

## 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 Elective	Compulsory	Compulsory
Lecturer	EijiroTAKEUCHI Associate Professor	Hiraku okada Associate Professor	

### Course Purpose

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

### Prerequisite Subjects

Basic mathematics

### Course Topics

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

### Textbook

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

### Additional Reading

Some references will be announced in the lecture.

### Grade Assessment

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

Reports should be submitted after each lesson.

### Contacting Faculty

Students can communicate with their lecturer and TA during lecture hours or via email (cs1-20@katayama.nuee.nagoya-u.ac.jp).

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

Course Type	Basic Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	SHIGEMORI Masaki Designated Professor		

### Course Purpose

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

### Prerequisite Subjects

Fundamentals of Physics I; Calculus I

### Course Topics

See syllabus for Fundamentals of Physics I

### Textbook

Students are required to purchase the online Fundamentals of Physics Extended 10th Edition International Student Version with WileyPLUS Set (John Wiley & Sons, 2010 ISBN:9780470576083) [However, do not purchase it before the first class meeting where further details will be announced in class]

### Additional Reading

order it during a class as needed

### Grade Assessment

Grading Attendance 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

There are no prerequisites

### Contacting Faculty

By appointment. Please email instructors to make an appointment.

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

Course Type	Basic Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	TAMA Florence Muriel Professor		

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### Course Purpose

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

### Prerequisite Subjects

Related Courses Calculus I; Fundamentals of Physics I ; Fundamentals of Physics II

### Course Topics

Course Contents See syllabus for Fundamental Physics II.

### Textbook

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

### Additional Reading

Instructions will be given as necessary in class

### Grade Assessment

Grading Weekly 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

There are no prerequisites

### Contacting Faculty

By email: [florence.tama@nagoya-u.jp](mailto:florence.tama@nagoya-u.jp)

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

Course Type	Basic Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	Compulsory	Elective
Lecturer	John A. WOJDYLO Designated Professor		

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### 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 to problem-solving.

### Prerequisite Subjects

Fundamentals of Physics

### Course Topics

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

### Textbook

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

### Additional Reading

Instructions will be given as necessary in class

### Grade Assessment

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

### Notes

There are no prerequisites

### Contacting Faculty

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

Course Type	Basic Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	Compulsory	Elective
Lecturer	Bernard GELLOZ Designated Associate Professor		

**Course Purpose**

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

**Prerequisite Subjects**

Fundamentals of Physics

**Course Topics**

1. Oscillations 2. Introduction to Maxwell's Equations 3. Waves 4. Electromagnetic Waves 5. Images 6. Interference & Diffraction  
It is desirable to read a textbook or reference materials before a class

**Textbook**

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

**Additional Reading**

Instructions will be given as necessary in class

**Grade Assessment**

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

**Notes**

Fundamentals of Physics

**Contacting Faculty**

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

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	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 Professor	ABE Tomohiro Designated Assistant Professor	

### Course Purpose

#### 5th period

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

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

#### 4th period

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

### Prerequisite Subjects

#### Prerequisites

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

#### Related Courses

Mathematical Physics Tutorial I, Mathematical Physics II

### Course Topics

#### Course Outline

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

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

#### Textbook

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

### Additional Reading

4th period

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

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

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

5th period

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

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

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

### Grade Assessment

4th period

tutorial Attendance: 50%; Class performance: 50%

5th period

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

### Notes

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

### Contacting Faculty

4th period

Office: BuES ilding, ES617

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

5th period

Office: Science Hall 5F 517

Phone: 052-789-2307

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

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

Course Type	Basic Specialized Courses		
Class Format	Lecture and Exercise		
Course Name	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	SONNENSCHNEIN Volker Thomas Assistant Professor	

### Course Purpose

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

### Targets

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

### Prerequisite Subjects

Calculus I, II

Linear Algebra I, II

### Course Topics

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

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

### Textbook

Not specified. Notes are distributed during the lecture.

### Additional Reading

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

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

### Grade Assessment

Reports: (50%)

Examinations: (50%)

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

### Notes

None.



Contacting Faculty

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

Phone: 052-789-4593,

E-mail : [fujita@energy.nagoya-u.ac.jp](mailto:fujita@energy.nagoya-u.ac.jp)

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

Course Type	Basic Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Autumn Semester	2 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	SHIGEMORI Masaki Designated Professor	Makoto KUWAHARA Associate Professor

### Course Purpose

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

### Prerequisite Subjects

None

### Course Topics

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

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

### Notes

There are no prerequisites

### Contacting Faculty

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

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

Course Type	Basic Specialized Courses	
Class Format	Lecture	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Autumn Semester	2 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	SeichiMIYAZAKI Professor	Shin KAJITA Associate Professor

### Course Purpose

The purpose of this course is to develop an understanding of basic electrical-circuit theory and responses of electrical circuits. Upon completion of the course, students will be able to (1)describe responses of electrical circuits with circuit equations, (2) explain steady-state and transient phenomena in electrical circuits, and (3)understand various phenomena by utilizing equivalent circuit analysis.

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

Grades will be based on a midterm examination (40%),final examination (40%), and reports (20%). Students must obtain a score of 60 or higher to pass the course.Grade Points;10090:A+, 8980:A, 7970:B, 6960:C, <59:F

### Notes

No special condition is requested.

### 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 S. Kajita, call ext.3144 or e-mail to kajita.shin@nagoya-u.jp

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

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

### Course Purpose

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

### Prerequisite Subjects

Calculus & Physics

### Course Topics

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

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

### Notes

No other specific requirements

### Contacting Faculty

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

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

Course Type	Basic Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Autumn Semester	2 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	HOSSAIN Akter Designated Lecturer	

### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

1. Thermal Equilibrium and Temperature 2. State Equations, Partial Differentials, Units and Dimensions 3. The First Law of Thermodynamics 4. The Second Law of Thermodynamics 5. Entropy 6. Thermodynamic Functions 7. Phase Equilibrium and Chemical Equilibrium 8. Kinetic Theory and Statistical Mechanics  
Students will solve problems under guidance of a faculty.

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

### Textbook

Printed handouts will be provided.

### Additional Reading

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

### Grade Assessment

Grades will be based on class participation, assignments and a final examination. 30% for attendance 30% for assignments 40% for final examination

### Notes

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

### Contacting Faculty

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

## Kinematics of Machines (2.0credits) (機構学)

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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	

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### Course Purpose

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

### Prerequisite Subjects

Calculus & Linear Algebra

Physics

### Course Topics

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

### Textbook

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

(Copies are available in the main library.)

### Additional Reading

As handed out in class.

### Grade Assessment

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

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Mid-term Exam - 30%

Final Exam - 30%

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

### Notes

Submit the assignments within 2 weeks after presenting them.

### Contacting Faculty

## Kinematics of Machines (2.0credits) (機構学)

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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](mailto:akatsu@nuem.nagoya-u.ac.jp)

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

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

Course Type	Basic Specialized Courses	
Class Format	Lecture	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Spring Semester	2 Spring Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	Makoto KOBASHI Professor	KATSUTOSHI Nagaoka Professor

### Course Purpose

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

### 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
7. Application of metals and ceramics

Students have to submit the reports when required.

### Textbook

Printed handouts will be provided.

### Additional Reading

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

### Grade Assessment

Grades will be based on reports and examinations.

50% for midterm examination

50% for final examination

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

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

### Notes

It is desirable to have completed chemistry. However, you can take the course even if you do not have credits.

### 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)

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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

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### Course Purpose

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

### Prerequisite Subjects

Electrical Circuit

### Course Topics

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

### Textbook

Necessary materials will be distributed in class.

### Additional Reading

Principles of Transistor Circuits, Ninth Edition, Addison Wesley

### Grade Assessment

Evaluate in reports (20%) and exams (80%). For each of the above, the grade must be C or higher. Grades: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

### Notes

There are no requirements for taking the course.

### Contacting Faculty

Answer questions during breaks after class or at office hours.

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## Solid Mechanics (2.0credits) (固体力学)

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

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### Course Purpose

The purpose of this course is to learn two- and three-dimensional theories of elasticity. The goals are to come to be able (1) to understand and explain equations of equilibrium, relationship between displacements and strains, compatibility of strain components, Hooke's Law, boundary conditions for three-dimensional elastic bodies, (2) to understand and use a method to solve two-dimensional problems by using Airy stress function, and (3) to understand and use energy theorems.

### Prerequisite Subjects

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

### Course Topics

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

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

### Textbook

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

### Additional Reading

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

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

### Grade Assessment

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

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

### Notes

No other specific requirements

### Contacting Faculty

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

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

Course Type	Basic Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Spring Semester	2 Spring Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	HOSSAIN Akter Designated Lecturer	

### Course Purpose

The purpose of this course is to understand the fundamental characteristics of fluid motions applied to many areas of fluid mechanics and learn the physical laws governing them.

Students will:

- (1) understand the properties, basic principles, and concepts of fluids.
- (2) learn about the basic equations derived from above, i.e. continuity equation, motion equation, and energy equation, and be able to use them in calculations, and
- (3) comprehend the aspects and properties of fluids conceptually utilizing the engineering observations of practical examples.

### Prerequisite Subjects

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

### Course Topics

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

Students will solve problems under faculty guidance.

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

### Textbook

Printed handouts will be provided.

### Additional Reading

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

### Grade Assessment

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

30% for attendance

30% for assignments

40% for final examination

### Notes

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

### Contacting Faculty

Students can ask questions at any time during classes.

Questions during off-class hours can be asked at the lecturer's room (Engineering



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

Course Type	Basic Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Spring Semester	2 Spring Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	Yosuke AKATSU Designated Professor	

### Course Purpose

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

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

### Prerequisite Subjects

Calculus, Analytical Dynamics, Mechanics

### Course Topics

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

### Textbook

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

### Additional Reading

As handed out in class.

### Grade Assessment

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

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Mid-term Exam - 30%

Final Exam - 30%

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

#### Notes

Submit the assignments within 2 weeks after presenting them.

#### 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](mailto: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	YutakaMATSUO Professor

### Course Purpose

Generally, in automobiles, about 30% of energy is consumed as friction loss. Wear is one of the important factors that determine the service life and the period of repair. In the first half of this lecture, students will acquire basic knowledge essential for considering the efficiency and life of vehicles such as wear and friction and learn life prediction.

Through this lecture, students aim to learn:

Understand the factors that determine friction and apply them to specific problems

Understand the factors that determine wear and apply to specific problems

Understand the meaning and usage of important Stribeck curves in designing friction systems under lubrication, and apply them to specific systems

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

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

### Prerequisite Subjects

Chemistry, Material engineering, Thermodynamics, Tribology, and Statistics

### Course Topics

Fundamental chemistry for automobiles:

1. Introduction; Tribology in engine
2. Surface morphology, chemistry and tribology
3. Contact engineering
4. Lubricant, solid lubrication
5. Stribeck Curve
6. Wear mechanism and Life time prediction of engine parts.
7. Structures in solar cells
8. Photoelectric conversion mechanism in solar cells.
9. Materials design and synthesis for energy conversion
10. Application of solar cells in automobiles

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

### Textbook

Printed handouts will be distributed in class.

### Additional Reading

Introduction to tribology

Physical Chemistry 9th ed. Atkins & de Paula

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

### Grade Assessment

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

examination.

C: 60 to 69 points

B: 70 to 79 points

A: 80 to 100 points

S: particularly excellent among the evaluation A

Each professor's evaluation is equivalent.

#### Notes

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

#### Contacting Faculty

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

Email: H. KITA: [kita.hideki@material.nagoya-u.ac.jp](mailto:kita.hideki@material.nagoya-u.ac.jp)

Email: Y. MATSUO: [yutaka.matsuo@chem.material.nagoya-u.ac.jp](mailto:yutaka.matsuo@chem.material.nagoya-u.ac.jp)



## Scientific Measurements (2.0credits) (計測工学)

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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 Associate Professor	

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### Course Purpose

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

### Prerequisite Subjects

Electronics, Electrical circuit

### Course Topics

1. Outline (systematization of measurement etc.) 2. Operation principle of sensing elements 3. Signal detection and conversion 4. Signal processing Please read the designated part of the textbook before each class.

### Textbook

Distribute printed materials by the lecturer.

### Additional Reading

We will introduce appropriate books as the lecture progresses.

### Grade Assessment

Report Acceptance criteria are to be able to properly explain the measurement and the device configuration required for the measurement, and to correctly understand basic concepts and terms related to signal processing required for the measurement. Credits will be awarded to those students who score 60 or more. Grades are as follows: S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

### Notes

No course requirements.

### 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](mailto:tutiyama@nuee.nagoya-u.ac.jp) To K. Niitsu, call ext.2794 or e-mail to [niitsu@nuee.nagoya-u.ac.jp](mailto:niitsu@nuee.nagoya-u.ac.jp)

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

Course Type	Basic Specialized Courses	
Class Format	Lecture and Exercise	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	3 Autumn Semester	3 Autumn Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	Yosuke AKATSU Designated Professor	

### Course Purpose

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

### Prerequisite Subjects

Calculus, Linear Algebra, & Analytical Dynamics

### Course Topics

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

### Textbook

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

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

(Copies available in library)

### Additional Reading

As handed out in class.

### Grade Assessment

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

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

The semester percentile grade is based on the following breakdown:

Homework Assignments - 40%

Intermediate Exam - 30%

Final Exam - 30%

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

### Notes

Submit the assignments within 2 weeks after presenting them.

### 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](mailto:akatsu@nuem.nagoya-u.ac.jp)

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

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

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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

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### 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 1 a)

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 Professor		

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### Course Purpose

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

### Prerequisite Subjects

Calculus I

### Course Topics

Exercises sheets will be provided each week before the tutorial, and will be available on the web site of the course. Homework will be due every week during the tutorial. For more information: <http://www.math.nagoya-u.ac.jp/richard/fall2018.html>

### Textbook

order it during a class as needed

### Additional Reading

do not appoint the textbook, but distribute a lecture document by a class of every time

### Grade Assessment

Your final grade will be determined by homework (50%) and quizzes (50%).

### Notes

### Contacting Faculty

Email to : [richard@math.nagoya-u.ac.jp](mailto:richard@math.nagoya-u.ac.jp)

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

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	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

The course is intended for students taking Linear algebra I.

### Course Topics

1. Geometric setting : points and vectors in  $\mathbb{R}^n$ , located vectors in  $\mathbb{R}^n$ , scalar product in  $\mathbb{R}^n$ , norm and scalar product in  $\mathbb{R}^n$ , 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. It is desirable to read a textbook or reference materials before a class

### Textbook

I do not appoint the textbook

### Additional Reading

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

### Grade Assessment

The assessment of this course coincides with the assessment of the course Linear Algebra II. Any student who does not participate in the final exam will receive the grade "Absent".

### Notes

do not need the study condition

### Contacting Faculty

Phone: 052-789-5612 Office: A-331, Science building A.

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

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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	Ryo YOSHIIE Associate Professor

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### Course Purpose

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

### Prerequisite Subjects

Physics

### Course Topics

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

### Textbook

Handouts will be distributed in the class.

### Additional Reading

Some books will be introduced in the lecture as needed.

### Grade Assessment

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

### Notes

No other specific requirements

### Contacting Faculty

Students can contact their lecturer by email.

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

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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 Professor		

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### Course Purpose

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

### Prerequisite Subjects

Calculus II, G30 program

### Course Topics

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

### Textbook

No textbook is required for this tutorial.

### Additional Reading

No reference book is required for this tutorial.

### Grade Assessment

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

### Notes

do not need the study condition

### Contacting Faculty

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



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

Course Type	Specialized Courses		
Class Format	Exercise		
Course Name	Chemistry	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	Erik Darpo Designated Associate Professor		

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### Course Purpose

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

### Prerequisite Subjects

Linear Algebra II

### Course Topics

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

### Textbook

do not appoint the textbook

### Additional Reading

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

### Grade Assessment

Explained during the first class

### Notes

While not a formal requirement, Linear Algebra I is strongly recommended.

### Contacting Faculty

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

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

Course Type	Specialized Courses		
Class Format	Lecture		
Course Name	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	Part-time Faculty		

### Course Purpose

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

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

### Prerequisite Subjects

Computer Software 1

### Course Topics

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

Homework is assigned in the lecture.

### Textbook

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

### Additional Reading

Some books will be introduced in the lecture.

### Grade Assessment

Programming skills are evaluated by homework assignments and programming projects.

Homework assignments : 50%

Programming projects : 50%

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

### Notes

Based on the knowledge gained in Computer Software 1.

### 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)

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

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### Course Purpose

In this course, students will learn about vehicle structures.

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

### Prerequisite Subjects

Thermodynamics

### Course Topics

#### 1. Design and Body

\*Product Planning

\*Body

\*Equipment

#### 2. Chassis

\*Suspension

\*Steering

\*Brake

#### 3. Power Train

\*Engine

\*Electric Propulsion

\*Drive Train

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

### Textbook

Printed handouts will be provided.

### Additional Reading

Automotive Engineering Fundamentals, SAE

### Grade Assessment

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

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

30% for attendance

30% for assignments

40% for final report

### Notes

No other specific requirements

### Contacting Faculty

Students can ask questions at any time during classes.

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

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

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Course Type	Specialized Courses	
Class Format	Lecture	
Course Name	Automotive Engineering	Automotive Engineering
Starts 1	2 Spring Semester	2 Spring Semester
Elective/Compulsory	Compulsory	Compulsory
Lecturer	Norikazu SUZUKI Associate Professor	Takayuki TOKOROYAMA Associate Professor

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### Course Purpose

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

### Prerequisite Subjects

graphics, mechanics

### Course Topics

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

### Textbook

All important materials are distributed at a lecture room. “Manual of Engineering Drawing, Elsevier, C.H. Simmons et al.” is recommended as a reference textbook. All important information about CAD projects, schedule, due date, evaluations, urgent guidance, are distributed via following website.

<http://mx45.cadcam.etch.engg.nagoya-u.ac.jp/>

### Additional Reading

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

### Grade Assessment

Comprehension of the achievement level is totally evaluated based on grade of the submitted drawings and participations of the practical trainings. The credit will be accepted if the basic problems can be handled

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

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properly among the primary practices that ask for an understanding of drafting standards. Also, participation in all hands-on training is mandatory. If the advanced problems can be handled appropriately, they will be reflected as a better grade accordingly.

### Notes

No course requirements.

### Contacting Faculty

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

## Analytical Chemistry (2.0credits) (分析化学)

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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	Masaya KAWASUMI Designated Professor	Yoshitaka ADACHI Professor	Takahiro ITOH Associate Professor
	Yasutoshi IRIYAMA Professor	MihoTAGAWA Associate Professor	

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### Course Purpose

Analytical chemistry is a branch of science and engineering 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.

The purpose of this course is a clear and thorough introduction to the principles and practices underpinning modern analytical chemistry. Through the course, students will be able to explain the fundamentals of analytical chemistry and various applications of cutting-edge techniques for science and engineering.

### Prerequisite Subjects

Fundamentals of Chemistry

### Course Topics

Accuracy and precision,  
Separation and concentration,  
Chemical analysis,  
Atomic and molecular spectroscopy,  
Surface and structural analysis,  
and some more techniques in analytical chemistry,  
Practical applications in materials science and engineering.

Short examinations or homework will be given per topic.

### Textbook

There is no prescribed textbook. Important handouts will be given or chosen as needed during the course.

### Additional Reading

Analytical Chemistry 2.1 (Open textbook library, David Harvey, DePauw University, Pub Date: 2016, Publisher: David T. Harvey)

### Grade Assessment

Grade assessment will be based on short examinations or reports per topic. To pass the course, students must obtain a letter grade C or better. Unauthorized absence and absence without a valid excuse will be a sufficient reason for a grade F.

### Notes

Understanding basics of chemistry will be required to take this course.

### Contacting Faculty

Any questionnaires are welcome via e-mail: [masaya.kawasumi@chem.material.nagoya-u.ac.jp](mailto:masaya.kawasumi@chem.material.nagoya-u.ac.jp) or phone call via intra-office No.4643 at the Room No.309 in Materials Research Laboratory for Green Vehicle Building.

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

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

### Course Purpose

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

### Prerequisite Subjects

There are no particular prerequisites for this course.

### Course Topics

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

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

### Notes

There is not particular note.

### Contacting Faculty

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





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

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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

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### Course Purpose

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

The second part of the class is focused on the study of numerical method to analyze a partial differential equation. When mechanical structures are designed, their physical behaviors must be calculated in advance. Since the actual design objects have complicated structures, their analytical solutions in mathematical representation cannot be obtained. Therefore, some numerical analysis methods are needed for the simulation of the related physical behavior. The differential equation which is treated in the class is the simplest partial differential equation, Laplace's equation, for two-dimensional problems. The students study this partial differential equation, and a numerical method called boundary element method (BEM). The class is given based on the handouts and the students cope with the assignments for formulating BEM and example numerical demonstrations.

By finishing this class, the students are targeted to have the capability of doing the following skills:

1. Understanding Laplace's equation
2. Derivation of Green's identity from Laplace's equation
3. Formulation of the boundary element method
4. Developing a simple boundary element code

### Prerequisite Subjects

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

### Course Topics

(First part)

1. Numerical integration methods: General guideline
2. Numerical integration methods: Euler method, Backward Euler method
3. Numerical integration methods: Runge Kutta method
4. Numerical integration methods: Adams method
5. Numerical integration methods: Newmark beta method
6. Summary of part (1) and Programming with Matlab

(Second part)

7. Laplace's equation as a partial differential equation and its boundary value problem
8. Formula of integration by parts
9. Fundamental solution and derivation of Green's identity
10. Derivation of boundary integral equation
11. Discretization of the boundary integral equation
12. Applying boundary conditions and derivation of a system of linear algebraic equations
13. Numerical demonstration of the boundary element method through some examples

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

week.

### Textbook

For first half part:

Printed material will be distributed, or download page will be prepared.

For second half part:

Printed handouts are used.

### Additional Reading

For first half part:

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

For second half part:

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

### Grade Assessment

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

For first half:

class participations and homework (50%) and reports and/or examination(50%)

For second half:

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

### Notes

There is no condition for taking this lecture

### Contacting Faculty

Students can ask questions at any time during classes.

Questions 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.tsuyoshi@nagoya-u.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 Spring Semester	3 Spring Semester
Elective/Compulsory	Elective	Elective
Lecturer	HOSSAIN Akter Designated Lecturer	

### Course Purpose

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

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

### Prerequisite Subjects

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

### Course Topics

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

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

### Textbook

Printed handouts will be provided.

### Additional Reading

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

### Grade Assessment

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

30% for attendance

30% for assignments

40% for final report

### Notes

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

### Contacting Faculty

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

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Students can ask questions at any time during classes.

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

## Fluid Mechanics II (2.0credits) (流体力学 2)

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Course Type	Specialized Courses
Class Format	Lecture
Course Name	Automotive Engineering
Starts 1	3 Autumn Semester
Elective/Compulsory	Elective
Lecturer	HOSSAIN Akter Designated Lecturer

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### Course Purpose

The purpose of this course is to understand the fundamental characteristics of fluid motions applied to many areas of fluid mechanics and learn the physical laws governing them.

Students will:

- (1) understand the properties, basic principles, and concepts of fluids.
- (2) learn about the basic equations derived from above, i.e. continuity equation, motion equation, and energy equation, and be able to use them in calculations, and
- (3) comprehend the aspects and properties of fluids conceptually utilizing the engineering observations of practical examples.

### Prerequisite Subjects

Calculus 1, 2; