a member of society through a college life having high flexibility as well as the lecture of the university, but this is the conscious problem that it is independent and should work on. Therefore, about life, the responsibility of the necessary member of society (a person of occupation and researcher solving another person such as engineers and social problem situation), found ability, ethic, it is the purpose of the class that gets an image at the beginning of student life. I solved many problems until now, and the engineer developed the society, but had much failure, accidents and the ethical disgraceful affair. I understand basic power to act as a member of society, an engineer ethically while having the viewpoint to the future a little while referring to a lot of such failure examples. In addition, I acquire a custom to think on the spot, and to be settled necessary for an engineer, a member of society. (the lecturer is engaged in a study and the business of the engineer ethic in professional engineer (nation qualification) with the work experience.)

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Management Engineering (2.0credits) (経営工学)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Physical Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering
	Department of Mechanical and Aerospace Engineering	Architecture	
Starts 1	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester	4 Autumn Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Part-time Faculty		

●Course Purpose

[purpose of the class] In the corporate management, I learn it about the management of the technique that is essential for the growth, development and the innovation.
[arrival target] I become able to understand a way of thinking and the basics of management. I understand an organization change and an organization design, the management of the innovation and come to be able to give explanation.

●Prerequisite Subjects

●Course Topics

Management of technology (MOT) and knowledge management
Management and artefact (artifact)
Organization to realize innovation
Science, technique, sense of values
Innovation and organization learning

[instructions of the class overtime learning]
Preparing a next class range, and understanding the meanings of the technical term.

●Textbook

Isao Naito, Yukihiro Wakuta edition (2016) " organization theory of the representation" CHUOKEIZAI-SHA

●Additional Reading

Instructions will be given as necessary in class

●Grade Assessment

evaluation method] I give a small test to look back on the lecture content of the day before the end of the lecture of every time and have you finally submit a report. I evaluate it at 50% of normal points, report point 50%. In addition, I do not accept the submission of the report when there is absence more than 1/3.
[point of reference] Pass in understanding the basic concept and term in conjunction with the management engineering definitely; is based.

●Notes

There are no prerequisites

●Contacting Faculty

I accept questions during the class.

Industry and Economy (2.0credits) (産業と経済)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Physical Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering
	Department of Mechanical and Aerospace Engineering	Civil Engineering	Architecture
Starts 1	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
Lecturer	Part-time Faculty		

●Course Purpose

I learn knowledge about the economy while examining the background, structure, influence about various economic phenomena, pocketbook issues.
I learn the economic thought method that economists built that understanding, explanation solves a pocketbook issue at the same time.

A target: In this lecture, a student attending a lecture aims for coming to be able to do the next thing.
1. As a member of society, an industrial person, I learn necessary and useful economic knowledge and come to be able to inflect.
2. I understand structure and the mechanism of the economic phenomenon, pocketbook issue and come to be thought systematically.
3. I understand the way of economic thought (view, way of thinking) and learn it and become able to inflect.

●Prerequisite Subjects

Because it is not a specialized subject, I do not appoint it in particular.

●Course Topics

1. Economic circulatory structure ... give-and-take
2. Change ... prosperous conditions and recession of the economy
3. Foreign exchange rate ... strong yen and weak yen
4. Role ... annual revenue and annual expenditure of the government
5. Maintenance of role ... price stability and the trust order of Bank of Japan
6. Problem ... overflow of population of the population and too few population
7. Economic history ... Smith and Keynes
8. Free-market economy ... light and shadow
9. Japanese economy ... inflation and deflation after World War II

Reading as I appoint the range that should read a textbook beforehand at the time of a lecture of every time for the next time.
In addition, reviewing it as I show a part to review and a method about the document which I distributed, and deepening understanding.

●Textbook

Nakaya"Nyumonsho wo yomumae no Keizaigaku nyumon",Doubunkan

●Additional Reading

P. A.Samuelson, W. D.Node house "economics" (Iwanami Shoten) Kennichi Miyazawa () "introduction to industrial linkage analysis" (Nikkei library, Nihon Keizai Shimbun, Inc.) Iwao Ozaki "industrial structure of Japan" (Keio University publication society)

R. A.I introduce it at the time of a lecture of every time including Feldman "economic latest lecture of the Dr. Feldman in Japan" (Bungeishunju Ltd.).

●Grade Assessment

Understand a basic concept about the economy definitely, and keep the structure of the pocketbook issue under control, and, in wearing an economic thought method, pass; is based. I evaluate an accomplishment degree by a small report (20%) to assign at the time of a lecture of every time and the regular examination (80%) of the term end and do higher than 60 points with a pass at one hundred perfect score. In addition, the absentee of the regular examination assumes it "absence".

●Notes

There are no prerequisites

●Contacting Faculty

Around during the lecture and lecture time, a charge teacher copes in a lecture room

Patent and Intellectual Property (1.0credits) (特許及び知的財産)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Chemistry and Biotechnology	Department of Physical Science and Engineering	Department of Energy Science and Engineering
	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering	Civil Engineering
	Architecture		
Starts 1	2 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
	4 Autumn Semester		
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	Elective
	Elective		
Lecturer	Masahiro KITO Professor		

●Course Purpose

Understand the necessity and significance of patents from the viewpoint of researchers and engineers at universities and companies

Acquire basic knowledge of patents and acquire what researchers and engineers who invent should do.

Attainment target

1. Understand the purpose and necessity of the patent system
2. Understand the basics of patent application procedures and how to write application documents
3. Can perform basic patent search
4. Understand how companies and universities use patents

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Statistics and Analysis B (2.0credits) (データ統計解析Ｂ)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Department of Physical Science and Engineering	Department of Electrical Engineering, Electronics, and Information Engineering	Department of Mechanical and Aerospace Engineering
	Civil Engineering	Architecture	
Starts 1	4 Spring Semester	4 Spring Semester	4 Spring Semester
	4 Spring Semester	4 Spring Semester	
Elective/Compulsory	Elective	Elective	Elective
	Elective	Elective	
Lecturer	Yoji YAMADA Professor	ShogoOKAMOTO Associate Professor	

●Course Purpose
In the first half of the course, we study the basic statistics with underlying mathematics for data analysis. In the second half of the course, we study a few representative multivariate analysis techniques. Through the analysis of actual data using these techniques, we are to attain insights into the mechanisms behind the data.

●Prerequisite Subjects
There is no specific requirement to enroll in this course.

●Course Topics
1. Probabilistic distribution- Random variable and probabilistic distribution function- Gaussian distribution and normalization2. Basis of statistics- Statistics representing data- Moment3. Statistic estimation and test- Sampling- Error and uncertainty- Estimation- Hypothesis test4. Correlation and regression- Statistic independence- Explanatory and objective variables- Linear regression equation5. Level of measurement6. Multiple regression analysis- Theory including generalized inverse matrix- Variable selection- Extension to nonlinear analysis- Presentation by students

●Textbook

●Additional Reading
Provided in the class accordingly.

●Grade Assessment
Homework (60%) and examination (40%). After this course, the students should be able to analyze their own data and reach some conclusions by themselves.

●Notes
Potential atendees are not required to have finished Data Statistics Analysis A.

●Contacting Faculty
It is preferred that questions are asked, solved, and shared with all the attendees during the class. Emails or direct visits with appointments are acceptable.- Prof. Yoji Yamada, yamada-yoji@mech.nagoya-u.ac.jp, Room 302 at 2nd eng. build.- Dr. Shogo Okamoto, okamoto-shogo@mech.nagoya-u.ac.jp, Room 305 at 2nd eng. build.