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	Fundamental and Applied Physics	Automotive Engineering	Automotive Engineering
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory	Compulsory
Lecturer	Ichiro IDE Associate Professor		

●Course Purpose

The purpose of this course is to provide 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

●Grade Assessment

Grades will be based on weekly reports, class attendance, and several project 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

●Contacting Faculty

Students can communicate with their lecturer and TA during lecture hours or via email (cs1-16@murase.m.is.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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	1 Autumn Semester 1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	Foong See KIT Designated Professor	Tsutomu KOUYAMA Professor	

●Course Purpose

This is a companion course to the lecture course Fundamentals of Physics I, and 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.

●Prerequisite Subjects

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

●Course Topics

See syllabus for Fundamentals of Physics I

●Textbook

Fundamentals of Physics Extended 9th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2010ISBN:9780470576083)

●Additional Reading

●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

FOONG See KitOffice: ES420 Phone: 052-789-2861 Email: skfoong@eken.phys.nagoya-u.ac.jpKOUYAMA TsutomuOffice: Science Hall 7F 723Phone: 052-789-5108Email:kouyama@bio.phys.nagoya-u.ac.jp

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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	1 Autumn Semester 1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	Bernard GELLOZ Designated Professor	TAMA Florence Muriel Professor	

●Course Purpose

Course PurposeThis 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 9th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2010ISBN:9780470576083)

●Additional Reading

●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

Office: Science Hall 5F 517Phone: 052-789-2307Email: john.wojdylo@s.phys.nagoya-u.ac.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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	1 Spring Semester 1 Spring Semester	1 Spring Semester	1 Spring Semester
Elective/Compulsory	Elective Elective	Compulsory	Elective
Lecturer	Bernard GELLOZ Designated Professor	Foong See KIT Designated Professor	John A. WOJDYLO Designated Associate Professor

●Course Purpose

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

●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 Inductance

●Textbook

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

●Additional Reading

●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	Fundamental and Applied Physics	Automotive Engineering
	Automotive Engineering		
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Elective/Compulsory	Elective	Compulsory	Elective
	Elective		
Lecturer	Bernard GELLOZ Designated 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 & Diffraction

●Textbook

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

●Additional Reading

●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 (3.0credits) (数学１及び演習)

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	Fundamental and Applied Physics	Automotive Engineering	Automotive Engineering
Starts 1	2 Autumn Semester	2 Autumn Semester	2 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory	Compulsory
Lecturer	John A. WOJDYLO Designated Associate Professor	Shinya MATSUZAKI 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.

●Textbook

4th period

None

5th period

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

●Additional Reading

4th period

1. Boas M.L., 2006, Mathematical Methods in the Physical Sciences, 3rd ed., John Wiley & Sons.
2. Strang, G., Introduction to Linear Algebra, 4th Edition, Chapter 6.
3. Arfken G.B. & Weber H.J., 2005, Mathematical Methods for Physicists, 6th ed., Elsevier Academic Press.

(Copies are available in the library.)

5th period

1. Boyce W., DiPrima R, Elementary Differential Equations, 9th or 10th Ed., Wiley.
2. Strang, G., Introduction to Linear Algebra, 4th Edition, Chapter 6.
3. Riley K.F., Hobson M.P., and Bence S. J., 2006, Mathematical Methods for Physics and Engineering, 3rd ed., Cambridge University Press.
4. Boas M.L., 1983, Mathematical Methods in the Physical Sciences, John Wiley & Sons.

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: ES Building, ES747

Phone: 052-789-5043

Email: synya@hken.phys.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 (3.0credits) (数学２及び演習)

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

●Course Purpose

Building on the mathematics and physics knowledge gained in Fundamental Major Subjects, 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.

●Prerequisite Subjects

Fundamental Major Subjects: physics and mathematics courses

●Course Topics

1. Orientation of the course 2. Vector algebra
3. Vector differential operations
4. Curved lines and curved surfaces 5. Gradient, divergence and rotation
6. Vector integration; line integrals, surface integrals and volume integrals
7. Gauss theorem, Green's theorem and Stokes theorem
8. Irrotational (conservative) field and solenoidal field
9. Curvilinear coordinate systems
10. Concept of partial differential equations
11. Laplace equation, diffusion equation and wave equation
12. Separation of variables 13. Use of Fourier series
14. Poisson's equation and Green function

●Textbook

TBA

●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

Attendance: (20%)
Reports: (30%)
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@ees.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	Foong See KIT 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

●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

Classical Mechanics, Herbert Goldstein, Addison-Wesley

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

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	Kazuo NAKAZATO 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 Transformers

●Textbook

Electric Circuits-6th EditionEds. by Mahmood Nahvi and Joseph A. EdministerSchaum's Outlines Series, The McGraw-Hill Comp, Inc. 2014

●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%). Students must obtain a score of 60 or higher to pass the course.Grade Points;10090:S, 8980:A, 7970:B, 6960:C, <59:F

●Notes

●Contacting Faculty

Questions are accepted after each lecture at the class room or in the office by appointment. To S. Miyazaki, call ext.3588 or e-mail to miyazaki@nuee.nagoya-u.ac.jpTo K. Nakazato, call ext.3307 or e-mail to nakazato@nuee.nagoya-u.ac.jp

Mechanics of Materials and Tutorial (2.5credits) (材料力学及び演習)

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

●Course Purpose

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

●Prerequisite Subjects

Calculus & Physics

●Course Topics

1. Stress and strain 2. Tension and compression 3. Beam bending 4. Torsion of a bar 5. Combined stress 6. Strain energy 7. Buckling of a column

●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

●Contacting Faculty

Office hours for the semester will be specified during the first lecture.Questions via email are welcomed anytime: nobuohno@nagoya-u.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	Fujio TAKIMOTO Designated Professor	

●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 1,2Linear Algebra 1,2Fundamentals of Physics 1,2,3,4Fundamentals 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

●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

●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: takimotof@nuem.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

●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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	2 Spring Semester	2 Spring Semester	2 Spring Semester
Elective/Compulsory	Elective	Compulsory	Compulsory
Lecturer	John A. WOJDYLO Designated Associate Professor		

●Course Purpose

Course PurposeThis course offers a solid introduction to electrostatics and magnetostatics. It introduces fundamental mathematical methods required to solve problems in physics, engineering and applied mathematics. This course has dual 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.

●Textbook

Griffiths, D.L., 2012, Introduction to Electrodynamics, 4th ed., Prentice Hall. (It is essential that students read this book.)

●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	

●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.

●Prerequisite Subjects

Mechanics of Materials with exercises

●Course Topics

Contents treated in this program are as follows:
1.Crystal structures of metals, alloys and ceramics
2.Deformation and dislocation of metals
3.Strengthening of metals
4.Mechanical properties of metals and ceramics
5.Phase diagrams
6.Processing and forming of metals and 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 class participation and examinations.
20% for attendance
40% for midterm examination
40% 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.

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	Satoshi IWATA Professor	Noriyasu ONO 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. Introduction2. Amplification using transistor and equivalent circuit3. Power amplifiers4. Direct-coupled amplifiers5. C-R coupled amplifiers6. Negative feedback amplifiers7. Operational amplifiers8. Oscillators

●Textbook

●Additional Reading

Principles of Transistor Circuits, Ninth Edition, Addison Wesley

●Grade Assessment

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

E-mail :Satoshi IWATA :iwata@nuee.nagoya-u.ac.jp Noriyasu OHNO: ohno@nuee.nagoya-u.ac.jp

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	Tadashige IKEDA Associate Professor	

●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

●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 examinations. 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

●Contacting Faculty

Students can ask questions any time.
E-mail: ikeda@nuae.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	Fujio TAKIMOTO Designated Professor	

●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.

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●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.

●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

●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: takimotof@nuem.nagoya-u.ac.jp

Vibration Engineering and Tutorial (2.5credits) (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	Hideki KITA Professor	KeijiYASUDA Associate Professor	Yasuhiro TANABE Professor

●Course Purpose

This course discusses the fundamentals of chemical systems used in automobiles, such as material properties, engine friction, and fuel cell systems.

●Prerequisite Subjects

Chemistry, Material engineering, Thermodynamics, Tribology, and Statistics

●Course Topics

Fundamental chemistry for automobiles:
1. Manufacturing, properties and applications about carbon fiber, CFRP and hard coatings on plastics
2. Surface chemistry and tribology for engine friction
3. Basic statistics for life time prediction of engine parts
4. Spontaneous chemical reactions and the response of equilibria to the conditions
5. Equilibrium electrochemistry

●Textbook

Printed handouts will be distributed in class.

●Additional Reading

Physical Chemistry 9th ed. Atkins & de Paula

●Grade Assessment

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

●Notes

●Contacting Faculty

Students can ask questions during and after lectures, as well as via email. They can also ask questions by e-mail. Email: H.KITA: hkita@nuce.nagoya-u.ac.jp, Y.TANABE: y.tanabe@nuce.nagoya-u.ac.jp, K.YASUDA: yasuda@nuce.nagoya-u.ac.jp.

Scientific Measurements (2.0credits) (計測工学)

Course Type	Basic Specialized Courses		
Class Format	Lecture		
Course Name	Fundamental and Applied Physics	Automotive Engineering	Automotive Engineering
Starts 1	3 Autumn Semester	3 Autumn Semester	3 Autumn Semester
Elective/Compulsory	Elective	Elective	Compulsory
Lecturer	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Lecturer	

●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.

●Prerequisite Subjects

Electronics, Electrical circuit

●Course Topics

1. Outline (systematization of measurement etc.)2. Operation principle of sensing elements3Signal detection and conversion4Signal processing

●Textbook

●Additional Reading

●Grade Assessment

Report 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

●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 (2.5credits) (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

●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	Fundamental and Applied Physics	Automotive Engineering
	Automotive Engineering		
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester		
Elective/Compulsory	Elective	Elective	Elective
	Elective		
Lecturer	RICHARD Serge Charles Designated Associate Professor		

●Course Purpose

The aim of this tutorial is to deepen the understanding of calculus and to cultivate the ability to apply mathematical knowledge. The tutorial is mainly intended for students taking Calculus I.

●Prerequisite Subjects

Calculus I, 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 Ib (1.0credits) (数学演習１ｂ)

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry Automotive Engineering	Fundamental and Applied Physics	Automotive Engineering
Starts 1	1 Autumn Semester 1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
Elective/Compulsory	Elective 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 and other sciences at university level. The course is intended for students taking Linear algebra I.

●Prerequisite Subjects

Linear Algebra I

●Course Topics

1. Geometric setting : points and vectors in Rn, located vectors in Rn, scalar product in Rn, norm and scalar product in Rn, parametric representation of a line, planes and hyperplanes. 2. Matrices and linear equations: matrices, homogeneous linear equations, row operations and Gauss elimination, elementary matrices. 3. Vector spaces: abstract definition, linear combinations, convex sets, linear independence, dimension, the rank of a matrix. 4. Linear maps: general maps, linear maps, kernel and range of linear maps, rank and linear maps, matrix associated with a linear map, composition of linear maps, inverse of a linear map.

●Textbook

Linear Algebra with Applications, fourth edition, Otto Bretscher, Edition: Pearson (can be borrowed in Central Library)

●Additional Reading

●Grade Assessment

Explained during the first class

●Notes

●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	Norihiko NISHIZAWA 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. History of vehicle development2. Basic vehicle physics3. Basic vehicle structure4. Practice of disassembly and assembly of a car

●Textbook

●Additional Reading

Handouts will be distributed.

●Grade Assessment

Grades will be based on a report. 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 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	Fundamental and Applied Physics	Automotive Engineering
	Automotive Engineering		
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Elective/Compulsory	Elective	Elective	Elective
	Elective		
Lecturer	RICHARD Serge Charles Designated Associate Professor		

●Course Purpose

The aim of this tutorial is to deepen the understanding of calculus and to cultivate the ability to apply mathematical knowledge. The tutorial 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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	1 Spring Semester 1 Spring Semester	1 Spring Semester	1 Spring Semester
Elective/Compulsory	Elective 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 and other sciences at university level. The course is intended for students taking Linear algebra II.

●Prerequisite Subjects

Linear Algebra II

●Course Topics

See Linear Algebra II.

●Textbook

Linear Algebra with Applications, fourth edition, Otto Bretscher, Edition: Pearson (can be borrowed from the Central Library)

●Additional Reading

●Grade Assessment

Explained during the first class

●Notes

●Contacting Faculty

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

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Fundamental and Applied Physics	Automotive Engineering	Automotive Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Elective/Compulsory	Compulsory	Elective	Compulsory
Lecturer	YosukeWATANABE Designated Associate Professor		

●Course Purpose

Building on the knowledge gained in Computer Software 1, students will 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. In the latter part of the course, 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 12. Pointers3. Pointers and Arrays4. Strings5. Input/Output 6. Writing Large Programs7. Structures, Unions and Enumerations8. Advanced Uses of Pointers9. The Preprocessor, Declarations10. Programming project I11. Programming project II12. Programming project III13. Programming project IV14. Programming project V15. Programming project VI

●Textbook

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

●Additional Reading

●Grade Assessment

Homework assignments : 50% Programming projects : 50% Students must obtain a score of 60 or higher to pass the course.

●Notes

●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.

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	Fujio TAKIMOTO Designated Professor	

●Course Purpose

In this course, students will learn about vehicle structures. The purpose of the course is to 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

●Textbook

Printed handouts will be provided.

●Additional Reading

Automotive Engineering Fundamentals, SAE

●Grade Assessment

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

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

●Notes

●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: 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	Associated Faculty

●Course Purpose

This course discusses the current topics in each field of the advanced electrical, electronic, and information engineering in terms of automobile technologies.

●Prerequisite Subjects

●Course Topics

1. Electrical Engineering, 2. Electronic Engineering, 3. Infromation and Communication Engineering,

●Textbook

●Additional Reading

●Grade Assessment

Reports

●Notes

●Contacting Faculty

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	Associate Professor	Norikazu SUZUKI 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 two-dimensional mechanical drawings, and students learn how to make a drawing by CAD (Computer Aided Design) software through several projects. They also study three-dimensional geometry creation (CAD) and computer aided manufacturing (CAM). Cutter location (CL) data for machining operations are created by utilizing CAM software, and mechanical structures are fabricated in practice with by using a vertical machining center and NC programs.

●Prerequisite Subjects

graphics, mechanics

●Course Topics

1) Practice of 2D drawings of 3D objects by using CAD software. 2) Practice of description of dimensions, dimension lines, and dimensional tolerances on the 2D drawings by using CAD software. 3) Practice of description of center lines and hidden outlines on the 2D drawings by using CAD software. 4) Practice of description of screws, holes, and counterbores on the 2D drawings by using CAD software. 5) Practice of description of surface textures, geometric tolerances, and fits on the 2D drawings by using CAD software. 6) Practice of 3D geometry creation of 3D object including rounded surfaces by using CAD software. 7) Practice of toolpath generation for manufacturing 3D objects by using commercial CAM software. 8) Practice of machining by utilizing a vertical machining center and generated CL data.

●Textbook

Distributed at lectures.Other reference materials are distributed through following site.http://mx45.cadcam.etech.engg.nagoya-u.ac.jp/

●Additional Reading

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

●Grade Assessment

Evaluated by CAD projects and CAM practices.70% for CAD Assignments30% for CAM attendances and Projects

●Notes

●Contacting Faculty

During Drawing practices, Classes, CAM practices.

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	Tsuyoshi INOUE Professor	Yasunobu YOKOMIZU Professor

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

About 10 themes are provided, and the experiment for each theme is performed for the group with 5-6 members. After the each experiment, student analyses obtained experimental data, and writes a report.

●Textbook

A text book for the experiment is provided and announced at/before the first day of the experiment

●Additional Reading

●Grade Assessment

Students must submit reports for all themes. 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

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	Hiroaki MATSUMIYA Associate Professor	

●Course Purpose

Analytical chemistry is a branch of science that deals with the separation, quantification, identification and characterization of natural and artificial chemical compounds. More simply speaking, analytical chemistry is the study involving how we analyze the chemical composition and structure of samples.

This course provides a clear and thorough introduction to the principles and practices underpinning modern analytical chemistry. Through the course, students will develop an understanding of the fundamentals of analytical chemistry and various applications of cutting-edge techniques.

●Prerequisite Subjects

Fundamentals of Chemistry

●Course Topics

1. Accuracy and precision
2. Separation and concentration
3. Chemical analysis
4. Atomic and molecular spectroscopy
5. Surface and structural analysis

●Textbook

●Additional Reading

●Grade Assessment

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

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	Yoshitsugu HAYASHI Professor	Atsushi KATAGI Professor
	Hirokazu KATO Associate Professor		

●Course Purpose

This presents the role of car traffic in urban structure, the environment and quality of life,as well as its impact on these.

●Prerequisite Subjects

None

●Course Topics

1. Impacts of Motorization on Land Use and the Environment (Hayashi) - Interaction between motorization and urban growth - Transport systems and quality of life2. Motor Townscape (Katagi) - An outline of car design - An outline of highway design - Formation of 'strip'3. Car Traffic and Other Modes in Urban Transport Systems (Kato) - The role of public transport systems and car traffic - Environmental assessment of transport activity - Low carbon transport systems4. Risk Management of Urban Environment (Mori) - Concept of risk - Exposure analysis and threshold - Fatality rate and residual life - Air pollution, noise, and vibration

●Textbook

●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

Grades will be based on the reports. Students must obtain a score of 60 or higher to pass the course.

●Notes

●Contacting Faculty

Students are encouraged to ask questions during classes or via email.Appointments can be made upon request. The email addresses of the lecturers are as follows: HAYASHI: yhayashi@genv.nagoya-u.ac.jp. KATAGI: katagi@corot.nuac.nagoya-u.ac.jp MORI: yasu@sharaku.nuac.nagoya-u.ac.jp KATO: kato@genv.nagoya-u.ac.jp

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	Takeshi FURUHASHI Professor	Shinji DOKI Professor

●Course Purpose

Power electronics is one of the key technologies for eco-generation, eco-friendlycars, shinkansen (bullet train), linear motor car, robot actuation, etc. This lecture is aimed at understanding of basics of power electronics for automotive engineers.Upon completion of the course,students will understand the basics of power electronic circuits,such as converters, choppers and inverters and the basics of DC/AC motor control.

