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	EijiroTAKEUCHI Associate Professor	Hiraku okada 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 interface2. 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.

●Contacting Faculty

Students can communicate with their lecturer and TA during lecture hours or via email (cs1-21@katayama.nuee.nagoya-u.ac.jp).

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

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 10th Edition International StudentVersion with WileyPLUS Set (John Wiley & Sons, 2010ISBN:9780470576083) [However, do not purchase it beforethe first class meeting where further details will be announced in class]

●Additional Reading

order it during a class as needed

●Grade Assessment

GradingAttendance and Class participation: 40%　Assignments and Quizzes: 60%Class attendance is required. Absentee must give a valid reason, supported with document. A student will receive an “Absent” grade if he is absent 2 or more times without valid reason.

●Notes

●Contacting Faculty

By appointment. Please email instructors to make an appoinment.

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

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

Related CoursesCalculus I; Fundamentals of Physics I ; Fundamentals of Physics II

●Course Topics

Course ContentsSee 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

Instructions will be given as necessary in class

●Grade Assessment

GradingWeekly assignments; attendance; class participation. (Weighting to be advised.)Criteria for “Absent” & “Fail” Grades• Class attendance is required. Absentees must give a valid reason (e.g. doctor’s certificate). A student who is absent from more than 3 sessions will receive zero for the semester attendance mark.• The “Absent” grade is reserved for students who withdraw by November 16. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester.

●Notes

●Contacting Faculty

By email: florence.tama@nagoya-u.jp

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

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

The aims of this course are to deepen students' understanding of basic Physics ofelectricity and magnetism and to cultivate their ability to apply Physics knowledge to problem-solving.

●Prerequisite Subjects

Fundamentals of Physics

●Course Topics

1. Electric Charge and Electric Fields 2. Gauss' Law 3. Electric Potential 4. Capacitance, Current, Resistance and Circuits 5. Magnetic Fields 6. Induction and InductanceIt is desirable to read a textbook or reference materials before a class

●Textbook

Fundamentals of Physics David Halliday, Robert Resnick, Jearl Walker John Wiley & Sons Inc

●Additional Reading

Instructions will be given as necessary in class

●Grade Assessment

Class attendance is required. Absentee must give a valid reason.Class Attendance: 10%; Assignments, quizzes and other assessment (written, presentation, etc.): 90%

●Notes

●Contacting Faculty

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

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 aims of this course are to deepen students' understanding of basic Physics of waves and optics, and to cultivate their ability to apply Physics knowledge.

●Prerequisite Subjects

Fundamentals of Physics

●Course Topics

1. Oscillations2. Introduction to Maxwell's Equations3. Waves4. Electromagnetic Waves5. Images 6. Interference & DiffractionIt is desirable to read a textbook or reference materials before a class

●Textbook

Fundamentals of Physics David Halliday, Robert Resnick, Jearl Walker John Wiley & Sons Inc

●Additional Reading

Instructions will be given as necessary in class

●Grade Assessment

Class attendance is required. Absentee must give a valid reason.Class Attendance: 10%; Assignments, quizzes and other written assessment: 90%.

●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

oyce 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

●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,
Elesevier, 2005 (ISBN: 0-12-088584-0)
Mathematical Methods in the Physical Sciences, by Mary L. Boas,
Wiley, 2006 ((ISBN: 978-0471198260)

●Grade Assessment

Reports: (50%)
Examinations: (50%)
Students need to obtain at least 60% of the total marks to pass the course.

●Notes

●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	Makoto KUWAHARA Associate 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 equation2. The Euler-Lagrange equation and constraints3. Variational principle4. The Hamilton equations and canonical transformation Analytics classical mechanicsStudents 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 Library1. 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 ShigemoriOffice: ES Bldg. room 420Phone: 052-789-5549Email: shige@eken.phys.nagoya-u.jpKUWAHARA MakotoOffice: Eng. Bldg.3, room 453 Phone: 052-789-3597Email: 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	SeiichiMIYAZAKI Professor	Shin KAJITA Associate Professor

●Course Purpose

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

+ MathematicsLinear 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 Lows(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 TransformersPreparation 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-, <60: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:miyazaki@nuee.nagoya-u.ac.jp, kajita.shin@nagoya-u.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 columnYou 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:59-0The 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: nobuohno@nagoya-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	HOSSAIN Akter Designated Lecturer	

●Course Purpose

This subject introduces thermodynamics and its applications in automotive engineering.The main focus of this course is to understand the basic principles of classical thermodynamics which are the basis for macroscopicunderstanding of all the physical phenomena.

