

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

| | | |
|---------------------|----------------------------------|--|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Hiraku okada Associate Professor | CARBALLO SEGURA Alexander Designated Associate Professor |

Course Purpose

The purpose of this course is to study basic computer literacy skills and basic computer programming techniques for solving various problems in the C language through exercises.

Prerequisite Subjects

Basic mathematics

Course Topics

1. Basic computer literacy skills - Writing and sending e-mails - UNIX command line interface
2. Basics of the C language - Data types and variables - Control structures (Selection, loop, etc.) - Functions - Standard C library functions (Input/Output, Math, etc.) - Fundamental data structures (Scalars, arrays, etc.)
3. Problem Solving by Programming

Textbook

K.N. King: "C Programming: A Modern Approach, 2nd Edition", W. W. Norton & Company, 2008 (ISBN: 978-0393979503)

Additional Reading

Some references will be announced in the lecture.

Grade Assessment

Grades will be based on weekly reports, class attendance, and several project reports. Grades are determined from a score of 100 points. Students must obtain the score of 60 or higher to pass the course.

Notes

Knowledge of mathematics at the high school level. The course consists of on-demand video lectures and face-to-face or Teams-based exercises. On-demand video will be uploaded to NUCT before each lecture. The exercises will be explained in the video. The teaching assistant (TA) will be available to stay in Room E32 during the lecture period (14:45-16:15, JST) to answer questions. At the same time, real-time remote meetings by Microsoft Teams will be available to ask questions remotely.

Contacting Faculty

Students can communicate with their lecturer and TA during lecture hours or via email (cs1-22@katayama.nuee.nagoya-u.ac.jp).

Fundamental Physics Tutorial I a (1.0credits) (物理学基礎演習 1 a)

| | | | |
|---------------------|--|------------------------|------------------------|
| Course Type | Basic Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester | 1 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | SHIGEMORI Masaki Designated Professor | | |

Course Purpose

This is the companion course to the lecture course Fundamentals of Physics I on introductory calculus-based mechanics. It offers exercises to cultivate the ability to analyze and solve problems, as well as presentation and discussion skills so as to participate effectively in discussions among peers and instructors, leading to mastering the concepts introduced in the lecture course. Therefore students taking the lecture course are expected to register for this tutorial course.

Prerequisite Subjects

Fundamentals of Physics I; Calculus I

Course Topics

See syllabus for Fundamentals of Physics I

Textbook

Students are required to purchase the online Fundamentals of Physics Extended 11th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2018 ISBN: 978-1119460138).[However, do not purchase it before the first class meeting where further details will be announced in class]

Additional Reading

Feynman Lectures On Physics (Vol.1) by Richard P. Feynman (Pearson PTR)

Grade Assessment

Attendance, class participation, quizzes and assignments. Details will be explained at the first tutorial. Class attendance is required. Absentee must give a valid reason supported by documents. A student will receive an "Absent" grade if he is absent for more than 2 times without valid reason.

Notes

Hybrid or online only (will use Zoom or Teams) Please keep Zoom and Teams upgraded to the latest version.

Contacting Faculty

By appointment. Please email instructors to make an appointment.

Fundamental Physics Tutorial I b (1.0credits) (物理学基礎演習 1 b)

| | | | |
|---------------------|-----------------------------------|------------------------|------------------------|
| Course Type | Basic Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester | 1 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | TAMA Florence Muriel Professor | | |

Course Purpose

This is a companion course to Fundamental Physics II, and offers practical exercises for mastering the concepts introduced in the lecture courses. Students taking the lecture courses should also take this tutorial class

Prerequisite Subjects

Concurrent registration with Fundamentals of Physics II

Course Topics

Course Contents See syllabus for Fundamental Physics II.

Textbook

Fundamentals of Physics Extended 10th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2010 ISBN: 9781118230749)

Additional Reading

Contact the instructor in charge.

Grade Assessment

Weekly tutorials, quizzes (Weighting to be advised) Absent: submission of Course Withdrawal Request Form required Fail: total accumulated score of less than 60%.

Notes

Concurrent registration with Fundamentals of Physics II The class will be face-to-face or conducted remotely - information will be available on the NUCT website before class start.

Contacting Faculty

By email: florence.tama@nagoya-u.jp Question to teachers should be asked using the NUCT function "Message"

Fundamental Physics Tutorial II a (1.0credits) (物理学基礎演習 2 a)

| | | | |
|---------------------|---|------------------------|------------------------|
| Course Type | Basic Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Spring Semester | 1 Spring Semester | 1 Spring Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | John A. WOJDYLO Designated Professor | | |

Course Purpose

This is a companion course to Fundamentals of Physics III, and offers practical exercises for mastering the concepts introduced in those lectures. Students enrolled in Fundamentals of Physics III are strongly urged to enrol in this tutorial course. The aims of this course are to deepen students' understanding of basic Physics of electricity and magnetism and to cultivate their ability to apply Physics knowledge to problem-solving. Students will significantly improve their understanding of the elementary Electricity and Magnetism introduced in the FPIII course, as well as their proficiency in solving simple related problems.

Prerequisite Subjects

Fundamentals of Physics 1 and 2. Concurrent enrolment in Fundamentals of Physics 3.

Course Topics

Students must solve problems and present their solutions during the tutorial. Topics covered include (Chapter references are to the textbook by Resnick, Halliday and Walker): Chapter 21: Electric Charge Chapter 22: Electric Fields Chapter 23: Gauss' Law Chapter 24: Electric Potential Chapter 25: Capacitance Chapter 26: Current and Resistance Chapter 27: Circuits Chapter 28: Magnetic Fields Chapter 29: Magnetic Fields Due to Currents Chapter 30: Induction and Inductance

Textbook

Resnick, Halliday and Walker, Wiley. Or WILEYPLUS Online. The WileyPlus website has many useful videos and worked examples. You should explore the resources available on that website

Additional Reading

Leighton, R.B. & Feynman, R.P., Feynman Lectures on Physics (Volume 2), Pearson. This is a Year 2 level textbook, but even in Year 1 it is very useful.

Grade Assessment

Class attendance is required. Absentee must give a valid reason. Class Attendance, performance and attitude: 10%; Assignments 45%; Tutorial reports, quizzes 45%. The "Absent (W)" grade is reserved for students who withdraw by the official deadline in May. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester. If FPT2a is NOT A COMPULSORY SUBJECT and the student plans never to take FPT2a in the future, then a late withdrawal request will be considered.

Notes

Live lectures via MS Teams (Online only). Before the start of semester students should ensure that they have correctly installed MS Teams using their Nagoya University email account. All lectures will be live via MS Teams (online only). A lecture video will be available immediately after each lecture to help with student revision. The lecturer will be available at most times during the day to answer questions via Teams chat.

Contacting Faculty

Fundamental Physics Tutorial II b (1.0credits) (物理学基礎演習 2 b)

| | | | |
|---------------------|---|------------------------|------------------------|
| Course Type | Basic Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Spring Semester | 1 Spring Semester | 1 Spring Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | Bernard GELLOZ Designated Associate Professor | | |

Course Purpose

The aim of this course is to deepen students' understanding of basic Physics of waves and optics, and to cultivate their ability to apply Physics knowledge. Problem solving methods are introduced. This tutorial focuses on mechanical and electromagnetic waves, as well as optics. Students will train on both conceptual understanding and problem solving. Understanding waves and optics is important as preparation for more advanced subjects, for example in quantum mechanics, chemistry, and engineering.

Prerequisite Subjects

The three courses Fundamentals of Physics I, II and III. Since this tutorial is designed to accompany Fundamentals of Physics IV, it is highly recommended to register for this course too if you have not already passed it.

Course Topics

- Review of mechanical oscillations (part of chapter 15)- Short introduction to electromagnetic oscillations (part of chapter 30)- Fundamentals of waves and mechanical waves (chapter 15)- Introduction to Maxwell's equations (part of chapter 32)- Electromagnetic waves (chapter 33)- Images (geometrical optics) (part of chapter 34)- Optical interference (chapter 35)- Introduction to optical diffraction (part of chapter 36)

Textbook

Fundamentals of Physics Extended 10th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2010 ISBN-13: 978-1118230725)

Additional Reading

Feynman Lectures On Physics (Vol. 2) by Richard Phillips Feynman (Pearson P T R)

Grade Assessment

Online Assignments: 20%, Tutorial reports: 20%; quizzes: 60%.

Notes

Contacting Faculty

Mathematics I and Tutorial (4.0credits) (数学 1 及び演習)

| | | |
|---------------------|---|--|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | John A. WOJDYLO Designated Professor | KITAHARA Teppei Designated Assistant Professor |

Course Purpose

5th period

This course is a companion course to Mathematical Physics II. This course introduces first order and second order ordinary differential equations and their solution methods. Students master analytical techniques for problems that arise in physics, engineering and chemistry. Questions of uniqueness of solutions and convergence are also discussed. Students are also introduced to Fourier series, the Fourier transform, convolution, Laplace transform, and the Dirac delta function. Students will find this mathematical methods course helpful in other units such as Quantum Mechanics, Analytical Mechanics, Electricity and Magnetism, as well as in Automotive Engineering and other engineering courses.

This course has dual aims: 1) to convey mathematical principles; 2) to improve students' technical ability – i.e. ability to express intuition in mathematical terms and ability to solve problems.

4th period

Students taking Mathematical Physics I should also take this tutorial class. This course introduces first order and second order ordinary differential equations and their solution methods. Students master exact and approximate analytical techniques for initial value problems that arise in physics, engineering and chemistry. Questions of existence, uniqueness and convergence are also discussed. Fourier series follow naturally from the 2nd order theory and these are investigated, too.

Prerequisite Subjects

Prerequisites

Calculus I; Calculus II; Linear Algebra I; Linear Algebra II, or Consent of Instructor

Related Courses

Mathematical Physics Tutorial I, Mathematical Physics II

Course Topics

Course Outline

- First order ordinary differential equation (ODE) initial value problems. Integration factor; separable equations; systems of ODEs (Hamiltonian systems); phase plane, flow. Uniqueness and existence theorems. Some differences between linear and nonlinear ODEs.
- Second order linear ODE initial value problems. Homogeneous solution. Proving linear independence (Wronskian). Method of Undetermined Coefficients; Variation of Parameters. Series solutions: ordinary point, regular singular point; convergence tests; Method of Frobenius. Examples from physics, engineering and chemistry.
- Fourier series. Dirichlet conditions. Role of symmetry. Gibbs phenomenon. Effect of jump discontinuity on speed of convergence. Integration and differentiation of Fourier series.
- Fourier transform, convolution, Dirac delta function. Laplace transform.

It is desirable to read a textbook or reference materials before a class

Textbook

Boyce W., DiPrima R, Elementary Differential Equations, 7th –10th Ed., Wiley.

Additional Reading

4th period

1. Boas M.L., 2006, Mathematical Methods in the Physical Sciences, 3rd ed., John Wiley & Sons.

2. Strang, G., Introduction to Linear Algebra, 4th Edition, Chapter 6.

3. Arfken G.B. & Weber H.J., 2005, Mathematical Methods for Physicists, 6th ed., Elsevier Academic Press. (Copies are available in the library.)

5th period

1. Boas M.L., 2006, Mathematical Methods in the Physical Sciences, 3rd ed., John Wiley & Sons.

2. Strang, G., Introduction to Linear Algebra, 4th Edition, Chapter 6.

3. Arfken G.B. & Weber H.J., 2005, Mathematical Methods for Physicists, 6th ed., Elsevier Academic Press. (Copies are available in the library.)

Grade Assessment

4th period

tutorial Attendance: 50%; Class performance: 50%

5th period

Attendance: 5%; Weekly Quizzes and Assignments: 25%; Mid-term exam: 35%; Final Exam: 35%

Notes

Contacting Faculty

4th period

Office: BuES ilding, ES617

Email: abetomo@kmi.nagoya-u.ac.jp

5th period

Office: Science Hall 5F 517

Phone: 052-789-2307

Email: john.wojdylo@s.phys.nagoya-u.ac.jp

Mathematics II and Tutorial (4.0credits) (数学 2 及び演習)

| | | |
|---------------------|---------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | TakaakiFUJITA Professor | |

Course Purpose

This course introduces students to vector analysis and partial differential equations, expecting their applications to advanced engineering, such as those related to mechanics and electromagnetics, and those to materials and heat transfer phenomena. The purpose of the course is to acquire fundamental knowledge in vector analysis and partial differential equations and enable students to apply it to solve actual engineering issues through intensive exercises.