●Prerequisite Subjects

Calculus I, IILinear algebra I, IIVector analysisElectricity and magnetismElectrical circuitsElectronic circuits

●Course Topics

1. AD-DC Converters2. DC-DC Choppers3. DC motor control4. DC-AC Inverters 5. AC motor controlClass periods (90 min.)will be divided into a lecture (first half)and exercises in circuit design and construction(second half).

●Textbook

Handouts compiled by the lecturers

●Additional Reading

Power Electronics, Daniel W. Hart, McGraw Hill Higher Education, 2010Electromechanical systems, electric machines, and applied mechatronics, Sergey E. Lyshevski. CRC Press, 2000Introduction to power electronics, Eiichi Ohno, Clarendon Press, 1988Power Electronics -- Breadboard Models and Theory (in Japanese), Takeshi Furuhashi, Corona Publishing Co., Ltd., 2008,

●Grade Assessment

Circuit Construction Exercises:40%, Final examination:60%Grades: S:100-90,A:89-80,B:79-70,C:69-60,F:below 60

●Notes

●Contacting Faculty

Office hours will be announced in class.

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).

●Prerequisite Subjects

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

●Course Topics

1. Equation of motion of bodies
2. Constraint Equations and Augmented form of system equations
3. Numerical integration methods
4. Program with Fortran/Matlab
5. Virtual work principle and weighted residual form
6. Discretization
7. Newton's method
8. Gaussian quadrature formula
9. Solution methods of linear system of equations

●Textbook

Planar Multibody Dynamics: Formulation, Programming, and Applications, Parviz Nikravesh

Numerical Methods with Worked Examples: Matlab Edition
Authors: C. Woodford, C. Phillips, Springer

Introduction to Approximate Solution Techniques, Numerical Modeling, and
Finite Element Methods, Marcel Dekker Inc

●Additional Reading

●Grade Assessment

Grades will be based on class participations, reports, and examination.

●Notes

●Contacting Faculty

Students can ask questions at any time during classes.
Questoins during off-class hours can be asked at the lecturers' rooms:
* Prof. Tsuyoshi Inoue
Room 208, Aerospace Mechanical Engineering Research Building 2F, (3122), E-mail: inoue@nuem.nagoya-u.ac.jp
* Prof. Toshiro Matsumoto
Room 323, Engineering Building No.2 North Wing 3F, (2780), E-mail: t.matsumoto@nuem.nagoya-u.ac.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 Autumn Semester	3 Autumn Semester
Elective/Compulsory	Elective	Elective
Lecturer	Fujio TAKIMOTO Designated Professor	

●Course Purpose

In this course, students will learn fundamental theory on conductive, convective and radiative heat transfers, and their applications such as heat exchangers. Course objectives include
(1) developing an understanding of steady and unsteady conductive heat transfer by Fourier's law,
(2)explaining the principle of forced and natural convection,
(3)explaining the phenomena of surface radiative heat transfer by understanding the fundamentals of radiation laws, and
(4)learning the design of heat exchangers.

●Prerequisite Subjects

Calculus 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

●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

●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: takimotof@nuem.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	Shinkichi INAGAKI Associate Professor

●Course Purpose

Robot manipulators are widely used in the real production line of automotives.In order to make better production, we have to know 'what is making' as well as 'what is made'.This course introduces fundamental knowledge for designing a robot manipulator: link mechanics, drive mechanics and integration of them.Finally, students will be able to design a four-degree of freedom robot-manipulator from the desirable characteristics, specification.

●Prerequisite Subjects

Design Practice 1

●Course Topics

The classes are composed of lecture and practice.The contents are as follows.(1) Basic concept of robot manipulator(2) Design of link mechanics(3) Principles of drive mechanics: - Gear wheel - Chain and belt drives - Bearing(4) Design of robot manipulator from the specification(5) Drawing practice: Design and drawing of a four-degree of freedom robot-manipulator

●Textbook

Distributed in each class or updated on NUCT

●Additional Reading

●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

●Contacting Faculty

Students can contact with lecturers via email: INAGAKI: inagaki@nuem.nagoya-u.ac.jp MORI: mori@nuae.nagoya-u.ac.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 sapplied practically, and cover state of research and production at various companies.

●Prerequisite Subjects

Introduction to Automotive Engineering

●Course Topics

Factory visits to automotive companies in Chubu, Kansai and Kanto districts

●Textbook

●Additional Reading

●Grade Assessment

Grading will be decided based on attendance to the factory visit.

●Notes

●Contacting Faculty

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.

●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 visit to automotive companies in Chubu, Kansai and Kanto districts

●Textbook

●Additional Reading

●Grade Assessment

Grading will be decided based on attendance to the factory visit.

●Notes

●Contacting Faculty

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.

●Prerequisite Subjects

●Course Topics

Practical experiences in automotive engineering at industrial plants

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

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	Tsuyoshi INOUE Professor	Yasunobu YOKOMIZU Professor

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

About 10 themes are provided, and the experiment for each theme is performed for the group with 5-6 members. After the each experiment, student analyses obtained experimental data, and writes a report.

●Textbook

A text book for the experiment is provided and announced at/before the first day of the experiment

●Additional Reading

●Grade Assessment

Students must submit reports for all themes. 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

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	Tomohiko TAGAWA Professor	Yoshihiro KOJIMA Associate Professor	Noriyuki KOBAYASHI Associate Professor

●Course Purpose

This course discusses current topics in chemical systems used in the automobile, such as fuels and combustion, energy management, fuel cell system, and exhaust gas handling.

●Prerequisite Subjects

Automotive Chemical Systems1

●Course Topics

1. Automotive fuel processing 2. Chemistry of fuel cell system 3. Chemical heat pump for heat management4. Exhaust catalytic converter

●Textbook

Printed materials will be prepared and distributed in class.

●Additional Reading

N/A

●Grade Assessment

Grades will be based on reports and an 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 at the end of each lecture,or via email.
T.TAGAWA:tagawa@nuce.nagoya-u.ac.jp,Y.KOJIMA:ykojima@esi.nagoya-u.ac.jp or N.KOBAYASHI :koba@nuce.nagoya-u.ac.jp

Organic Materials (2.0credits) (有機材料)

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

●Course Purpose

The purpose of this course is to learn the basics of polymer science. The course begins with basic polymer concepts, then proceeds to polymerization and synthesis of various structured polymers, and finishes with polymer characterization and properties of polymers.

●Prerequisite Subjects

Organic Chemistry, Physical Chemistry, Analytical Chemistry

●Course Topics

1. Introduction to Polymer2. Step-Growth Polymerization3. Free-Radical Addition Polymerization4. Ionic Polymerization5. Linear Copolymers and Other Architectures6. Polymer Stereochemistry7. Polymerization Reactions Initiated by Metal Catalysts and Transfer Reactions8. Polymers in Solution9. Polymer Characterization – Molar Masses10. Polymer Characterization – Chain Dimensions, Structures, and Morphology11. The Crystalline State and Partially Ordered Structures12. The Glassy State and Glass Transition13. Rheology and Mechanical Properties14. The Elastomeric State15. Structure-Property Relations16. DNA and RNA that Encode Genetic Information as their Sequences17. Higher-Order Structures of Polypeptides and Protein

●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

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

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	Shinya YAGI Professor	

●Course Purpose

The purpose of this course is to introduce the fundamentals of materials fabrication and reaction on surface or interface . Upon completion of the course, students will (1)understand catalysis,(2)understand nanoparticles, 3. understand surface and interface for catalytic reactions

●Prerequisite Subjects

●Course Topics

1. Bulk, Thin film and Surface...Nanoparticle2. What is nanoparticles?3. What is catalysis?2. How to fabricate nanoparticles3. What are surface and interface?4. Measurement techniques5. Some topics related to automotive catalysis6. What is environmental pollution?7. How to convert polluted materials?8. Future plan about new catalysis

●Textbook

●Additional Reading

●Grade Assessment

1. Reports: 6-7 times(80%)2. Discussions(during the lecture)(20%)

●Notes

●Contacting Faculty

Please give me some questions and comments under lecture.

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

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.

●Prerequisite Subjects

●Course Topics

- Introduction
- Background of ITS Development in Japan
- ITS for Traffic Demand Management
  Automobile Use Restriction Measures
  Public Transportation Promotion Measures
- ITS applications in Japan
- Fundamentals of traffic flow characteristics
- Car-following theory and traffic simulation
- Four Step Forecasting Method of Traffic Demand
- Development of Surveying Technique of Transportation
- Traffic Accident Analysis and Prevention
- Evacuation management
- Probe Vehicle System
- Route Guidance System
- ITS in Logistics

●Textbook

Not specified.

●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

Students will be evaluated by reports (100%).
The reports will be offered by each professor.
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

●Contacting Faculty

Students can ask questions to professors at any time during classes.
Questoins during off-class hours can be asked via e-mail: miwa@nagoya-u.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.

●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.

●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

●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 Spring Semester	3 Spring Semester
Elective/Compulsory	Elective	Elective
Lecturer	Fujio TAKIMOTO Designated Professor	

●Course Purpose

In this course, students will learn about the combustion engine and advanced propulsion systems. Course objectives include (1)developing an understanding of the design and mechanics of the combustion engine (Otto-cycle engine and Diesel engine) and, (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

●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

Grades will be based on class participation and reports.

30% for attendance
30% for interim report
40% for final report

●Notes

●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: 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

Introduction to Production Engineering (2.0credits) (生産工学概論)

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	Chemistry Automotive Engineering	Fundamental and Applied Physics	Automotive Engineering
Starts 1	4 Spring Semester 3 Spring Semester	4 Spring Semester	3 Spring Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	Part-time Faculty		

●Course Purpose

Lecturers from Japanese leading industries provide the knowledge of the current status of production engineering in Japan. Developing the ability of understanding English lectures is expected.

●Prerequisite Subjects

none

●Course Topics

1. Production engineering in automobile industry 2. Production systems for automotive parts 3. Production engineering in aerospace industry 4. Production systems for aerospace products Foreign students have first priorities. The maximum number of students is limited to 30. In some lectures, group discussions and assignments may be done. Sufficient level of English language capability, TOEIC score of 600 or its equivalent as a minimum, is required.

●Textbook

Lecture notes are provided.

●Additional Reading

None

●Grade Assessment

Reports

●Notes

●Contacting Faculty

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 develop an understanding of vehicle safety development and engineering based on mechanical and human factors.

●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 simulation

●Textbook

Automotive Safety Handbook (SAE International)

●Additional Reading

●Grade Assessment

Grades will be based on class participation and reports.30% for attendance30% for interim report40% for final report

●Notes

●Contacting Faculty

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 mothod 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.

●Textbook

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

●Additional Reading

●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

●Contacting Faculty

Students can contact their lecturer via email.

Graduation Research A (2.5credits) (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.

●Prerequisite Subjects

●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.

●Textbook

●Additional Reading

●Grade Assessment

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

●Notes

●Contacting Faculty

Graduation Research B (2.5credits) (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.

●Prerequisite Subjects

●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.

●Textbook

●Additional Reading

●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

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	Tsutomu NOMIZU Professor	

●Course Purpose

The purpose of this course is to develop scientific and technical Japanese language knowledge in various skill areas such as technical vocabulary, lecture listening comprehension, article reading, report writing, and oral presentation.

●Prerequisite Subjects

●Course Topics

1. Introduction and background survey2. Japanese language skill check3. Practical listening comprehension training in students' major4. Reading of Japanese articles in students' major5. Writing Japanese reports on the scientific themes 6. Oral presentation on the scientific themes

●Textbook

TBA

●Additional Reading

●Grade Assessment

Attendance & Participation: 25%Written Reports in Japanese: 15% × 3Oral Presentation 10% × 3

●Notes

●Contacting Faculty

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

The purposes of this course are as follows: (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, and (4)learn Japanese business protocols.

●Prerequisite Subjects

Japanese language classes

●Course Topics

Self-introduction I Self-introducction Phone call Appointment Phone call Meeting Meeting Claim Claim 10 Introducing products 11 Negotiation 12 Receiving orders

●Textbook

Handouts will be distributed in class

●Additional Reading

●Grade Assessment

30% attendance and participation20% homework20% quizzes30% final exam Grades: S: 100%-90%, A: 89%-80%, B: 79%-70%, C: 69%-60%, F: 59%-0%

●Notes

●Contacting Faculty

Students may ask questions in class.They may make an appointment by email or telephone.E-mail: o47251a@cc.nagoya-u.ac.jpPhone: (052)789-3603Office location: Room 314-1, Engineering Building Number 7

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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	3 Autumn Semester 4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	Emanuel LELEITO Lecturer	Gang ZENG Lecturer	Kiyohisa NISHIYAMA Lecturer

●Course Purpose

This course introduces the history, current state and the future prospects of R&D (research and development) in various sectors related to the engineering field in Japan. This class consists of omnibus-style lectures, all provided in English.

●Prerequisite Subjects

Nothing

●Course Topics

1. Introduction to Embedded Computing Systems and Related Technology　1.1 Fundamentals and Trends　1.2 Low Energy Design　1.3 Automotive Applications2. Introduction to Disaster Management and Related Technology　2.1 Introduction to Disaster Management　2.2 Disaster Management Technology　2.3 Disaster Management Related Mini class project3. Introduction to Mass Production and Related Technology　3.1 Introduction to Mass Production　3.2 Technology for Mass Production　3.3 Current Problems and Future of Mass Production

●Textbook

The lecture materials will be distributed in each lecture.

●Additional Reading

1.“Programming Embedded Systems”, Second Edition, Michael Barr and Anthony Massa, O`Reilly Media 20062.“Designing Embedded Processors: A Low Power Perspective”, Henkel, Jeorg and Parameswaran, Sri, Springer Published 2007.3.“Disaster Management in Japan”, Cabinet Office, Government of Japan (Available Online)
http://www.bousai.go.jp/panf/saigaipanf.pdfhttp://www.bousai.go.jp/1info/pdf/saigaipanf.pdf4.“Disasters by Design: A Reassessment of Natural Hazards in the United States (Natural Hazards and Disasters: Reducing Loss and Building Sustainability in a Hazardous World: A Series)”, Dennis Mileti, A Joseph Henry Press.5.“Toyota Production System: Beyond Large-Scale Production”, Taiichi Ohno, Productivity Press 1988

●Grade Assessment

Attendance: 40%, One report per lecture: 30%, Final presentation: 30%

●Notes

●Contacting Faculty

Lecturer: Gang ZengEmail: sogo@ertl.jpTel: 052-789-5420

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	Fundamental and Applied Physics	Automotive Engineering
Starts 1	3 Autumn Semester 4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	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. To familiarize students with the subject matter, trips to the related manufactuaring companies are planned

●Prerequisite Subjects

●Course Topics

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

●Textbook

●Additional Reading

●Grade Assessment

reports

●Notes

●Contacting Faculty

Introduction to Civil Engineering and Architecture (2.0credits) (社会環境工学概論)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Chemistry Automotive Engineering	Fundamental and Applied Physics	Automotive Engineering
Starts 1	3 Autumn Semester 4 Autumn Semester	4 Autumn Semester	4 Autumn Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	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.

●Prerequisite Subjects

●Course Topics

Planned schedulesLecture & Site-visit 1: Architecture and culture – Nagoya Castle Hommaru Place Lecture & Site-visit 2: Architecture and culture – Nagakute Culture Center Lecture 1: Social infrastructure and civil engineering (1)Site-visit 3: Construction of new expressway (Central Nippon Expressway Co., Ltd)
Site-visit 4: Highway Traffic Control Center and Highway (Central Nippon Expressway Co., Ltd) Lecture and Site-visit 5: Nagoya University Disaster Mitigation & Management OfficeLecture 2: Social infrastructure and civil engineering (2)

●Textbook

●Additional Reading

●Grade Assessment

Students will be evaluated on attendance and written reports.

●Notes

●Contacting Faculty

Contact to Kentaro NAKAIEmail nakai@civil.nagoya-u.jp

Introduction to Chemical and Biological Industries (2.0credits) (化学・生物産業概論)

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Fundamental and Applied Physics	Automotive Engineering	Automotive Engineering
Starts 1	4 Spring Semester	4 Spring Semester	4 Spring Semester
Elective/Compulsory	Elective	Elective	Elective
Lecturer	Associated Faculty		

●Course Purpose
The purpose of this course is to provide a broad overview of trends in chemical and biological industries in Japan.

●Prerequisite Subjects
Not specified.

●Course Topics
This course introduces cutting-edge R&D topics and anticipated future trends, and looks at chemical and biological production in Japan. It illustrates how these topics relate to society in general, how they play a role in energy and environmental issues, and how they affect the international community. The course will invite researchers with ample experience working abroad to give inspiring lectures in English.

●Textbook
Not specified.

●Additional Reading
N/A

●Grade Assessment
Grades will be based on written reports and effort/attitude in class. Students must obtain a score of 60/100 or higher to pass the course.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

●Contacting Faculty
Students can ask questions during lecture hours.

Introduction to Applied Physics/ Materials and Energy Engineering (2.0credits) (物理・材料・エネルギー工学概論

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Chemistry Automotive Engineering	Fundamental and Applied Physics	Automotive Engineering
Starts 1	4 Spring Semester 4 Spring Semester	3 Spring Semester	4 Spring Semester
Elective/Compulsory	Elective Elective	Elective	Elective
Lecturer	Associated Faculty		

●Course Purpose

Fundamentals in applied physics, material science, and quantum energy are introduced. Magnetism and superconductivity, and recent topics of quantum computers are discussed. Materials sciences to resolve many problems in design of physical properties, in refining and formation processing of materials are discussed. Recent developments in materials science are introduced. Introduction to nuclear fusion and quantum energy utilization are also discussed.

●Prerequisite Subjects

●Course Topics

1. Introduction to magnetism 2. Introduction to quantum computers 3. Introduction to superconductivity 4. Introduction to laser materials processing I 5. Introduction to laser materials processing II 6. Introduction to nuclear fusion I 7. Introduction to nuclear fusion II 8. Introduction to nuclear fusion III 9. Introduction to nuclear fusion IV10. Fundamentals of ceramics and applications I11. Fundamentals of ceramics and applications II12. Fundamentals of ceramics and applications III13. Fundamentals of metals and applications I14. Fundamentals of metals and applications II

●Textbook

Lecture materials will be given during every lecture.

●Additional Reading

Shackelford, James F., Introduction to Materials Science for Engineers, Prentice Hall, Upper Saddle River, New Jersey, USA

●Grade Assessment

Evaluation will be based on written reports to be submitted at each lecture.

●Notes

●Contacting Faculty