●Prerequisite Subjects

Calculus 1, 2; Linear Algebra 1, 2; Fundamentals of Physics 1, 2, 3, 4; Fundamentals of Chemistry 1, 2

●Course Topics

1. Thermal Equilibrium and Temperature2. State Equations, Partial Differentials, Units and Dimensions 3. The First Law of Thermodynamics4. The Second Law of Thermodynamics 5. Entropy 6. Thermodynamic Functions 7. Phase Equilibrium and Chemical Equilibrium 8. Kinetic Theory and Statistical MechanicsStudents will solve problems under guidance of a faculty.

Remarks: To obtain an excellent grade of this course, you have to prepare yourself properly by allocating enough time (i.e., it is your own duty/responsibility) for the assignment and final examination outside the course hours using the printed handouts of the lecture materials.

●Textbook

Printed handouts will be provided.

●Additional Reading

Modern Engineering Thermodynamics; Robert T. Balmer; Academic Press (2010)

●Grade Assessment

Grades will be based on class participation, assignments and a final examination.30% for attendance30% for assignments40% for final examination

●Notes

The whole lecture schedules/plans (including the date of the assignment/report, and the date of the final examination and so on) will be announced at the first class of each semester. The contents of the lecture, based on the course topics, will be provided in every lecture. However, the items as stated above are subject to change with prior notice during the semester.

●Contacting Faculty

Students can ask questions at any time during classes.Questoins during off-class hours can be asked at the lecturer's room (Engineering Building No.3 North Wing, Room 223 (3125) or via e-mail:akter.hossain@mae.nagoya-u.ac.jp

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	Yosuke AKATSU Designated Professor	

●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

Office hours for the semester will be specified during the first lecture.
Questions via email are welcomed any time: akatsu@nuem.nagoya-u.ac.jp

Office: Engineering Building No.3 North-wing, Room 235

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. Maxwell’s Equations are derived. The course also introduces students to fundamental mathematical methods required to solve problems in physics, engineering and applied mathematics. This course has dual pedagogical aims: 1) to convey physical principles; 2) to improve students’ technical ability – i.e. ability to express physical intuition in mathematical terms and ability to solve problems.

●Prerequisite Subjects

Calculus I&II; Fundamentals of Physics III&IV; Mathematical Physics II or Consent of Instructor.Physics Tutorial IIa

●Course Topics

Course Contents• Revision of vector calculus, curvilinear coordinates, Dirac Delta Function.• 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. Work and Energy in Electrostatics. Conductors. Induced Charges. Surface Charge and the Force on a Conductor. • Special Techniques. The Method of Images: point charge near a conducting plane or sphere, grounded or insulated. Separation of Variables.• Electric Fields in Matter. Polarization. Dielectrics. The Electric Displacement. Linear Dielectrics. • Magnetostatics. The Lorentz Force Law. The Biot-Savart Law. The Divergence and Curl of B. Applications of Ampere's Law. Magnetic Vector Potential A. What is “real”, A or B?• Magnetic Fields in Matter. Magnetization. Diamagnetism, Paramagnetism, Ferromagnetism. The Auxiliary Field H. Magnetic Susceptibility and Permeability. • Introduction to Electrodynamics. Electromotive Force. Electromagnetic Induction. Faraday's Law. Energy in Magnetic Fields. Maxwell's Equations. Magnetic levitation above a superconductor.It is desirable to read a textbook or reference materials before a class

●Textbook

1. Griffiths, D.L., 2012, Introduction to Electrodynamics, 4th ed., Prentice Hall.Alternative textbook (HIGHLY RECOMMENDED -- many copies in the G30 section of the Science Library):2. Nayfeh, M. H. & Brussel M. K., Electricity and Magnetism, Dover, 2015.(It is essential that students read at least one of these books. Nayfeh is much cheaper to buy and the explanations are clearer. It covers what we need for EM1.)

●Additional Reading

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

●Grade Assessment

Attendance: 5%; Weekly quizzes or other written assessment: 15%; Mid-term exam: 40%; Final Exam: 40% The “Absent” grade is reserved for students who withdraw by May 16. After that day, a letter grade will be awarded based on marks earned from all assessment during the semester.

●Notes

●Contacting Faculty

Office: Science Hall 5F 517Phone: 052-789-2307Email: john.wojdylo@s.phys.nagoya-u.ac.jp

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	KATSUTOSHI Nagaoka 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 phisical prperties.

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

●Notes

●Contacting Faculty

Students can ask questions during and after lectures,as well as via e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp
nagaoka.katsutoshi[at]material.nagoya-u.ac.jp

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

●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 (60%) and exams (40%). For each of the above, the grade must be C or higher.

●Notes
No requirement for attending this course.

●Contacting Faculty
Answer questions during breaks after class or at office hours.

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: nobuohno@nagoya-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	HOSSAIN Akter Designated Lecturer	

●Course Purpose

The purpose of this course is to understand the fundamental characteristics of fluid motions applied to many areas of fluid mechanics and learn the physical laws governing them.
Students will:
(1) understand the properties, basic principles, and concepts of fluids.
(2) learn about the basic equations derived from above, i.e. continuity equation, motion equation, and energy equation, and be able to use them in calculations, and
(3) comprehend the aspects and properties of fluids conceptually utilizing the engineering observations of practical examples.

●Prerequisite Subjects

Calculus 1, 2; Linear Algebra 1, 2; Fundamentals of Physics 1, 2, 3, 4;
Fundamentals of Chemistry 1, 2; Thermodynamics

●Course Topics

1. Properties of Fluid
2. Flow around bodies
3. Thermodynamics of fluid
4. Basic equations of fluid mechanics

Students will solve problems under faculty guidance.

Remarks: To obtain an excellent grade of this course, you have to prepare yourself properly by allocating enough time (i.e., it is your own duty/responsibility) for the assignment and final examination outside the course hours using the printed handouts of the lecture materials.

●Textbook

Printed handouts will be provided.

●Additional Reading

Fluid Mechanics; Robert A. Granger; Dover Publications (1995)

●Grade Assessment

Grades will be based on class participation, assignments and a final examination.

30% for attendance
30% for assignments
40% for final examination

●Notes

The whole lecture schedules/plans (including the date of the assignment/report, and the date of the final examination and so on) will be announced at the first class of each semester. The contents of the lecture, based on the course topics, will be provided in every lecture. However, the items as stated above are subject to change with prior notice during the semester.

●Contacting Faculty

Students can ask questions at any time during classes.
Questoins during off-class hours can be asked at the lecturer's room (Engineering

Building No.3 North Wing, Room 223 (3125) or via e-mail:akter.hossain@mae.nagoya-u.ac.jp

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	Yosuke AKATSU Designated Professor	

●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

Office hours for the semester will be specified during the first lecture.
Questions via email are welcomed any time: akatsu@nuem.nagoya-u.ac.jp
Office:Engineering Building No.3 North-Wing, Room 235

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.

●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	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

In generally science and measurement are closely correlated and product technologies have been developed with developing measurement technologies. The purpose of the course is to develop an understanding of the fundamentals of measurement systems, including sensor devices and signal processing circuits.The goal is to be able to do the following by learning this lecture.1. Understand the principle of measurement and device configuration. 2. Selection of sensor devices required for measurement. 3. Signal processing required for measurement

●Prerequisite Subjects

Electronics, Electrical circuit

●Course Topics

1. Outline (systematization of measurement etc.)2. Operation principle of sensing elements3Signal detection and conversion4Signal processingPlease read the designated part of the textbook before each class.

●Textbook

Distribute printed maters by the lecturer.

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Report Acceptance criteria are to be able 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.Credits will be awarded to those students who score 60 or more. Grades are as follows:S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

●Notes

Nothing

●Contacting Faculty

Questions are accepted after each lecture at the class room or in the office by appointment. To T. Uchiyama, call ext.3617 or e-mail to tutiyama@nuee.nagoya-u.ac.jp To K. Niitsu, call ext.2794 or e-mail to niitsu@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	Yosuke AKATSU Designated Professor	

●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

Office hours for the semester will be specified during the first lecture.
Questions via email are welcomed any time: akatsu@nuem.nagoya-u.ac.jp
Office: Engineering Building No.3 North-wing, Room 235

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 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

●Contacting Faculty

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

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

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 thevarious 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 ofpolynomial functions.

●Contacting Faculty

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

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

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	Erik Darpö Designated Associate Professor		

●Course Purpose

The aim of this course is to provide essential mathematical knowledge necessary to further study mathematics andother 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 Rn, image and kernel, linear independence, bases, dimension, coordinates, orthogonal bases, theGramSchmidt 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	Eijiro MAEDA 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 structure2. Steering mechanism3. Electric component mechanism4. Power transmission in automobile5. Motorization of automobiles and energy management6. Engine in automobile I7. 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２ａ)

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 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 II.

●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

No textbook is required for this tutorial.

●Additional Reading

No reference book is required for this tutorial.

●Grade Assessment

Your final grade will be determined by homework (40%) and quizzes (60%).

●Notes

●Contacting Faculty

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

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

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	Erik Darpö 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

ction to Electrical/ Electronic and Information Engineering for Automobiles (2.0credits) (自動車のための電子・情報

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 technologyis evaluated by the reports.

●Notes

No specific course requirements.

●Contacting Faculty

Contact each faculty member directly by e-mail.
About this class: Yoshio HONDA, honda@nuee.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	Norikazu SUZUKI Associate Professor	Takayuki TOKOROYAMA Associate Professor

●Course Purpose

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

●Prerequisite Subjects

graphics, mechanics

●Course Topics

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

●Textbook

All important materials 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-larning. The e-larning method is written in NUCT, and bidirectional communication by Microsoft Teams.The students ask lectureres 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	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.

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	(undecided) Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The goal of this course is to provide a sound physical understanding of the principles of analytical chemistry and to show how these principles are applied in chemistry and related disciplines. In this course, the students will learn the tools and master the skills in chemical qualitative and quantitative procedures.

At the end of the course, the students are expected to:
• Understand the core ideas in analytical chemistry.
• Identify and describe the steps that are included in a complete analytical method.
• Understand the techniques involved in chemical analysis from sampling to data analysis.
• Understand analytical methods based on liquid and gas chromatography, electroanalysis, methods based on atomic and molecular spectroscopy and mass spectroscopy.
• Master the skills to choose and apply appropriate separation - and detection method to solve simple problems.
• Develop critical thinking needed to solve analytical problems.

●Prerequisite Subjects

Fundamentals of Chemistry

●Course Topics

A course concerned with the chemical characterisation 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, which includes stoichiometry, solution, equilibrium and acid/bases, classical analytical method of gravimetric and volumetric analyses.
• Instrumental methods of analysis which covers the electrochemical methods of potentiometric and voltammetric analyses, spectrophotometric methods such as atomic absorption, fluorescence, UV-Vis, IR, and NMR; and chromatographic methods such as paper chromatography, HPLC and GC.

●Textbook

Printed handouts will be provided.

●Additional Reading

Quantitative chemical analysis (Harris, Daniel C., 8th edition, W. H. Freeman and Company, 2010.)

●Grade Assessment

The final course grade will be based on total points earned for exam, assignments and class participation.
The course components are scored as followed:
Final exam (55%)
Assignments* (35%)
Class participation (Exercises and Attendance) (10%)
Total (100%)
*There will be 3 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.

●Contacting Faculty

Any questionnaires are welcome via e-mail: qwang0611@gmail.com

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 HOTTA Yoshihiro Assistant Professor	Hirokazu KATO Professor	Miho IRYO(ASANO) 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 expectancy2. Motor Townscape- An outline of car design- An outline of highway design- Formation of 'strip'2. 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 systems4. Oil Pollution and Remediation5. Expansion of Transportation Infrastructure Network and its Environmental ImpactSeveral 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

●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 @.

Power Electronics (2.0credits) (パワーエレクトロニクス)

Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	3 Autumn Semester	3 Autumn Semester
Elective/Compulsory	Elective	Compulsory
Lecturer	YAMAMOTO Masayoshi Professor	Shinji DOKI Professor

●Course Purpose

Electrical and Electronics engineering have been attracted great interest from the automotive area, the aerospace area and industry application area in recent years. Nagoya university is located at Chukyo area which supports Manufacturing technologies and companies in Japan. Therefore, Nagoya university must support the Japanese manufacturing strategy. This lecture includes the idea of responsibility. Concretely, this lecture has analysis, exercise and construction of experimental setup using Electric Circuit, Control Engineering and Electromagnetics knowledge. Our lecture target is shown as follows;1.You can understand and analyze the drive method of Power Semiconductor Devices using transient phenomena.2.You can understand and analyze the Power Electronics Circuit using transient phenomena.3.You can design inductor using Magnetic Circuit applied Electromagnetics.4.You can analyze the Transfer function of Power Electronics Circuit using control engineering knowledge.5.You can design the control stability of Power Electronics Circuit using control engineering knowledge.6.You can learn not only Classroom lecture but also experimental setup of electric circuit design.

●Prerequisite Subjects

Linear circuit theory, Mathematics1, 2, Mathematics for electrical & electronic eng.,Electrical circuit, Electronic circuit, Electromagnetic theory

●Course Topics

Contents of lecture1. Power electronics1.1 Power electronics applications1.2 Basic knowledge of power semiconductor devices1.3 Power electronics circuit1.4 How to drive the power semiconductor device2. Control of power electronics2.1 Bode plot2.2 Relationship between power electronics and bode plot 2.3 Control stability of power electronics2.4 PWM control2.5 Control design method of power electronics3. Design of power inductor3.1 Inductor of power electronics3.2 Principle of magnetic circuit3.3 Design method of Inductor4. Power electronics applications4.1 Power electronics system of MODEL S/TESLA4.2 Power electronics system of MODEL 3/TESLA4.3 Power electronics system of LEAF/ NISSAN4.4 Power electronics system of EA (Electric Aircraft) Submit the report for the assignment due at the end of lecture

●Textbook

Print distribution as appropriate.

●Additional Reading

Print distribution as appropriate.

●Grade Assessment

Evaluation based on Examination and ReportsEntrance Year: 2020 or later　100 - 95:A+, 94 - 80:A, 79 - 70:B, 69 - 65:C, 64 - 60:C-, < 59:F Entrance Year: 2019 or before　100 - 90:S, 89 - 80:A, 79 - 70:B, 69 - 60:C, < 59:F

●Notes

No course requirements.

●Contacting Faculty

You can contact anytime by e-mail. I can share the question time by adjusting the schedule.email: m.yamamoto@imass.nagoya-u.ac.jp

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

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	Toshiro MATSUMOTO Professor	Tsuyoshi INOUE Professor

●Course Purpose

The purpose of this course is to acquire the fundamentals of numerical analysis through multibody dynamics simulation and numerical issues related to finite element methods. Through this course, students will develop an understanding of (1) the principles of multibody dynamics and some other methods frequently used in numerical analyses, and (2) various computation algorithms used in multibody dynamics simulation and the finite element method (students will also solve some simple practical examples).

The second part of the class is focused on the study of numerical method to analyze a partial differential equation. When mechanical structures are designed, their physical behaviors must be calculated in advance. Since the actual design objects have complicated structures, their analytical solutions in mathematical representation cannot be obtained. Therefore, some numerical analysis methods are needed for the simulation of the related physical behavior. The differential equation which is treated in the class is the simplest partial differential equation, Laplace's equation, for two-dimensional problems. The students study this partial differential equation, and a numerical method called boundary element method (BEM). The class is given based on the handouts and the students cope with the assignments for formulating BEM and example numerical demonstrations.
By finishing this class, the students are targeted to have the capability of doing the following skills:
1. Understanding Laplace's equation
2. Derivation of Green's identity from Laplace's equation
3. Formulation of the boundary element method
4. Developing a simple boundary element code

●Prerequisite Subjects

Calculus, Linear Algebra, Physics, Computer Software, Kinematics, Mechanical Vibration, Mechanics of Materials, Solid Mechanics, Vector Analysis

●Course Topics

(First part)
1. Numerical integration methods: General guideline
2. Numerical integration methods: Euler method, Backward Euler method
3. Numerical integration methods: Runge Kutta method
4. Numerical integration methods: Adams method
5. Numerical integration methods: Newmark beta method
6. Summary of part (1) and Programming with Matlab
(Second part)
7. Laplace's equation as a partial differential equation and its boundary value problem
8. Formula of integration by parts
9. Fundamental solution and derivation of Green's identity
10. Derivation of boundary integral equation
11. Discretization of the boundary integral equation
12. Applying boundary conditions and derivation of a system of linear algebraic equations
13. Numerical demonstration of the boundary element method through some examples

Students are required to solve the problems shown in the printed material, and report subjects given in each

week.

●Textbook

For first half part:
Printed material will be distributed, or download page will be prepared.

For second half part:
Printed handouts are used.

●Additional Reading

For first half part:
Planar Multibody Dynamics: Formulation, Programming, and Applications, Parviz Nikravesh

For second half part:
John Katsikadelis: The Boundary Element Method for Engineers and Scientists, 2nd Edition, Theory and Applications, ISBN: 9780128044933, eBook ISBN: 9780128020104, Academic Press, (2016)

●Grade Assessment

Grades will be based on the evaluation of first and second half parts:

For first half:
class participations and homework (50%) and reports and/or examination(50%)

For second half:
The understanding of the theory and computation algorithm of BEM is evaluated through assignments. Students can pass when the basic formulation of the boundary integral equation, its discretization procedure, and corresponding computational algorithm are understood. The grade is evaluated accordingly when they can formulate the boundary element method for more complicated problem and can develop a boundary element computer code.

●Notes

- No extra requirements are imposed.
- The classes will be given in face-to-face way and remote way through Zoom.

●Contacting Faculty

Students can ask questions at any time during classes.
Questions during off-class hours can be asked at the lecturers' rooms:
* Prof. Yasumasa Ito
E-mail: yito(at)nagoya-u.jp

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	HOSSAIN Akter Designated Lecturer	

●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 1, 2; Linear Algebra 1, 2; Fundamentals of Physics 1, 2, 3, 4;
Fundamentals of Chemistry 1, 2; Thermodynamics; Fluid mechanics 1

●Course Topics

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

Remarks: To obtain an excellent grade of this course, you have to prepare yourself properly by allocating enough time (i.e., it is your own duty/responsibility) for the assignment and final examination outside the course hours using the printed handouts of the lecture materials.

●Textbook

Printed handouts will be provided.

●Additional Reading

Heat Transfer (Schaum's Outline Series), McGraw-Hill College

●Grade Assessment

Grades will be based on class participation, assignments and reports.

30% for attendance
30% for assignments
40% for final report

●Notes

The whole lecture schedules/plans (including the date of the assignment/report, and the date of the final examination and so on) will be announced at the first class of each semester. The contents of the lecture, based on the course topics, will be provided in every lecture. However, the items as stated above are subject to change with prior notice during the semester.

●Contacting Faculty

Students can ask questions at any time during classes.

Questoins during off-class hours can be asked at the lecturer's room (Engineering Building No.3 North Wing, Room 223 (3125) or via e-mail:akter.hossain@mae.nagoya-u.ac.jp

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	Koichi MORI Associate Professor	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 productionAfter 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 industry2. Understand and explain how specific engineering theories are applied in industrial plants3. 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 industry2. Understand and explain how specific engineering theories are applied in industrial plants3. 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 plants2. 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 the NUCT tools, 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.

A minimum average 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 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,and5. 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 foe 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

Quize record: (20%) Reporting on lecture exercises: (30%) Final examinations: (50%) Students need to obtain at least 60% of the total marks to pass the course.Credits will be awarded to those students who score 60 or more.Grades are as follows: A+:100-90, A:89-80, B:79-70, C:69-60, F:59-0

●Notes

No special reqirement is applied, but attendance at every lecture is mandatory as well as keeping deadline strictly for submission of a few reports.but attendance at every lecture is mandatory as well as keeping deadline strictly for submission of a few reports.[About the class in 2021]Because due to countermeasure against COVID-19, lectures in the current class will be given as distance learning, in principal, online or on-demand basis by an assist of NUCT, where MS power point files or 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 quizz or reporting features.

●Contacting Faculty

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

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	Takayuki MORIKAWA Professor	Toshiyuki YAMAMOTO Professor
	Tomio MIWA Associate 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

Knowledge of fundamentals of traffic flow theory, traffic accident analysis and traffic and transportation management using ITS technologies obtained through the course will be evaluated. Evaluation will be based on the report work and 60% of evaluation score is required for credit earning.

●Notes

Any requirements are not required.
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 lesson.
Student can ask a question through chat system during a lecture and by email after a lecture.
Details will be explained until the first lecture throuth 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

Questions via email are welcomed any time: akatsu@nuem.nagoya-u.ac.jp

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

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

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	Yosuke AKATSU Designated Professor	

●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

Office hours for the semester will be specified during the first lecture.
Questions via email are welcomed any time: akatsu@nuem.nagoya-u.ac.jp
Office: Engineering Building No.3 North-wing, Room 235

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 analysis2.Understand the recent technologies for pre-crash and crash safety3.Understand the modeling and analysis of human driving behavior4.Understand how to design of personalized assistance system5.Understand how to design of fault tolerant controller6.Overview the biomechanics7.Understand the vehicle crashworthiness8.Understand how to protect occupant9.Understand how to protect pedestrian10.Understand the way of mathematical simulation

●Prerequisite Subjects

Control theoryProbabilistic inference (Bayesian approach)Rigid body mechanicsMechanics of materials

●Course Topics

1. Accident analysis2. Recent technologies for pre-crash and crash safety3. Modeling and analysis of human driving behavior4. Design of personalized assistance system5. Design of fault tolerant controller6. Biomechanics7. Vehicle crashworthiness8. Occupant protection9. Pedestrian protection10. Mathematical simulationRead 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 report50% 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 performaance 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 whic 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

Students can contact their lecturer via email.

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 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. 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

The purpose of this course is to develop Japanese language knowledge in various skill areas.
Students will acquire the skills such as academic and professional vocabulary, lecture listening comprehension, article reading, report writing, and oral presentation.

●Prerequisite Subjects

The skill of basic Japanese language is preferable.

●Course Topics

1. Introduction and background survey
2. Japanese language skill check
3. Practical listening comprehension training
4. Quick response and opinion presentation training in discussion
5. Reading of Japanese articles in students' major
6. Writing reports in Japanese
7. Oral presentation

Homework is assigned in the lecture.

●Textbook

Some books will be introduced in the lecture.

●Additional Reading

Some books will be introduced in the lecture.

●Grade Assessment

Attendance (10%) Participation in discussion (30%) Written Reports in Japanese (30%) Oral presentation (30%)
Students must obtain a score of 60 or higher out of 100 to pass the course.

●Notes

No requirement for this lecture

●Contacting Faculty

E-mail: m.ito5628($)gmail.com
Please replace ($) with @.

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 and humble Japanese expressions (3) Practice writing and reading 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

Self-introduction I Self-introduction Phone call Appointment Phone call Meeting Meeting Mid-term test Claim 10 Claim 11 Introducing products 12 Negotiation 13 Receiving orders14 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

Handouts 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 belowGrading will be decided based on the ability to facilitate smooth communication in Japanese in business setting.

●Notes

There are no course requirements for taking this class.

●Contacting Faculty

Questions will be answered before class, in class, after class or by e-mail.

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 Kiyohisa NISHIYAMA Lecturer	Emanuel LELEITO Lecturer	GRIB Dina 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 valuate your understanding of the topics taught. The reports will be worth 60% of the total score.
2) Presentation (40%): You will be asked to do a final presentation based on one or a combination of the topics taught. The presentation will require that you to do independent online research to gather necessary information and present the topic in 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

None

●Contacting Faculty

Questions are received during or after class time.

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

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.

●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.

Introduction to Civil Engineering and Architecture (2.0credits) (環境土木・建築学概論)

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 technology2. 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 AreaLecture and Site-visit 2: Architecture and cultureLecture and Site-visit 3: Nagoya University Disaster Mitigation Research CanterLecture 4: Social infrastructure and civil engineering (1) Expressway Development in JapanLecture 5: Social infrastructure and civil engineering (2) Maintenance and Operation of ExpresswaySite-visit 6: Maintenance and Operation of ExpresswaySite-visit 7: Traffic Control Center of ExpresswayReports 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.jpDr. Tobita).