Targets

1. Enable to solve basic problems on vector analysis.
2. Enable to solve basic problems on partial differential equations.

Prerequisite Subjects

Calculus I, II

Linear Algebra I, II

Mathematics I and Tutorial

Course Topics

1. Vector algebra
2. Vector differential operations
3. Curved lines and curved surfaces
4. Gradient, divergence and rotation
5. Line integrals and surface integrals
6. Gauss theorem, Stokes theorem and Green's theorem
7. Irrotational (conservative) field and solenoidal field
8. Curvilinear coordinate systems (cylindrical coordinates and spherical coordinates)
9. Poisson's equation and Green function
10. Separation of variables: Laplace equation, diffusion equation and wave equation

Students are expected to review the distributed notes after lectures. Students need to submit reports on the problems presented in the lecture. The solutions of the problems will be presented in the lecture where reports are returned, through which students are expected to deepen their understanding.

Textbook

Not specified. Notes are distributed during the lecture.

Additional Reading

Mathematical Methods for Physicists, sixth edition, by G. B. Arfken and H. J. Weber, Elsevier, 2005 (ISBN: 0-12-088584-0)

Mathematical Methods in the Physical Sciences, by Mary L. Boas, Wiley, 2006 ((ISBN: 978-0471198260)

Grade Assessment

Attendance, exercise and reports: 50%

Examination: 50%

Students need to obtain at least 60% of the total marks to pass the course.

Notes

This course is given in person. If the way would be changed, it would be informed in NUCT.

Those who hope to take this course but cannot attend the class in person, due to not staying in Japan for instace, are requested to send email to fujita@energy.nagoya-u.ac.jp by Sep. 26th, 2022.

Contacting Faculty

Office: Bld. No. 8 south, Room No. 407,

Phone: 052-789-4593,

E-mail : fujita@energy.nagoya-u.ac.jp

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

| | | |
|---------------------|--|---|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | SHIGEMORI Masaki Designated Professor | KazuyaFUJIMOTO Designated Assistant Professor |

Course Purpose

Theoretical formalism using Lagrangians and Hamiltonians is very useful for studying the motion of dynamical systems consisting of point particles and rigid bodies. In this lecture, students will gain an understanding of fundamental principles of theoretical formalism and learn technical aspects through simple applications.

Prerequisite Subjects

None

Course Topics

1. General coordinates and the Euler-Lagrange equation
2. The Euler-Lagrange equation and constraints
3. Variational principle
4. The Hamilton equations and canonical transformation
Analytics classical mechanics
Students will solve problems under faculty guidance.

Textbook

John R. Taylor, Classical Mechanics (University Science Book, 2005)

Additional Reading

These reference books are available in the Main Library
1. H. Goldstein, Poole & Safko, Classical Mechanics (Addison Wesley, 2002)
2. R. D. Gregory: Classical Mechanics (Cambridge, 2008)
3. J.B. Marion, Classical Dynamics of Particles and Systems (Academic Press, 1965)
4. G. R. Fowles: Analytical Mechanics (1962)

Grade Assessment

Criteria for “Absent” & “Fail” Grades: Class attendance is required. Absentee must give a valid reason. A student will receive an “Absent” grade if he is absent from class more than 2 times or he is absent without valid reason from the Final Exam. A student who is NOT “Absent” but wishes to receive an “Absent” grade must see the instructor immediately after the Final Exam.

Notes

No registration requirement

Contacting Faculty

Masaki Shigemori
Office: ES Bldg. room 420
Phone: 052-789-5549
Email: shige@eken.phys.nagoya-u.jp
KUWAHARA Makoto
Office: Eng. Bldg.3, room 453
Phone: 052-789-3597
Email: kuwahara@imass.nagoya-u.ac.jp

Electrical Circuits Engineering (2.0credits) (電気回路工学)

| | | |
|---------------------|---|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Muneaki KURIMOTO Associate Professor | |

Course Purpose

This course deals with the basic concepts and principles of electrical circuits, as a basis for Automobile Engineering Laboratory I-II, Power Electronics, Scientific Measurements. The purpose of this course is to develop an understanding of basic electrical-circuit theory and responses of electrical circuits. Upon completion of the course, students will be able to (1)describe responses of electrical circuits with circuit equations, (2)explain steady-state and transient phenomena in electrical circuits, and (3)understand various phenomena by utilizing equivalent circuit analysis.

Prerequisite Subjects

+ Mathematics(Linear Algebra, Calculus, Complex and Vector Analyses)+ Electricity and Magnetism

Course Topics

1. Electrical Quantities (Charge, Current, Electrical Potential and Power)2. Circuit Concepts and Elements (Resistance, Inductance and Capacitance)3. Circuit Laws(Kirchhoff's Voltage and Current Laws)4. Circuit Analysis Methods (Matrices, Thevenin's and Norton's Theorems)5. Waveforms and Signals for AC Circuits6. First-Order Circuits (RC and RL Circuits)7. Higher-Order Circuits (RLC Circuits)8. Sinusoidal Steady-State Circuit Analysis9. AC Power10. Frequency Response of AC Circuits11. Mutual Inductance and Transformers
Preparation on each of above-mentioned topics described in the textbook is requested. Homework assigned in each class should be reported no later than designated deadline.

Textbook

Electric Circuits-7th EditionEds. by Mahmood Nahvi and Joseph A. EdministerSchaum's Outlines Series, The McGraw-Hill Comp, Inc. 2018

Additional Reading

For Examples:Electric Circuits (9th Edition) [Hardcover] Eds. by James W. Nilsson and Susan RiedelISBN-10: 0136114997ISBN-13: 978-0136114994

Grade Assessment

Grades will be based on a midterm examination (40%),final examination (40%), and reports(20%). A score of 60 or higher is requested to get the credit of this course.Grade Points;10095:A+, 9480:A, 7970:B, 6965:C, 6460:C-, 59:F

Notes

There are no limitations for taking this course.Lectures will be given face-to-face basically, but if necessary, both face-to face and remotely (on-demand via NUCT).*In changing the lecture style, it will be announced through the NUCT website.

Contacting Faculty

For questions on the lectures after registration, the message function of the NUCT should be used.Before registration, please contact the following e-mail addresses:kurimoto@nuee.nagoya-u.ac.jp

Mechanics of Materials and Tutorial (3.0credits) (材料力学及び演習)

| | | |
|---------------------|---------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Part-time Faculty | Part-time Faculty |

Course Purpose

In this course, students will learn the fundamentals of stress, strain, and how materials deform. Students will also solve problems related to the course topics under the guidance of the faculty. By the end of the course, students will: 1. Understand the concepts of stress and strain. 2. Have the ability to analyze stress in rods and beams that undergo tension, compression, bending, and torsion. 3. Have the ability to analyze combined stresses in rods and beams. 4. Have the ability to determine the strain energy in rods and beams.

Prerequisite Subjects

Calculus & Physics

Course Topics

1. Stress and strain 2. Tension and compression 3. Beam bending 4. Torsion of a bar 5. Combined stress 6. Strain energy 7. Buckling of a column You are supposed to prepare and review each lecture by reading textbooks outside the course hours. In addition, there will be homework provided at each lecture.

Textbook

Strength of Materials, S. Timoshenko, ISBN: 9780898746211 (Copies are available in the main library)

Additional Reading

History of Strength of Materials, Timoshenko, ISBN: 978-0486611877 (Copies are available in the main library)

Grade Assessment

Students must obtain a letter grade of C or above to pass the course. Letter grades are assigned based on the percentages: S:100-90 A:89-80 B:79-70 C:69-60 F:59-0 The semester percentile grade is based on the following breakdown: Homework Assignments - 40% Mid-term Exam - 30% Final Exam - 30% Homework assignments will be graded based on a 10 point scale. The mid-term and final exams will be based on a 100 point scale. The final exam will be comprehensive.

Notes

No requirements for attending this course

Contacting Faculty

Students can ask questions to the lecturer any time via email. E-mail: miyake@gifu-u.ac.jp

Thermodynamics and Tutorial (2.5credits) (熱力学及び演習)

| | | |
|---------------------|---------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Yasumasa ITO Professor | |

Course Purpose

The main focus of this course is the basic principles of thermodynamics, which means not only classic thermodynamics but also chemical reaction and energy conversion. It is expected that, after the course, students acquire basic knowledge of thermodynamics. It is also expected that students can explain the fundamentals for macroscopic physical phenomena and calculate engineering problems such as thermal efficiency of heat engines.

Prerequisite Subjects

Calculus, linear algebra, fundamentals of physics

Course Topics

1. Thermal Equilibrium and Temperature, and State Equations
2. The First Law of Thermodynamics
3. The Second Law of Thermodynamics and Carnot Cycle
4. Entropy
5. Free Energy
6. Thermodynamic Functions
7. Phase Equilibrium and Chemical Equilibrium
8. Heat engines
Exercise session follow every other week.
Part of problems are assigned as homework.

Textbook

Handouts will be provided.

Additional Reading

Thermodynamics, an engineering approach (McGrawHill)

Grade Assessment

Mainly final exam and midterm exam but homework will be taken into account too. Full mark is 100 points and 60 points is the minimum requirement to earn credits.

Notes

No specific subject

Contacting Faculty

Message through NUCT. If you can't use it for some reason, email to yito@nagoya-u.jp. This class will be held in the classroom (in person). If you can't make it, please let me know.

Kinematics of Machines (2.0credits) (機構学)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Autumn Semester | 2 Autumn Semester |
| Elective/Compulsory | Compulsory | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

In this course, students will learn to analyze basic mechanisms commonly found in automobiles and other devices. Students will also be encouraged to apply these basic mechanisms to enhance their understanding of the mechanical world around them. By the end of the course students will be able to analyze the position, velocity, and acceleration of the elements of single and multiple degree-of-freedom linkages and understand and analyze the different methods of motion transmission.

Prerequisite Subjects

Calculus & Linear Algebra

Physics

Course Topics

1. Mechanisms types (pair, chain)
2. Kinematics of mechanisms (instantaneous center, centrode)
3. Velocity and acceleration of machine element (graphical analysis & algebraic analysis)
4. Linkage mechanism (quadric crank chain)
5. Transmission of motion (cam, rolling contact, toothed wheels, wrapping connector)
6. Matrix representation of machinery movements.

Textbook

Kinematics and Dynamics of Machines, G. Martin, ISBN: 9781577662501

(Copies are available in the main library.)

Additional Reading

As handed out in class.

Grade Assessment

Students must obtain a letter grade of C or above to pass the course.

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Mid-term Exam - 30%

Final Exam - 30%

Homework assignments will be graded based on a 10 point scale. The mid-term and final exams will be based on a 100 point scale.

Notes

Contacting Faculty

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

Electricity and Magnetism (2.0credits) (電磁気学)

| | | |
|---------------------|---|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Chemistry | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Elective | Compulsory |
| Lecturer | John A. WOJDYLO Designated Professor | |

Course Purpose

This course is a solid introduction to electrostatics and magnetostatics, as well as elementary electro- and magnetodynamics. It covers the first half of the textbook by Griffiths.

NOTE TO INTERNATIONAL EXCHANGE STUDENTS: this course assumes knowledge of vector calculus. We do not have time to reteach the basics that Nagoya University students have already learned. You must have a good grasp of vector calculus to take this course.

By the end of the course, students will have gained an intuitive as well as quantitative understanding of the basic physical principles of electromagnetism, as well as familiarity -- and hopefully mastery -- of some of the fundamental mathematical methods required to solve problems in physics, engineering, chemistry and applied mathematics.

This course has dual aims: 1) to convey physical and mathematical principles relevant to solving applied problems in physics, engineering and chemistry; 2) to improve students' technical ability – i.e. ability to express intuition in mathematical terms and ability to solve problems.

The course objective is to enable students to master each point in the course plan as outlined below, to the level of the first half of the textbook by Griffiths.

Prerequisite Subjects

Calculus I&II; Mathematical Physics II or Consent of Instructor.

Students MUST have previously performed strongly in a vector calculus course.

Course Topics

Participants are expected to prepare solutions to problems relating to the lecture course content, which are handed out by the EM1 lecturer, and present their solutions on the whiteboard (or online using MS Teams) during the tutorial course (Physics Tutorial IIa).

Course outline.

1. Revision of vector calculus, curvilinear coordinates, Dirac Delta Function.
2. Electrostatics. Coulomb's Law. Continuous Charge Distributions. Divergence and Curl of Electrostatic Fields. Field Lines, Flux, and Gauss's Law. Electric Potential. Poisson's Equation and Laplace's Equation. The Potential of a Localized Charge Distribution. Physical meaning of the Dirac delta function in the context of Poisson's Equation.
3. Work and Energy in Electrostatics. Conductors. Induced Charges. Surface Charge and the Force on a Conductor. The Method of Images: point charge near a conducting plane or sphere, grounded or insulated. Separation of Variables.
4. Electric Fields in Matter. Polarization. Dielectrics. The Electric Displacement. Linear Dielectrics.

5. Magnetostatics. The Lorentz Force Law. The Biot-Savart Law. The Divergence and Curl of B. Applications of Ampere's Law. Magnetic Vector Potential A. Gauge transformations.

6. Magnetic Fields in Matter. Magnetization. Diamagnetism, Paramagnetism, Ferromagnetism. The Auxiliary Field H. Magnetic Susceptibility and Permeability.

7. Introduction to Electrodynamics. Electromotive Force. Electromagnetic Induction. Faraday's Law. Energy in Magnetic Fields. Maxwell's Equations. Magnetic levitation.

Textbook

1. Griffiths, D.L., 2012, Introduction to Electrodynamics, 4th ed., Prentice Hall.

Alternative textbook (HIGHLY RECOMMENDED):

2. Purcell, E.M. and Morin, D. J., Electricity and Magnetism, 3rd Ed., Cambridge University Press

(It is essential that students read at least one of these books.)

Additional Reading

1. Leighton, R.B. & Feynman, R.P., Feynman Lectures on Physics (Volume 2), Pearson.
(Highly recommended.)

2. Boas, Mary, Mathematical Methods in the Physical Sciences 3rd Ed., Wiley (2005). (Intuitive and well-explained introduction to much of the basic mathematics students need to master in undergraduate physics, including vector calculus.)

3. Jackson, J. D., Classical Electrodynamics, 3rd Edition, 1998. (Advanced reference.)

Even if at this stage you can't understand much of the theory in the book by Jackson, you can occasionally "consult Professor Jackson" and understand a page or more, and also look at the fascinating graphs of solutions. You can learn a lot doing even this.

Grade Assessment

Attendance and class performance, attitude: 5%; Weekly quizzes or other written assessment: 30%; Midterm exam: 32.5%; Final Exam: 32.5%

The "Absent (W)" grade is reserved for students who withdraw by the official deadline in May. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester.

If Electricity and Magnetism I is NOT A COMPULSORY SUBJECT and the student plans never to take Electricity and Magnetism I in the future, then a late withdrawal request will be considered.

Notes

Live lectures via MS Teams (Online only). Before the start of semester students should ensure that they have correctly installed MS Teams using their Nagoya University email account.

Contacting Faculty

Office: Science Hall 5F 517

Phone: 052-789-2307

Email: john.wojdylo@s.phys.nagoya-u.ac.jp

All lectures will be live via MS Teams (online only).

A lecture video will be available immediately after each lecture to help with student revision.

The lecturer will be available at most times during the day to answer questions via Teams chat.

Metallic and Ceramic Materials (2.0credits) (金属材料とセラミックス)

| | | |
|---------------------|-----------------------------|--------------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Makoto KOBASHI Professor | Oho ken Associate Professor |

Course Purpose

The purpose of this course is to learn various properties of metallic and ceramic materials. Students will acquire general and fundamental knowledge of metals, alloys and ceramics, including crystal structures, physical properties and material processing techniques. At the end of this course, students can describe typical crystal structures of metals and ceramics. Students can also describe the basic physical properties.

Prerequisite Subjects

Mechanics of Materials with exercises

Course Topics

Contents treated in this program are as follows:

1. Crystal structures of metals and ceramics
2. Deformation and dislocation of metals
3. Strengthening of metals
4. Mechanical properties of metals and ceramics
5. Failure of ceramics
6. Application of ceramics
7. Synthesis and fabrication of ceramics

Textbook

Printed handouts will be provided.

Additional Reading

Materials science and engineering, W.D.Callister Jr., Wiley

Grade Assessment

Grades will be based on reports and examinations.

50% for midterm examination

50% for final examination

Students must obtain a score of 60 or higher to pass the course.

Notes

Course Requirements

No course requirements are needed.

Classroom policy for response to COVID-19.

The class will be conducted both at lecture room (face-to-face) and remotely (on-demand). On-demand lecture will be held on NUCT.

The exchange of opinions among students regarding the class shall be conducted through the NUCT function "Message".

Contacting Faculty

Students can ask questions during and after lectures, as well as via e-mail.

kobashi.makoto[at]material.nagoya-u.ac.jp

wang.qian[at]material.nagoya-u.ac.jp

Office Hour: 10:30-11:30 of the lecture day

Electronic Circuits (2.0credits) (電子回路工学)

| | | | |
|---------------------|---------------------------|--|---|
| Course Type | Basic Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Automotive Engineering | Automotive Engineering | |
| Starts 1 | 2 Spring Semester | 2 Spring Semester | |
| Elective/Compulsory | Elective | Compulsory | |
| Lecturer | Noriyasu ONO Professor | Masahiro HORITA Associate Professor | Muneaki KURIMOTO Associate Professor |

Course Purpose

The purpose of this course is to study basic analog transistor circuits, and to master the design of amplifiers and other analog electronic circuits.

Prerequisite Subjects

Electrical Circuit

Course Topics

1. Introduction: diodes and transistors
2. Amplification using transistor
3. Common emitter circuit, Common base circuit, Common collector circuit
4. Bias circuit, equivalent circuit
5. h parameter, input / output resistance
6. Impedance matching
7. Decibel, FET structure and circuit
8. Summary of the basics of electronic circuits and evaluation
9. Small-Signal Mid-frequency Bipolar Junction Transistor (BJT) Amplifiers
10. Frequency Effects in RC Amplifiers: low frequency
11. Frequency Effects in RC Amplifiers: high frequency
12. Power amplifiers: A class
13. Power amplifiers: B class
14. Operational amplifiers
15. Summary of amplifiers and evaluation

Homework is assigned every time after class. Please submit it as a small report the next time.

Textbook

Necessary materials will be distributed in class.

Additional Reading

Principles of Transistor Circuits, Ninth Edition, Addison Wesley

Grade Assessment

Evaluate in reports (20%) and exams (80%). For each of the above, the grade must be C or higher.

Notes

The lecture is conducted face-to-face in a lecture room in principle.

A student who is not in Japan or who cannot come to campus for some reasons, can attend the class by remote access.

If you want to attend by remote access, please contact to Horita by the first class.

Contacting Faculty

Please contact by e-mail:

Horita: horita__at__nuee.NU

Ohno: ohno__at__ees.NU

Kurimoto: kurimoto__at__nuee.NU

(substitute @ for __at__ and nagoya-u.ac.jp for NU)

Solid Mechanics (2.0credits) (固体力学)

| | | |
|---------------------|---------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Part-time Faculty | |

Course Purpose

The purpose of this course is to learn two- and three-dimensional theories of elasticity. The goals are to come to be able (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 bodies, (2) to understand and use a method to solve two-dimensional problems by using Airy stress function, and (3) to understand and use energy theorems.

Prerequisite Subjects

Mechanics of Materials with Exercises, Fundamentals of Physics (desirable)

Course Topics

1. Stress and Strain (Three-dimensional General Theory)
2. Relationship between Stress and Strain (Equations of Elasticity)
3. Two-dimensional Theory of Elasticity
4. Principles of Energy
5. Torsion of a Shaft

You are supposed to prepare and review each lecture by reading textbooks outside the course hours.

Textbook

Timoshenko, S. and Goodier, J. N., "Theory of Elasticity," McGraw-Hill Publishing Company; International ed of 3rd revised ed (1970/10)

Additional Reading

Fung, Y. C. and Tong, P., "Classical and Computational Solid Mechanics (Advanced Series in Engineering Science)," World Scientific Pub Co Inc (2001/10)

Sadd, M. H., "Elasticity, Theory, Applications, and Numerics" Elsevier, 2nd ed (2009)

Grade Assessment

Grades will be based on the following breakdown: Homework assignments - 40%, Mid-term examinations - 30%, and Final examinations - 30%. Students must obtain a minimum score of 60/100 to pass the course.

Grades: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

Notes

No requirements for attending this course

Contacting Faculty

Students can ask questions to the lecturer any time via email. E-mail: miyake@gifu-u.ac.jp

Fluid Mechanics I and Tutorial (2.5credits) (流体力学 1 及び演習)

| | | |
|---------------------|---------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Yasumasa ITO Professor | |

Course Purpose

Learn fundamental characteristics of fluid motion, physical laws, and governing equations for Newtonian fluids.

Specific objectives are to understand

1. basic fluid properties and principle of hydrostatics,
2. momentum equation of ideal fluids and the energy conservation law,
3. momentum law,
4. dimensional analysis and similarity law,
5. experimental techniques for flow measurements.

Prerequisite Subjects

Mechanics I, II

Calculus I, II

Linear Algebra I, II

Mathematics 1 with Exercises

Thermodynamics

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

Exercise lesson follows the lecture class every week. Part of problems are assigned as homework.

Textbook

Handouts will be provided.

Additional Reading

Fluid Mechanics (Ed; Kundu) Academic press

Grade Assessment

Final exam and homework.

The full mark is 100 points, and the passing mark is 60 points.

Notes

No specific requirement but students are expected to have taken the courses listed in the background subjects.

Contacting Faculty

Message through NUCT. Please email me at yito@nagoya-u.jp only when you can't use NUCT.

This lecture will be taught in the classroom (in person). If you can't make it, please let me know in advance.

Vibration Engineering and Tutorial (3.0credits) (振動学及び演習)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

In this course students will acquire the basic knowledge of vibration. This lecture focuses not only on the fundamental analysis but also on the vehicle vibration with some examples which are essential topics for vehicle engineers.

This course introduces the mathematical analysis on vibrating systems that is necessary in dynamic design analysis of machinery. Students will also solve problems related to the course topics under the guidance of the faculty. By the end of the course, students should be familiar with the analysis of single and multiple degree-of-freedom systems.

Prerequisite Subjects

Calculus, Analytical Dynamics, Mechanics

Course Topics

1. Introduction of the concept of vibration
2. Vibration of single degree-of-freedom systems
 - (2-1) Free response with a single degree of freedom
 - (2-2) Harmonic response with a single degree of freedom
 - (2-3) Forced response with a single degree of freedom
 - (2-4) Analysis with MATLAB in tutorial
3. Vibration of two degree-of-freedom systems
 - (3-1) Free & Forced Response with two degree-of-freedom model
 - (3-2) Lagrange's Equations
 - (3-3) Analysis with MATLAB in tutorial
4. Matrix Methods for multi degree-of-freedom systems

Textbook

William J.Palm III, "Mechanical Vibration" John Wiley & Sons, Inc.
(Copies available in library)

Additional Reading

As handed out in class.

Grade Assessment

Students must obtain a letter grade of C or above to pass the course.

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Mid-term Exam - 30%

Final Exam - 30%

Homework assignments will be graded based on a 10 point scale. The mid-term exam and final exam will be based on a 100 point scale.

Notes

Contacting Faculty

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

Automobile Chemical Systems I (2.0credits) (自動車化学システム 1)

| | | |
|---------------------|---------------------------------|---------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | KATSUTOSHI Nagaoka Professor | YutakaMATSUO Professor |

Course Purpose

Catalysts play an important role in automobiles. Exhaust gases from automobiles, including hybrid vehicles, are purified by the catalysts. Catalysts are also used in fuel cell vehicles to produce electricity from hydrogen and oxygen. In the first half of this lecture, students will acquire basic knowledge of catalysis and catalyst.

Through this lecture, students will learn

1. Catalysis and its definition
2. Materials and structures of solid catalysts
3. Catalysis for exhaust gas purification
4. Catalysis for fuel cell

Besides, energy conversion from sunlight to electricity will push forward the development of electric vehicles. In this context, flexible, light-weight, and thin-film solar cells will contribute to realizing such green-energy automobiles in future. Through this course, students can learn:

1. Photoelectric conversion mechanism in thin-film organic solar cells.
2. Necessary materials for constructing solar cells.
3. How to make organic and perovskite solar cells.

Prerequisite Subjects

Chemistry, Material engineering, Thermodynamics, Kinetics

Course Topics

1. Reaction path in the presence of the catalyst
2. Materials for heterogeneous catalysts
3. Structures of solid catalysts
4. Automobile exhaust gases and catalytic purification
5. Fuel cells and power generation by electrocatalyst
6. Structures in solar cells
7. Photoelectric conversion mechanism in solar cells.
8. Materials design and synthesis for energy conversion
9. Application of solar cells in automobiles

Because it is necessary to deepen understanding widely, a report is imposed as appropriate for home study.

Textbook

Printed handouts will be distributed in class.

Additional Reading

Physical Chemistry 9th ed. Atkins & de Paula

Other appropriate books and review articles will be introduced in the lectures.

Grade Assessment

Grades (two credits) will be based on the mid-term examination (75%) and attendance (25%) for each professor. Students must obtain a score of 60 points or higher to pass the course. There will be no final examination.

C: 60 to 69 points

B: 70 to 79 points

A: 80 to 100 points

S: particularly excellent among the evaluation A

Each professor's evaluation is equivalent.

Notes

Students are required to understand high school level chemistry. Also, students are encouraged to study materials chemistry for energy conversion prior to take the later part of this course.

Classes are conducted in combination with face-to-face and remote (using Zoom) classes.

Contacting Faculty

Students can ask questions during and after lectures, as well as via email.

Email: K. NAGAOKA: nagaoka.katsutoshi@material.nagoya-u.ac.jp

Email: Y. MATSUO: yutaka.matsuo@chem.material.nagoya-u.ac.jp

Scientific Measurements (2.0credits) (計測工学)

| | | |
|---------------------|---|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Compulsory |
| Lecturer | Muneaki KURIMOTO Associate Professor | |

Course Purpose

This course deals with basic measurement systems found in automobiles and other devices. The purpose of the course is to develop an understanding of basic concepts and principle of sensors and signal processing. Upon completion of the course, students will be able to (1) understand the relationship between sensing principles and device configuration, (2) select the appropriate sensor devices, (3) design signal processing required for measurement.

Prerequisite Subjects

Electronics, Electrical circuit

Course Topics

1. Outline (systematization of measurement etc.) 2. Operation principle of sensing elements 3. Signal detection and conversion 4. Signal processing
Preparation on each of above-mentioned topics described in the textbook is requested. Homework assigned in each class should be reported no later than designated deadline.

Textbook

Print distribution as appropriate

Additional Reading

Print distribution as appropriate

Grade Assessment

Grades will be based on reports. Acceptance criteria is to properly explain the measurement and the device configuration required for the measurement, and to correctly understand basic concepts and terms related to signal processing required for the measurement. A score of 60 or higher is requested to get the credit of this course. Grade Points; 10095:A+, 9480:A, 7970:B, 6965:C, 6460:C-, 59:F

Notes

There are no limitations for taking this course. Lectures will be given face-to-face basically, but if necessary, both face-to face and remotely (on-demand via NUCT). *In changing the lecture style, it will be announced through the NUCT website.

Contacting Faculty

For questions on the lectures after registration, the message function of the NUCT should be used. Before registration, please contact the following e-mail addresses: kurimoto@nuee.nagoya-u.ac.jp

Control Engineering and Tutorial (3.0credits) (制御工学及び演習)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture and Exercise | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

In this course students will study control system design using transfer function representation and frequency response methods. Students will also be introduced to state-space representation and solve problems related to the course topics under the guidance of the faculty. By the end of the course, students should be familiar with the design and analysis of single-input/single-output (SISO) & multi-input/multi-output (MIMO) closed-loop control systems.

Prerequisite Subjects

Calculus, Linear Algebra, & Analytical Dynamics

Course Topics

1. Overview of control system design (open-loop vs. closed-loop, classical vs. modern, etc.)
2. Modeling of the control system (plant, sensor, control law, and actuator & 1st vs. 2nd order systems) using block diagram representation
3. Laplace and inverse Laplace transformation
4. Transient and steady-state response analysis.
5. Frequency response analysis
6. Stability of SISO and MIMO closed-loop control systems.
7. SISO control system design - root-locus and frequency-domain approaches.
8. MIMO control system design and analysis.

Textbook

Modern Control Engineering-5th International Ed., K. Ogata, ISBN:9780137133376

Introduction to Dynamics and Control, L. Meirovitch, ISBN: 9780471870746

(Copies available in library)

Additional Reading

As handed out in class.

Grade Assessment

Students must obtain a letter grade of C or above to pass the course.

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Intermediate Exam - 30%

Final Exam - 30%

Homework assignments will be graded based on a 10 point scale. The final exam will be based on a 100 point scale.

Notes

Contacting Faculty

Control Engineering and Tutorial (3.0credits) (制御工学及び演習)

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

Material Processing (2.0credits) (材料加工学)

| | | |
|---------------------|--------------------------------|---|
| Course Type | Basic Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Compulsory | Elective |
| Lecturer | Noritsugu UMEHARA Professor | Kiyohisa NISHIYAMA Designated Lecturer |

Course Purpose

The purpose of the lecture is to develop an understanding of materials processing technologies in relation to material science.

Prerequisite Subjects

Material engineering, Strength of materials, Dynamics

Course Topics

(1) Materials, processing and human life (2) Fundamentals of the mechanical behavior of materials (3) Structure and manufacturing properties of metals (4) Metal-casting processes and equipment; heat treatment (5) Bulk deformation processes (6) Material-removal processes: cutting (7) Material removal processes: abrasive, chemical, electrical and high-energy beams

Textbook

Manufacturing Process for Engineering Materials Fifth Edition, Addison Wesley

Additional Reading

N/A

Grade Assessment

Grades will be based on class participation and reports.30% for attendance70% for final examinationStudents must obtain a score of 60 or higher to pass the course.Grades: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

Notes

No requirements for attending this course.About lecture:If the some of registered students will not be join to the classroom, this lecture will be opened via Web system. Be careful to watch the NUCT.

Contacting Faculty

Students are requested to direct questions to the lecturer via email.

Mathematics Tutorial Ia (1.0credits) (数学演習 1 a)

| | | | |
|---------------------|---|------------------------|------------------------|
| Course Type | Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester | 1 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | RICHARD Serge Charles Designated Professor | | |

Course Purpose

The aim of this course is to deepen the understanding of calculus and to cultivate the ability to apply mathematical knowledge. The course is mainly intended for students taking Calculus I. Students will have the opportunity to manipulate the various notions introduced during the lectures.

Prerequisite Subjects

Calculus I

Course Topics

Exercises sheets will be provided each week before the tutorial, and will be available on the web site of the course. Homework will be due every week during the tutorial. For more information: <http://www.math.nagoya-u.ac.jp/richard/fall2020.html>

Textbook

Free reference books and lecture notes are available on the website of the course

Additional Reading

Free reference books and lecture notes are available on the website of the course

Grade Assessment

Your final grade will be determined by homework (50%) and quizzes (50%). The grading scale will be: A+: 95 - 100, A: 80 - 94, B: 70 - 79, C: 65 - 69, C: 60 - 64, F: 0 - 59.

Notes

Some basic knowledge on calculus from high school is assumed, including differentiation and integration of polynomial functions.

Contacting Faculty

Email to : richard@math.nagoya-u.ac.jp

Mathematics Tutorial Ib (1.0credits) (数学演習 1 b)

| | | | |
|---------------------|--|------------------------|------------------------|
| Course Type | Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester | 1 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | BACHMANN Henrik Designated Associate Professor | | |

Course Purpose

The aim of this course is to provide essential mathematical knowledge necessary to further study mathematics and other sciences at university level. The course is intended for students taking Linear algebra I.

Prerequisite Subjects

The course is intended for students taking Linear algebra I.

Course Topics

Linear systems, Gaussian elimination, matrices, vectors, linear maps, matrix multiplication, the inverse of a linear map, subspaces of \mathbb{R}^n , image and kernel, linear independence, bases, dimension, coordinates, orthogonal bases, the Gram-Schmidt algorithm, QR factorization, orthogonal complement, orthogonal maps, least square approximations.

Textbook

Otto Bretscher: Linear Algebra with Applications, fourth edition, Pearson 2009. ISBN: 978-0-13-600926-9

Additional Reading

Grade Assessment

The assessment of this course coincides with the assessment of the course Linear Algebra I.

Notes

High-school level mathematics.

Contacting Faculty

Introduction to Automotive Engineering (2.0credits) (自動車工学概論)

| | | | |
|---------------------|------------------------|------------------------|---|
| Course Type | Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Automotive Engineering | Automotive Engineering | |
| Starts 1 | 1 Autumn Semester | 1 Autumn Semester | |
| Elective/Compulsory | Compulsory | Compulsory | |
| Lecturer | Part-time Faculty | Part-time Faculty | Tadayoshi AOYAMA Associate Professor |

Course Purpose

The purpose of the course is to develop an understanding of the basic structure and physics of vehicles through practice of car disassembly and assembly.

Prerequisite Subjects

Physics

Course Topics

1. Automobile structure
2. Steering mechanism
3. Electric component mechanism
4. Power transmission in automobile
5. Motorization of automobiles and energy management
6. Engine in automobile I
7. Engine in automobile II

Textbook

Handouts will be distributed in the class.

Additional Reading

Some books will be introduced in the lecture as needed.

Grade Assessment

Student must attend all classes and submit reports. Grades will be based on participations in practice and reports. Students must obtain a score of 60 or higher to pass the course. Grades : S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

Notes

No requirements for attending this course

Contacting Faculty

Students can contact their lecturer by email.

Mathematics Tutorial II a (1.0credits) (数学演習 2 a)

| | | | |
|---------------------|---|------------------------|------------------------|
| Course Type | Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Spring Semester | 1 Spring Semester | 1 Spring Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | RICHARD Serge Charles Designated Professor | | |

Course Purpose

The course is mainly intended for students taking Calculus II. Students will have the opportunity to manipulate the various notions introduced during the lectures.

Prerequisite Subjects

Calculus II, G30 program

Course Topics

Exercises sheets will be provided each week before the tutorial, and will be available on the web site of the course. Homework will be due every week during the tutorial.

Textbook

Free reference books and lecture notes will be available on the website of the course.

Additional Reading

Notes provided during the lectures of Calculus II.

Grade Assessment

The final grade will be determined by homework (50%) and quizzes (50%). The grading scale will be The grading scale will be A+, A, B, C, C-, F. Depending if the tutorial sessions are compulsory or elective, the criteria are different. Discuss with the instructor for more information.

Notes

Some notions on functions of one variable, as seen in Calculus I. A basic knowledge of linear algebra will be an asset. Website for this course: <http://www.math.nagoya-u.ac.jp/~richard/spring2022.html> Most probably hybrid.

Contacting Faculty

Email to : richard@math.nagoya-u.ac.jp

Mathematics Tutorial II b (1.0credits) (数学演習 2 b)

| | | | |
|---------------------|--|------------------------|------------------------|
| Course Type | Specialized Courses | | |
| Class Format | Exercise | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Spring Semester | 1 Spring Semester | 1 Spring Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | BACHMANN Henrik Designated Associate Professor | | |

Course Purpose

The objective of this course is to provide essential mathematical knowledge necessary to further studies in mathematics and science at university level. The course is primarily intended for students taking the course Linear algebra II.

Prerequisite Subjects

Linear Algebra II

Course Topics

Orthogonal maps, vector spaces, determinants and their applications, eigenvalues and eigenvectors, applications of eigenvalue theory, linear differential equations.

Textbook

do not appoint the textbook

Additional Reading

Otto Bretscher: Linear Algebra with Applications, fourth edition, Pearson

Grade Assessment

Explained during the first class

Notes

Contacting Faculty

Email: darpo@math.nagoya-u.ac.jp

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

| | | |
|---------------------|------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 1 Spring Semester | 1 Spring Semester |
| Elective/Compulsory | Elective | Compulsory |
| Lecturer | Part-time Faculty | |

Course Purpose

Building on the knowledge gained in Computer Software 1, aim of Computer Software 2 is that students acquire advanced programming skills through C-programming exercises.

Advanced programming includes functions, arrays, string operations, structures, I/O, pointers, complex data structures, and large-scale programming. Students will acquire the skills to create practical large-scale programs utilizing several advanced programming tools.

Prerequisite Subjects

Computer Software 1

Course Topics

1. Review of Computer Software 1
2. Pointers
3. Pointers and Arrays
4. Strings
5. Input/Output
6. Writing Large Programs
7. Structures, Unions and Enumerations
8. Advanced Uses of Pointers
9. The Preprocessor, Declarations
10. Programming project I
11. Programming project II
12. Programming project III
13. Programming project IV
14. Programming project V
15. Programming project VI

Homework is assigned in the lecture.

Textbook

K N King. C Programming: A Modern Approach. 2nd ed.

Additional Reading

Some books will be introduced in the lecture.

Grade Assessment

Programming skills are evaluated by homework assignments and programming projects.

Homework assignments : 50%

Programming projects : 50%

Students must obtain a score of 60 or higher out of 100 to pass the course.

Notes

No course requirements are imposed.

Contacting Faculty

Students are encouraged to ask questions during and after lectures.

Faculty members can also be contacted at their offices, as well as by phone or email.

E-mail: k.sanada@elec.mie-u.ac.jp

Please replace (\$) with @.

Vehicle Structures (2.0credits) (自動車構造)

| | | |
|---------------------|------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Part-time Faculty | |

Course Purpose

In this course, students will learn about vehicle structures.

Through the course, students will develop an understanding of the structure and mechanism of vehicle body, chassis, and power train.

Prerequisite Subjects

Thermodynamics

Course Topics

1. Design and Body

*Product Planning

*Body

*Equipment

2. Chassis

*Suspension

*Steering

*Brake

3. Power Train

*Engine

*Electric Propulsion

*Drive Train

You are supposed to review each lecture by reading textbooks outside the course hours.

Textbook

Printed handouts will be provided.

Additional Reading

Automotive Engineering Fundamentals, SAE

Grade Assessment

Students must obtain a letter grade of C or above to pass the course. Letter grades are assigned based on the percentages: S:100-90 A:89-80 B:79-70 C:69-60 F:59-0.

Grades will be based on class participation and reports for the level of understanding of the topics listed in the Course topics.

30% for attendance

30% for assignments

40% for final report

Notes

No requirements for attending this course

Contacting Faculty

Students can ask questions at any time during classes.

Questions during off-class hours can be asked via e-mail: takimotof@nuem.nagoya-u.ac.jp

| | |
|---------------------|-----------------------------------|
| Course Type | Specialized Courses |
| Class Format | Lecture |
| Course Name | Automotive Engineering |
| Starts 1 | 2 Spring Semester |
| Elective/Compulsory | Compulsory |
| Lecturer | Faculty of Automotive Engineering |

Course Purpose

The purpose of this class is to discuss latest topics of the electrical field related to automotive technology. Students will be familiar with the most advanced technologies in the above subject matter.

Prerequisite Subjects

Wide knowledge of electrical systems in general

Course Topics

In this class, different faculty members give lectures on each topic each time, and discuss the latest topics in the following electrical field related to automotive technology:

1. Electrical Engineering
2. Electronic Engineering
3. Information and Communication Engineering

Guidance will be provided for the first time, and then each faculty members will be in charge of lectures. Impose reports during class.

Textbook

Document prepared by each teacher.

Additional Reading

Document prepared by each teacher.

Grade Assessment

Submission of a report after each lecture and tour is mandatory. A knowledge of lectured advanced technologies of the electrical field related to automotive technology is evaluated by the reports.

Notes

No specific course requirements.

Contacting Faculty

Contact each faculty member directly by e-mail.

About this class: Masahiro NAGAO, nagao.masahiro@imass.nagoya-u.ac.jp

About each lecture: will be announced on NUCT.

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

| | | |
|---------------------|--------------------------------------|---|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Sou NAGASHIMA 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

graphics, mechanics

Course Topics

(1) Lecture for fundamental of mechanical drawing
Fundamentals of Graphic science
General 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 coupler part
(3) Manufacturing automation
practice by means of CAM
CAM operation practice
Manufacturing practice utilizing a vertical machining center
Multiple 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 and movies for lectures are distributed via NUCT. “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 informed via NUCT.

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 registration requirements required. The lecture style and evaluation method may be changed depending on the Covid-19 situation. The lecture is held by face to face in lecture room or using e-learning. The e-learning method is written in NUCT, and bidirectional communication by Microsoft Teams. The students ask lecturers by through NUCT "message" system. The students share your opinions of this lecture by through NUCT "message" system.

Contacting Faculty

Responses to associated questions are given after lectures or during CAD practices. Faculty contact information is also listed on NUCT.

Automobile Engineering Laboratory I (2.0credits) (自動車工学実験 1)

| | | |
|---------------------|---------------------------------------|--------------------------------------|
| Course Type | Specialized Courses | |
| Class Format | Experiment | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Takaya INAMORI Associate Professor | Hiroki KONDOH Associate Professor |

Course Purpose

The purpose of this course is to experience the fundamental and important principles related to automobile, and to observe and understand the expected physical phenomena from them through various themes from mechanical, electrical, aerospace, and information engineering areas.

Achievement Objectives:

- to understand the fundamental and important principles related to automobile.

Prerequisite Subjects

Basic Specialized Courses and Specialized Courses of mechanical, electrical, aerospace, and information engineering.

Course Topics

About 10 themes on mechanical, electrical, aerospace, and information engineering are provided.

The experiment for each theme is performed by the group with 5-6 members. After each experiment, students are required to analyse obtained experimental data, and write a report.

Textbook

A text book for the experiment will be provided at/before the first day of the class.

Additional Reading

Listed in a text book

Grade Assessment

Achievement will be evaluated by reports. Students must submit reports for all themes.

Students must obtain a score of 60 or higher to pass the course.

-2019 Grades: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

2020- Grades: A+:100-95, A:94-80, B:79-70, C:69-65, C-:64-60, F:59-0.

Notes

Requested to register, participate in all themes, and submit all reports.

Contacting Faculty

Students are encouraged to ask questions during classes or via e-mail.

Contact

Takaya Inamoriinamori[at]nuae.nagoya-u.ac.jp5431.

Analytical Chemistry (2.0credits) (分析化学)

| | | |
|---------------------|--------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Oho ken Associate Professor | |

Course Purpose

The purpose of this course is to provide a fundamental understanding of analytical chemistry principles and to demonstrate how these principles are applicable. Students will acquire fundamental tools and skills in chemical qualitative and quantitative procedures that can be applied in a variety of fields during this course.

At the end of the course, the students are expected to:

- Understand the fundamental concepts of analytical chemistry.
- Identify and describe the steps that are included in an analytical procedure.
- Be familiar with the techniques used in chemical analysis, from sample collection to data analysis.
- Understand the fundamental analytical techniques.
- Master the skills to choose and apply appropriate separation techniques.
- Develop the critical thinking skills necessary for solving analytic problems.

Prerequisite Subjects

Course Topics

A course concerned with the chemical characterization of matter both quantitatively and qualitatively. This course will address the following topics:

- Introduction and a review of Analytical Chemistry
- Basic chemistry and classic methods of analysis.
- Instrumental methods of analysis which cover the electrochemical methods and spectrophotometric methods.

Textbook

Printed handouts will be provided.

Additional Reading

Fundamentals of Analytical Chemistry, 9th Edition (Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch)

Grade Assessment

The final course grade will be based on total points earned for exams, assignments and class participation.

The course components are scored as followed:

Final exam (60%)

Assignments* (20%)

Class participation (Exercises and Attendance) (20%)

Total (100%)

*There will be 2 problem sets. Problem sets are designed to highlight important concepts and practice problem-solving skills.

The lowest passing score is 60%.

Notes

No requirements for taking this class.

The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online

to the students who are not in Japan or cannot come to campus.

Students can ask questions during and after lectures, as well as via e-mail.

Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Urban Environment and Transportation System (2.0credits) (都市と交通)

| | | |
|---------------------|--|---|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Yasuhiro MORI Professor | Hirokazu KATO Professor Miho IRYO(ASANO) Associate Professor |
| | HOTTA Yoshihiro Associate Professor | |

Course Purpose

This series of lectures introduce the roles and impacts of car traffic and other modes on urban design, environment, society, and quality of life. At the end of this course, participants are expected to - Understand the environmental / social impact of various transportation modes and infrastructure arrangement - Understand the concept of risk and be able to estimate environmental risk,- Understand the architectural and urban design in the age of the motorization,- Be able to explain measures of traffic congestion to improve the environmental impact.

Prerequisite Subjects

There are no particular prerequisites for this course.

Course Topics

1. Risk Management of Urban Environment- Concept of risk & risk assessment considering air pollution- Exposure assessment and dose-response relationship- Mortality rate and loss of life expectancy
2. Motor Townscape- An outline of car design- An outline of highway design- Formation of 'strip'
3. Car Traffic and Other Modes in Urban Transport Systems- The role of public transport systems and car traffic - Environmental assessment of transport activity - Low carbon transport systems
4. Oil Pollution and Remediation
5. Expansion of Transportation Infrastructure Network and its Environmental Impact
Several reports will be assigned.

Textbook

There is no textbook. Handout materials will be distributed during classes.

Additional Reading

R. Venturi, D.S. Brown, and S. Izenour, Learning from Las Vegas, (The MIT Press, 1977) ISBN-13: 978-0262720069W. Rothengatter, Y. Hayashi, W. Shade(Eds.): Transport Moving to Climate Intelligence New Chances for Controlling Climate Impacts of Transport after the Economic Crisis, (Springer, 2011) ISBN: 978-1-4419-7642-0.

Grade Assessment

Your overall grade of this course will be decided on the basis on the several reports. Credits will be awarded to those students who score 60 or more out of 100.

Notes

Classes will be conducted online interactively through internet. The URL of the classes will be announced on NUCT.

Contacting Faculty

Questions during classes are encouraged. Questions can also be sent by e-mail. Appointment can be made upon request. The e-mail addresses of the lectures are as follows: Hotta: hotta(at)corot.nuac.nagoya-u.ac.jp, Iryo: iryo(at)nagoya-u.jp, Kato: kato(at)genv.nagoya-u.ac.jp, Katayama: katayama.arata(at)nagoya-u.jp, Mori: yasu(at)nuac.nagoya-u.ac.jp, Tanikawa: tanikawa(at)nagoya-u.jp,* Replace (at) with @.

Numerical Analysis (2.0credits) (数值解析法)

| | | |
|---------------------|------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Yasumasa ITO Professor | |

Course Purpose

The purpose of this course is to understand the fundamentals of numerical analysis (numerical simulation with time advancement) through multibody dynamics simulation, and heat transfer simulation and/or computational fluid dynamics. It is expected that, after the course, students become to be able to conduct numerical simulations using Matlab/Octave.

Prerequisite Subjects

Calculus, linear algebra, physics, Computer software, kinematics, mechanical vibration, vector analysis, fluid dynamics

Course Topics

After the lecture by the lecturer, students are required to program computational codes to solve the given problem using some specific schemes/algorithms. Their characteristics, advantages, and disadvantages such as accuracy, error, stability, and cost will also be explained. Homework is given basically every week.

(First part)

MCK equation for 1 DOE (degree of freedom) and 2 DOE systems.
Report submission after the first part.

(Second part)

Diffusion equation and diffusion-convection equation for heat with/without fluid motion.
Presentation by students in the class at the end of the class.

For the report and presentation, each of students tackles a unique theme.

Textbook

Handout will be provided.

Additional Reading

Will be introduced in the class.

Grade Assessment

Grades will be based on homework, report, and presentation, but mainly report and presentation. No submission of the report or no show of the presentation is counted as absence.

The full mark is 100 points, and the passing mark is 60 points.

Notes

Bring your laptop. If you don't have one, please let me know in advance. It is very difficult if you haven't learned fundamentals of programming and mechanical dynamics.

Contacting Faculty

Message through NUCT. Email to yito@nagoya-u.jp only when you can't use NUCT.

This lecture will be taught in the classroom (in person). If you can't make it, please let me know in advance.

Heat Transfer Engineering (2.0credits) (伝熱工学)

| | | |
|---------------------|------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Yasumasa ITO Professor | |

Course Purpose

In this course, students will learn fundamental theory on conductive, convective and radiative heat transfers, and their applications such as heat exchangers. Course objectives include

- (1) developing an understanding of steady and unsteady conductive heat transfer by Fourier's law,
- (2) explaining the principle of forced and natural convection,
- (3) explaining the phenomena of surface radiative heat transfer by understanding the fundamentals of radiation laws, and
- (4) learning the design of heat exchangers.

Prerequisite Subjects

Calculus, linear algebra, thermodynamics, fluid mechanics

Course Topics

1. Conductive heat transfer
2. Convective heat transfer
3. Radiative heat transfer
4. Heat exchanger

Textbook

Handouts will be provided.

Additional Reading

Will be introduced in the class.

Grade Assessment

Mid term exam and final exam, together with homework.

The full mark is 100 points, and the passing mark is 60 points.

Notes

Having taken fluid mechanics and thermodynamics is highly desired.

(IMPORTANT)

Although this course is elective for some reason, it is one of the essential subjects. Particularly mechanical engineering students are strongly encouraged to take. (In fact this is compulsory for regular course students at Mechanical Engineering at Nagoya University (and at most of universities)).

Contacting Faculty

Message through NUCT. If students can't use it for some reason, email to yito@nagoya-u.jp.

This lecture will be taught in the classroom (in person). If you can't make it, please let me know in advance.

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

| | | |
|---------------------|----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Eijiro MAEDA Associate Professor | |

Course Purpose

By applying knowledge learned by the Design Practice 1st, 2nd and specialized subjects etc, through experience a series of system design, machine (electric) design, manufacturing and evaluation for the given theme, master the basics of manufacturing.

This lecture corresponds to the lecture Design Practice III for Japanese. G30 students (English class) will be supported by TAs and a Translator.

Prerequisite Subjects

Design Practice 1

Course Topics

1. Overview of Design Practice 3rd (@241 lecture room / Oct.7. 9:30-12:00)
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

After class ours: Each student continues his/her own analyses, simulations, and designs.

For preparation before class: Methods of the subject in charge of each student should be prepared by reading the corresponding text books and/or internet.

Textbook

Distributed in each class or updated on NUCT

Additional Reading

Distributed in each class or updated on NUCT

Grade Assessment

Grades will be based on reports of design and drawing.

Students must obtain a score of 60 or higher to pass the course.

Grades: S:100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

Notes

No requirements for attending this course

Contacting Faculty

Students can contact lecturers via email:

Eijiro Maeda e.maeda@nagoya-u.jp

Tours in Industrial Plants A (0.5credits) (工場見学 A)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Practice | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 2 Spring Semester | 2 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

The purpose of this course is to review how previously reviewed automotive engineering theory is applied practically, and cover state of research and production at various companies. At the end of this course, students are supposed to acquire the following knowledge: 1. Know the variety of engineering companies in Japanese industry 2. Understand and explain how specific engineering theories are applied in industrial plants 3. Understand the relationship between the subjects in Automotive Engineering course and techniques used in the industry

Prerequisite Subjects

Introduction to Automotive Engineering

Course Topics

Factory visits to automotive companies in Chubu, Kansai and Kanto districts. You may need to write and submit a report after each visit.

Textbook

Documents are supplied if necessary.

Additional Reading

Not required

Grade Assessment

Grading will be decided based on attendance to the factory visit. You need to attend at least a total of six visits (during Tours in Industrial Plant A and B) to get a credit (1.0 credit).

Notes

This class may not be opened due to COVID-19.

Contacting Faculty

Please contact visit coordinators and/or program organizers if necessary.

Tours in Industrial Plants B (0.5credits) (工場見学 B)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Practice | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

The purpose of this course is to review how previously reviewed automotive engineering theory is applied practically, and cover state of research and production at various companies. At the end of this course, students are supposed to acquire the following knowledge: 1. Know the variety of engineering companies in Japanese industry 2. Understand and explain how specific engineering theories are applied in industrial plants 3. Understand the relationship between the subjects in Automotive Engineering course and techniques used in the industry

Prerequisite Subjects

Introduction to Automotive Engineering, Tours in Industrial Plants A, Vehicle Structures, Vehicle Dynamics and Control, Vehicle Engines and New Propulsion Systems, Electronic Devices in Automobiles

Course Topics

Factory visits to automotive companies in Chubu, Kansai and Kanto districts. You may need to write and submit a report after each visit.

Textbook

Documents are supplied if necessary.

Additional Reading

Not required

Grade Assessment

Grading will be decided based on attendance to the factory visit. You need to attend at least a total of six visits (during Tours in Industrial Plant A and B) to get a credit (1.0 credit).

Notes

This class may not be opened due to COVID-19.

Contacting Faculty

Please contact visit coordinators and/or program organizers if necessary.

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

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Practice | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

The purpose of the course is to gain further knowledge on automotive engineering through training in industrial plants. At the end of this course, students are supposed to acquire the following knowledge: 1. Understand and explain how specific engineering theories are applied in industrial plants 2. Understand the relationship between the subjects in Automotive Engineering course and techniques used in the industry

Prerequisite Subjects

Students need no specific subjects but are expected to be familiar with the subjects that they have learned by this term.

Course Topics

Practical experiences in automotive engineering at industrial plants You may need to write and submit a report after the training.

Textbook

Documents are supplied if necessary.

Additional Reading

Not required

Grade Assessment

Grading will be decided based on attendance to the training.

Notes

No requirements for attending this course

Contacting Faculty

Please contact program organizers if necessary.

Automobile Engineering Laboratory II (2.0credits) (自動車工学実験 2)

| | | |
|---------------------|---------------------------------|---------------------------------------|
| Course Type | Specialized Courses | |
| Class Format | Experiment | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Compulsory | Compulsory |
| Lecturer | Shin KAJITA Associate Professor | Kiyoshi KINEFUCHI Associate Professor |

Course Purpose

The purpose of this course is to experience the fundamental and important principles related to automobile, and to observe and understand the expected physical phenomena from them through various themes from mechanical, electrical, aerospace, and information engineering areas.

Achievement Objectives:

- to understand the fundamental and important principles related to automobile.

Prerequisite Subjects

Basic Specialized Courses and Specialized Courses of mechanical, electrical, aerospace, and information engineering.

Course Topics

About 10 themes on mechanical, electrical, aerospace, and information engineering are provided.

The experiment for each theme is performed by the group with 5-6 members. After each experiment, students are required to analyse obtained experimental data, and write a report.

Textbook

A text book for the experiment will be provided at/before the first day of the class.

Additional Reading

Listed in a text book

Grade Assessment

Achievement will be evaluated by reports. Students must submit reports for all themes.

Students must obtain a score of 60 or higher to pass the course.

-2019 Grades: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

2020- Grades: A+:100-95, A:94-80, B:79-70, C:69-65, C-:64-60, F:59-0.

Notes

Requested to register, participate in all themes, and submit all reports.

Contacting Faculty

Students are encouraged to ask questions during classes or via e-mail.

Automobile Chemical Systems II (2.0credits) (自動車化学システム 2)

| | | |
|---------------------|----------------------------|--------------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Koyo NORINAGA Professor | Yoshiaki KAWAJIRI Professor |

Course Purpose

This course discusses current topics in chemical systems used in automobiles. At the end of the course, students will be familiar with recent advance in chemical engineering and chemical systems in the automobile industry, such as fuels and combustion, battery and fuel cell systems, and biofuels. Technical fundamentals as well as recent developments of chemical systems technologies in automobiles will be introduced and discussed.

Prerequisite Subjects

Students are expected to be familiar with chemistry, math, and physics of the freshman and sophomore (1st-2nd year bachelor) level. Short reviews will be given for those whose technical background in these subjects is not sufficient. Automotive Chemical Systems 1 will also provide good background for this course.

Course Topics

1. Batteries and fuel cells
2. Biofuels (bioethanol, biodiesel, and other fuels)
3. Control in automobile industry
4. Fuels for automotive, resources and processing
5. Combustion engines
6. Exhaust gas treatments

Textbook

Printed materials will be prepared and distributed in class. Some of the lecture notes will be posted on Nagoya University Collaboration and Course Tools (NUCT).

Additional Reading

Additional references will be introduced in class.

Grade Assessment

Several report assignments will be given, where students search for recent literature to gain further understanding and knowledge of the topics discussed in class. Feedback will be given to improve students' writing skills. A minimum score of 60 or higher out of 100 should be obtained to pass this course.

Grades: S: 100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

Notes

No requirements for attending this course

Contacting Faculty

Students can reach instructors through Messages on NUCT, or by email (kawajiri_at_nagoya-u.jp, replace "_at_" by "@"). Office hours will be held at the end of the course to support students to write their reports.

Organic Materials (2.0credits) (有機材料)

| | | |
|---------------------|------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Chemistry | |

Course Purpose

The purpose of this course is to learn basics of polymer science and materials. The course begins with basic concepts of polymer, proceeds next to polymerization and synthesis of various polymers, and moves then to characterization, structures, properties, and functions of polymers, and biopolymers.

Upon taking this course, you aim to learn basics of polymer science and materials, such as what polymers are, how to make polymers, how to characterize polymer properties, how properties are affected by polymer structures, how to design functional polymers, and how biopolymers are different from synthetic polymers. You will get basic knowledge on polymer science and materials first and then abilities to apply the basic knowledge to creating new polymer materials.

Prerequisite Subjects

Fundamentals of Chemistry I, II, Organic Chemistry I, II, Physical Chemistry I, II, Analytical Chemistry

Course Topics

Course Topics

1. Introduction to Polymer
2. Step-Growth Polymerization
3. Free-Radical Addition Polymerization
4. Ionic Polymerization
5. Linear Copolymers and Other Architectures
6. Polymer Stereochemistry
7. Polymerization Reactions Initiated by Metal Catalysts and Transfer Reactions
8. Polymers in Solution
9. Polymer Characterization – Molar Masses
10. Polymer Characterization – Chain Dimensions, Structures, and Morphology
11. The Crystalline State and Partially Ordered Structures
12. The Glassy State and Glass Transition
13. Rheology and Mechanical Properties
14. The Elastomeric State
15. Structure-Property Relations
16. DNA and RNA that Encode Genetic Information as their Sequences
17. Higher-Order Structures of Polypeptides and Protein

Prior to taking each class, read the corresponding part of the textbook. After taking the class, solve the problems in the textbook by yourself. During each class, solve the quizzes.

Textbook

Polymers: Chemistry and Physics of Modern Materials (J. M. G. Cowie and Valeria Arrighi), 3rd Edition; CRC Press

Additional Reading

Principles of Polymerization (G. Odian), 4th Edition, Wiley-Interscience

Grade Assessment

The grading is based on quizzes during classes.

Credits will be awarded to those students who understand basics on synthetic and bio-based polymers, polymerization, polymer characterization, structures, properties, and functions. Advanced understandings will be considered.

Organic Materials (2.0credits) (有機材料)

A minimum average score of 60 or higher out of 100 should be obtained to pass this course.

Enrollees after 2020

100-95 : A+94-80 : A79-70 : B69-65 : C64-60 : C-59-0 : F

Enrollees before 2019

100-90 : S89-80 : A79-70 : B69-60 : C59-0 : F

Notes

No requirements for attending this course.

Contacting Faculty

Students can communicate with their lecturers after lectures.

Environment and Recycling (2.0credits) (環境とリサイクル)

| | | |
|---------------------|------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Youichi ENOKIDA Professor | |

Course Purpose

The purpose of this course is to understand a guide to sustainable production, the state of the art and science of design for environment, the real world practices and technology of recycling for energy resources and industrial materials. Upon completion of the course, students will understand i) material flows of processing and reprocessing, ii) efficiencies of process with or without recycling, iii) cost estimation of recycling, iv) several examples of recycling on industrial scale.

Prerequisite Subjects

Because this class gives a lecture on general engineering, no special prerequisite is required. The class is given in English, and distributed materials are also written in English. Because some of reference books for advanced reading are written in Japanese, which you can find in the university library, fundamental ability of Japanese language for reading is preferable.

Course Topics

In this class, every lecture is given for the students finally to understand the the following contents; 1. A guide to sustainable production, 2. The state of the art and science of design for environment, 3. The real world practices and technology of recycling for energy resources, 4. The real world practices and technology of recycling for materials resources, and 5. Recent developments for recycling of automotive parts and used catalysts. At the end of every lecture, important technical concept and terms are given by a lecturer, which the students should study by themselves by the following lecture. The results of the self-learning are tested by a quiz in the following lecture.

Textbook

1) J. Fiksel, Design for Environment - A guide to sustainable Product Development -, McGraw-Hill Professional (2011) in English. 2) E. Worrel, and M. A. Reuter, Handbook of recycling: State-of-the-art for Practitioners, Analysts, and Scientists, Elsevier (2014) in English. 3) R. G. Cochran (Author), Nuclear Fuel Cycle: Analysis and Management, American Nuclear Society (1993) in English

Additional Reading

1) T. Hirota, Frontline of automobile recycling, Grand Prix Book Publishing CO.LTD. (2005) in Japanese.

Grade Assessment

According to the following proportion, achievement shall be evaluated and a grade recorded. Quiz record: (20%) Reporting on lecture exercises: (30%) Final examinations: (50%)

Notes

No special requirement is applied, but attendance at every lecture is mandatory as well as keeping deadline strictly for submission of a few reports. [About the class in 2022] Because due to countermeasure against COVID-19, lectures in the current class will be given as normal meetings of face-to-face class at ES203 lecture room in principal, as well as on-demand resources by an assist of NUCT, where handouts of MS power point files or information of YouTube videos are provided, you should download the specified files and watch prior to each class. The preparation and review should be performed on NUCT's quiz or reporting features. For students staying in Japan, regular lecture will open on every Monday starting from 10:30 at the lecture room ES023 on the second floor in ES Building, Nagoya University.

Contacting Faculty

When you have an inquiry on the class or lecture contact the lecture, Professor Enokida by e-mail of addressing yenokida@nagoya-u.jp Direct visiting is welcomed; Concerning to the Office Hours, open door

Environment and Recycling (2.0credits) (環境とリサイクル)

policy from 7:30 a.m. to 4 p. m.-- when he is there, He is usually available. To guarantee availability, make an appointment by sending an e-mail to yenokida@nagoya-u.jp.

Intelligent Transportation Systems (2.0credits) (情報通信技術と自動車交通)

| | | | |
|---------------------|---|--------------------------------|---------------------------------|
| Course Type | Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Automotive Engineering | Automotive Engineering | |
| Starts 1 | 3 Spring Semester | 3 Spring Semester | |
| Elective/Compulsory | Elective | Elective | |
| Lecturer | Hideki NAKAMURA Professor Tomio MIWA Associate Professor | Takayuki MORIKAWA Professor | Toshiyuki YAMAMOTO Professor |

Course Purpose

For developing viable intelligent transportation systems, it is important to acquire various knowledge from a standpoint of transportation planning and traffic engineering. The purpose of this course is to review state of the art Intelligent Transport Systems (ITS) and to learn the fundamentals of traffic flow theory, traffic accident analysis and traffic and transportation management using ITS technologies.

The goal of this course is to develop the following abilities.

- Ability to explain fundamentals of traffic flow theory
- Ability to explain traffic and transport management using ITS technologies

Prerequisite Subjects

None

Course Topics

- Introduction
 - Travel Demand Analysis
 - Four Step Forecasting Method of Traffic Demand
 - Development of Surveying Technique of Transportation
 - Traffic Accident Analysis and Prevention
 - ITS for Travel Demand Management
 - Overview of ITS Development in Japan
 - Car Usage Control at City Center
 - Public Transportation Usage Promotion
 - Traffic Flow and ITS
 - ITS applications in Japan
 - Fundamentals of traffic flow characteristics
 - Car-following theory and traffic simulation
 - Route Guidance System
 - Route search method
 - Advanced research in ITS
- The reports will be offered by each professor.

Textbook

Lecture materials will be provided.

Additional Reading

The following books are recommended as references:

Khisty, C.J: Transportation Engineering: An Introduction, Prentice Hall.

Taylor, M.A.Young, W. and Bonsall, P.W.: Understanding Traffic Systems: Data, Analysis and Presentation, Avebury.

Grade Assessment

The evaluation is based on reports which will be offered by each professor. If the knowledge of the fundamentals of traffic flow theory, traffic accident analysis and traffic, and transportation management using ITS technologies are acquired correctly, the credit is earned.

Notes

There is no requirement.

Classes will be conducted remotely (online or on-demand).

The online class will use Teams or Zoom. The on-demand class will distribute the lecture video through NUCT.

Students who cannot take online classes should take on-demand lessons.

Students can ask a question through a chat system during a lecture and by email after a lecture.

Details will be explained until the first lecture through NUCT.

Contacting Faculty

Students can ask questions to professors at any time during classes.

Questions during off-class hours can be asked via e-mail to each professor.

Tomio Miwa (miwa@nagoya-u.jp),

Takayuki Morikawa (morikawa@nagoya-u.jp),

Hideki Nakamura (nakamura@genv.nagoya-u.ac.jp),

Toshiyuki Yamamoto (yamamoto@civil.nagoya-u.ac.jp)

Electronic Devices in Automobiles (2.0credits) (自動車の電子機器)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

This lecture will introduce students up to date technologies with respect to Electronic Devices which are used for developing vehicle control and information systems including ITS (Intelligent Transport Systems). You can learn the requirements for vehicle control and information systems including ITS and understand the reason why such specifications of electronic devices must have.

Each course of lectures is delivered by the experts invited from leading companies related to vehicle control and information systems who have matured experiences to plan, design and launch such systems in the market.

At the end of this course, students are supposed to acquire the following knowledge:

1. Understand the latest electronic device technologies used in automotive industry.
2. Understand the requirements in electric devices in automobiles for vehicle control and information systems.

Prerequisite Subjects

Vehicle Dynamics, Control Engineering

Course Topics

1. Electronic Control Systems in Automobiles and Vehicle dynamics control systems
2. Sensing Technologies mainly by image sensor and image processing being deployed for ADAS and automated driving
3. Vehicle as a sensor from IoT point of view.
4. Car electronics technologies for safety application
5. General overview on imaging devices
6. Wireless Technologies in ITS (Intelligent Transport Systems) toward Automated Driving Systems and Connected Car.
7. Intellectual Property activity in the automotive parts industry
8. Summary of Electronic Devices from application point of view.

You may need to write and submit a report after each lecture.

Textbook

No text-book.

Additional Reading

As handed out from each lecturer.

Grade Assessment

Students must obtain a letter grade of C or above to pass the course.

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The evaluation of grade is carried out by the average point of all submitted reports from students. If you miss one report, it will make a significant influence to your grade.

Notes

No specific course requirements.

Contacting Faculty

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

Vehicle Engines and New Propulsion Systems (2.0credits) (自動車エンジンと新動カシステム)

| | | |
|---------------------|--------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 3 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Part-time Faculty Professor | |

Course Purpose

In this course, students will learn about the combustion engine and advanced propulsion systems.

Through the course, students will be

(1)developing an understanding of the design and mechanics of the combustion engine (Otto-cycle engine and Diesel engine)

(2)reviewing revolutionary vehicles with new propulsion system (electric vehicles, hybrids and fuel cell vehicles).

Prerequisite Subjects

Thermodynamics, Fluid mechanics/dynamics

Course Topics

1. Otto-cycle engine
2. Diesel engine
3. Supercharging
4. Fundamental of vehicle propulsion
5. Combustion engines
6. Electric vehicles
7. Hybrid electric vehicles
8. Design principle of series and parallel hybrids
9. Fuel cell vehicles

You are supposed to review each lecture by reading textbooks outside the course hours.

Textbook

Printed handouts will be provided.

Additional Reading

The Internal Combustion Engine in Theory and Practice: Vol. 1, The MIT Press

Hybrid, Electric and Fuel-Cell Vehicles, Delmar Cengage Learning

Fuel Cell Systems Explained 2nd Edition, SAE International

Internal Combustion Engine Handbook, SAE International

Grade Assessment

Students must obtain a letter grade of C or above to pass the course. Letter grades are assigned based on the percentages: S:100-90 A:89-80 B:79-70 C:69-60 F:59-0.

Grades will be based on class participation and reports for the level of understanding of the topics listed in the Course topics.

30% for attendance

30% for interim report

40% for final report

Notes

No requirements for attending this course

Contacting Faculty

Vehicle Engines and New Propulsion Systems (2.0credits) (自動車エンジンと新動カシステム)

Students can ask questions at any time during classes.

Questions during off-class hours can be asked via e-mail: takimotof@nuem.nagoya-u.ac.jp

Vehicle Dynamics and Control (2.0credits) (自動車ダイナミクスと制御)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

In this course students will study fundamentals of vehicle dynamics and control systems. The course also covers classical topics and progress in recent topics of vehicle control such as tire dynamics, braking and steering dynamics and control, and active suspension systems. By the end of the course, students should understand how to model the maneuvering of surface vehicles and how to design control systems to augment these maneuvering characteristics with respect to 3 dimensional movement.

Prerequisite Subjects

Vibration, Analytical Dynamics, Controls, Kinematics

Course Topics

1. Introduction of vehicle dynamics and control systems
2. Acceleration and Braking performance
3. Road loads changes of vehicle dynamics
4. Braking actuations and performances
5. Type dynamics
6. Vehicle Handling Performance
(4-1)Steady state cornering
(4-2)Frequency Response
7. Basic theory of vehicle control
8. Active Suspension System

Textbook

Fundamentals of Vehicle Dynamics, T. Gillespie, ISBN: 9781560911999

Additional Reading

As handed out in class.

Grade Assessment

Students must obtain a letter grade of C or above to pass the course.

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Mid-term Exam - 30%

Final Exam - 30%

Notes

Contacting Faculty

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

Vehicle Safety (2.0credits) (自動車安全工学)

| | | |
|---------------------|------------------------|--------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Kouji MIZUNO Professor | Tatsuya SUZUKI Professor |

Course Purpose

Safety is a key issue in vehicle development. This course examines both active safety (prevention of accidents) and passive safety (injury mitigation). Through the course, students will be able to develop an understanding of vehicle safety design and engineering based on information technology, mechanics and human factors. In particular, the following topics will be provided. 1. Overview the outline of accident analysis 2. Understand the recent technologies for pre-crash and crash safety 3. Understand the modeling and analysis of human driving behavior 4. Understand how to design of personalized assistance system 5. Understand how to design of fault tolerant controller 6. Overview the biomechanics 7. Understand the vehicle crashworthiness 8. Understand how to protect occupants 9. Understand how to protect pedestrian 10. Understand the way of mathematical simulation

Prerequisite Subjects

Control theory Probabilistic inference (Bayesian approach) Rigid body mechanics Mechanics of materials

Course Topics

1. Accident analysis 2. Recent technologies for pre-crash and crash safety 3. Modeling and analysis of human driving behavior 4. Design of personalized assistance system 5. Design of fault tolerant controller 6. Biomechanics 7. Vehicle crashworthiness 8. Occupant protection 9. Pedestrian protection 10. Mathematical simulation
Read carefully the lecture note before attending each class. After each class, solving the exercises in the lecture note is highly recommended. Submission of the report after some classes is mandatory.

Textbook

Automotive Safety Handbook (SAE International) In addition, original lecture notes will be provided.

Additional Reading

It will be announced in the class.

Grade Assessment

Evaluation is based on two written reports. 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. 50% for 1st report 50% for 2nd report

Notes

No requirements for attending this course

Contacting Faculty

You can ask in person after each class or contact to corresponding profs.

Vehicle Design (2.0credits) (車両計画と車体設計)

| | | |
|---------------------|-----------------------------------|------------------------|
| Course Type | Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Faculty of Automotive Engineering | |

Course Purpose

This lecture will introduce students how to design each performance of vehicles which sometime faces trade-off situations. You can learn the requirements for vehicle systems and the method for designing the vehicle to improve their performances at higher level.

At the end of this course, students are supposed to acquire the following knowledge:

1. Understand the process of the designing vehicles.
2. Understand the requirements for vehicle systems and the method for designing the vehicle to improve their performances at higher level.

Prerequisite Subjects

Design practice 1
Design practice 2
Design practice 3
Creative Design and Practice on Automobiles 1
Creative Design and Practice on Automobiles 2
Vehicle dynamics, Vibration, Kinematics of nmachine, Control engineering

Course Topics

- 1 Vehicle dynamics performance from suspension design point of view
- 2 Passive safety performance from body design point of view
- 3 Active safety performance from body design point of view
- 5 Human factor design from safety and usability point of view
- 6 Strength and reliability experiment
- 7 Standard and regulation issues
- 8 HV car design from energy consumption and power train performance point of view

Each part of lectures is delivered by the experts invited from leading companies related to vehicle system design who have matured experiences to plan, design and launch such systems in the market.

You may need to submit a report/assignment after each lecture.

Textbook

Every lecture is to be presented based on the handouts which will be provided by each lecturer.

Additional Reading

None

Grade Assessment

Grades will be based on the subject which will be provided by each lecturer.

Students must obtain a score of 60 or higher to pass the course.

Grades: S:100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

The evaluation of grade is carried out by the average point of all reports from students. If you miss one report, it will make a significant influence to your grade.

Notes

No requirements for attending this course

Contacting Faculty

The instructor will be changed in 2022. Thus, the above contents may be changed. Details will be explained at the beginning of the class.

Contact: akira.ito@mae.nagoya-u.ac.jp

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

| | |
|---------------------|-------------------------|
| Course Type | Specialized Courses |
| Class Format | Experiment and Exercise |
| Course Name | Automotive Engineering |
| Starts 1 | 4 Autumn Semester |
| Elective/Compulsory | Compulsory |
| Lecturer | Associated Faculty |

Course Purpose

The aim is to learn how to research and how to present the contents of the research on topics in Automotive Engineering. At the end of this course, students are supposed to acquire the following knowledge:

1. Understand the nature of research activities related to automotive engineering.
2. Understand how to proceed a research project and present results obtained.

Prerequisite Subjects

All the subjects that students have learned.

Course Topics

The process begins with the student's selection of supervisor. The supervisor can be any faculty member whose research topic is related to automotive engineering. The student then belongs to the supervisor's research laboratory. The student selects a research topic which the supervisor offers or works together with the supervisor to explore a new topic. The student is required to report at the laboratory's meetings to be held several times in a semester to get advice from the supervisor and laboratory members. You may need to do lab work outside the regular course hours.

Textbook

Textbooks may be provided by the supervisor.

Additional Reading

Some books may be introduced by the supervisor.

Grade Assessment

The evaluation will be based on the student's reports at the laboratory meetings.

Notes

Contacting Faculty

Students can contact their supervisor.

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

| | |
|---------------------|-------------------------|
| Course Type | Specialized Courses |
| Class Format | Experiment and Exercise |
| Course Name | Automotive Engineering |
| Starts 1 | 4 Spring Semester |
| Elective/Compulsory | Compulsory |
| Lecturer | Associated Faculty |

Course Purpose

The aim is to learn how to research and how to present the contents of the research on topics in Automotive Engineering. At the end of this course, students are supposed to acquire the following knowledge:

1. Understand the nature of research activities related to automotive engineering.
2. Understand how to proceed a research project, present results obtained and write a final report as the dissertation.

Prerequisite Subjects

All the subjects that students have learned.

Course Topics

The students is required to report at the laboratory's meetings to be held several times in a semester to get advice from the supervisor and laboratory members.

As the research and thesis approach completion, the student prepares an oral presentation of the thesis with the supervisor. The student is required to defend the thesis. You may need to do lab work outside the regular course hours.

Textbook

Textbooks may be provided by the supervisor.

Additional Reading

Some books may be introduced by the supervisor.

Grade Assessment

The evaluation will be based on the student's reports at the laboratory meetings, the oral presentation/defense and the thesis.

Notes

Contacting Faculty

Students can contact their supervisor.

Scientific and Technical Japanese (2.0credits) (科学技術日本語)

| | | |
|---------------------|-----------------------------|------------------------|
| Course Type | Related Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Spring Semester | 3 Spring Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | Part-time Faculty | Part-time Faculty |

Course Purpose

This course aims to help students analyze research papers written in Japanese. Students will expand their vocabulary and expression list relating to their field of interest.

By the end of the course, students will be able to:

- explain the basic structure of a research paper
- explain the characteristics of each component
- use vocabulary adequately
- use expressions adequately
- choose the most relevant citation style
- write a summary paper

Prerequisite Subjects

“Japanese (basic)” and “Japanese (intermediate)” (or equivalent)

Course Topics

1. Orientation
2. Japanese proficiency check
3. Basics of academic writing in Japanese 1
4. Basics of academic writing in Japanese 2
5. Fundamental structure of research paper: Structural analysis
6. Oral presentation 1: Journals
7. Oral presentation 2: Instructions for authors
8. Oral presentation 3: Citation styles
9. Analysis 1: Title and abstract
10. Analysis 2: Research method
11. Analysis 3: Results and discussions
12. Analysis 4: Introduction and conclusion
13. Writing 1: Summary paper
14. Writing 2: Peer feedback
15. Summary

Textbook

No textbook for this class. Handouts will be distributed in class.

Additional Reading

Some books will be introduced in the lecture.

Grade Assessment

The following evaluation items constitute the maximum score of 100:

- Class Participation (15%)
- Homework Assignments (35%)
- Oral Presentation (30%)
- Summary Paper (20%)

A student must evidence a total score of 60 or higher on the final grading scale to pass this course.

Notes

- No prerequisite.
- There is a chance to redesign the class format, schedule, and grading system depending on the COVID-19

situation.

- There will be approximately ten face-to-face classes and five online (synchronous or on-demand) classes.
- Online, synchronous classes will be given on Zoom, whereas the on-demand classes will be given on NUCT.
- The first class will be met face-to-face in the regular classroom on campus, and the class format in the remaining semester will be announced via "Messages" on NUCT.
- Students are expected to express/exchange their ideas and opinions on NUCT and/or on another interactive presentation system to be announced in class.
- An active dialog is highly valued in this class, so your enthusiastic participation is vital to the success of your learning.
- Basically, homework is assigned on a weekly basis.

Contacting Faculty

Use the "Messages" tool on NUCT to contact the instructor. Only for a limited period of time (until the secondary course registration period ends), you can reach the instructor by email.

smrym(at)lets.chukyo-u.ac.jp

Please replace (at) with @, the at symbol.

Business Japanese (2.0credits) (ビジネス日本語)

| | | |
|---------------------|------------------------------------|------------------------|
| Course Type | Related Specialized Courses | |
| Class Format | Lecture | |
| Course Name | Automotive Engineering | Automotive Engineering |
| Starts 1 | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective |
| Lecturer | ReikoFURUYA Associate Professor | |

Course Purpose

To meet the Japanese language competency requirements expected at the time of internship or employment in Japan, participants in this class will study not only Business Japanese but also Japanese business manners so that they would be able to avoid miscommunication. By taking this class, students are expected to be able to do the following:(1) Develop speaking skills necessary for daily communication amid a Japanese working environment (2) Improve accuracy and learn expressions suitable for various business situations, including honorifics (3) Write and read Japanese notes, business letters, email messages and so on (4) Learn Japanese business protocols

Prerequisite Subjects

Japanese language classes G30 students took in Freshman year or equivalent

Course Topics

Greetings Telephone conversation Business e-mail Making a request Business e-mail Placing orders Communicating information Mid-term test Business letter 10 Permission 11 Business letter12 Entry sheet 13 Interview14 Review15 Final exam Homework will be assigned at the end of class. Students are expected to submit homework at the beginning of next class.

Textbook

Textbooks and references are not assigned for this class. However, depending on the student and class progress, necessary materials will be distributed in class.

Additional Reading

Grade Assessment

30% active class participation20% homework20% mid-term test30% final exam Grades: + 100%95% 94%80% 79%70% 69%65% 64%60% 59 and below Grading will be decided based on the ability to facilitate smooth communication in Japanese in business setting. Active participation is expected in every class.

Notes

There are no course requirements for taking this class.This class will be held face to face unless there are international students who cannot come to Japan.

Contacting Faculty

Questions will be answered before class, in class, after class or by e-mail.E-mail address o47251a@cc.nagoya-u.ac.jp

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

| | | | |
|---------------------|---|--------------------------|------------------------|
| Course Type | Related Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | Gang ZENG Lecturer | Emanuel LELEITO Lecturer | GRIB Dina Lecturer |
| | Kiyohisa NISHIYAMA Designated Lecturer | | |

Course Purpose

This course 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. This class consists of “omnibus-style” lectures, all provided in English.

What you will get tips in this lecture for:

Communication across different engineering fields

Communication across language barriers (English/Japanese)

Search skills for locating professional topics and information

Presentation skills

Reports and presentations, which require students to independently search necessary information, will be assigned in the lectures. The students should note that these reports are used for evaluation.

Prerequisite Subjects

This lecture does not require any background subject. Fundamental knowledge will be clearly instructed.

Course 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.

4. Societal, Cultural and Economic Contexts of Engineering Practice in Japan (Dina GRIB)

- The last part of this course introduces you to the Science, Technology and Society studies (STS) field and provides a brief overview of how Japanese cultural, economic, societal and political tradition affects technological innovation and scientific research as well as how STI in turn affect Japanese culture, society and politics.

- The participants will be invited to conduct a mini case study using online materials, share their findings in

class and participate in group discussions.

Textbook

Lecture materials will be distributed during at each lecture.

Additional Reading

Lecture materials will be distributed during at 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 evaluate 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 3-5 minutes. 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 course will be delivered online via Zoom or Teams video conferencing with the help of NUCT. Pre-recorded teaching materials are to be used partially and in this case students will be expected to use those to prepare for the in-class discussions.

Contacting Faculty

Questions are received during or after class time and via NUCT messenger.

Contact person: Emanuel LELEITO, leleito@nagoya-u.jp

| | | | |
|---------------------|-----------------------------|------------------------|------------------------|
| Course Type | Related Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | Associated Faculty | Associated Faculty | Associated Faculty |

Course Purpose

This course discusses the fundamentals of, and current topics in each field of the advanced electrical, electronic and information engineering, with an overview of the status of their researches and developments in Japan. Topics to be introduced are those related with energy, material and device, information and communication, multimedia and so on.

Students will be familiar with the most advanced technologies in the above subject matter.

Prerequisite Subjects

Physics, Electromagnetics, Mathematics

Course Topics

This course consists of two parts:

1. Six lectures in the classroom which will be given by faculty members.
2. Tours to three laboratories of companies and/or research organizations.

These six lectures are divided three pairs of lectures and each pair is on one of Electrical Engineering, Electronics, and Information and Communication Engineering. Each lecture covers from the fundamental to the cutting-edge topics of the research area of the faculty member responsible to it.

During three tours, students will visit laboratories on energy generation and novel materials.

Submission of a report after each lecture and tour is mandatory.

Textbook

Some books will be introduced in the lecture.

Additional Reading

Some books will be introduced in the lecture.

Grade Assessment

Submission of a report after each lecture and tour is mandatory. A knowledge of lectured advanced technologies in electrical, electronic and information engineering is evaluated by the reports. The final score is determined based on scores of these reports. Students must obtain a score of 60 or higher out of 100 to pass the course.

Notes

Although the time slots assigned to this course are 3rd period (13:00-14:30) and 4th period (14:45-16:15), the tours may take longer time and finish after 16:15.

Students must attend all lectures and join all tours. If there is a student who missed a tour without notice, it compromises the reputation of Nagoya university.

Remarks in 2021

Due to the COVID-19 infection, the lecture is provided by on-demand on NUCT.

The students ask lecturers by through NUCT "message" system. (Note: in this class, different faculty members give lectures on each topic each time.)

Contacting Faculty

Students are encouraged to ask questions during and after lectures.

Faculty members can also be contacted at their offices, as well as by phone or email.

View of Advanced Electrical/ Electronic and Information Engineering (2.0credits) (電気電子情報先端工学概論)

The question about the contents of lecture should be asked of each lecturer. The question about the others can be asked of Hiroki KOJIMA (kojima@nuee.nagoya-u.ac.jp).

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|---------------------|-----------------------------|------------------------|------------------------|
| Course Type | Related Specialized Courses | | |
| Class Format | Lecture | | |
| Course Name | Chemistry | Automotive Engineering | Automotive Engineering |
| Starts 1 | 3 Autumn Semester | 4 Autumn Semester | 4 Autumn Semester |
| Elective/Compulsory | Elective | Elective | Elective |
| Lecturer | Associated Faculty | Associated Faculty | |

Course Purpose

The objectives of this course are (1) to establish scenarios for certain social infrastructure projects, and thereby introduce relevant civil engineering theories and construction technology, as well as conduct site-visits; (2) to survey, through technical site visits, various aspects of urban and architectural studies, including building material experiments, energy conservation, and the recent development of regional disaster mitigation activities. After completing this course, students will be able to: 1. Understand civil engineering theories and construction technology 2. Understand urban and architectural studies.

Prerequisite Subjects

As the objective of this class is to understand fundamentals of civil engineering and architecture, no background class is assigned.

Course Topics

Lecture and Site-visit 1: Preservation of Historical Area
Lecture and Site-visit 2: Architecture and culture
Lecture and Site-visit 3: Nagoya University Disaster Mitigation Research Center
Lecture 4: Social infrastructure and civil engineering (1) Expressway Development in Japan
Lecture 5: Social infrastructure and civil engineering (2) Maintenance and Operation of Expressway
Site-visit 6: Maintenance and Operation of Expressway
Site-visit 7: Traffic Control Center of Expressway
Reports will be assigned in each lecture.

Textbook

Suggested in the class, if necessary.

Additional Reading

Suggested in the class, if necessary.

Grade Assessment

Students will be evaluated on written reports. To pass, students must understand the fundamentals of civil engineering theories and construction technology, and urban and architectural studies.

Notes

No condition is required.

Contacting Faculty

Questions are welcome. Please send your questions by e-mail. E-mail: nakamura@genv.nagoya-u.ac.jp (Dr. Nakamura), tobita@sharaku.nuac.nagoya-u.ac.jp (Dr. Tobita).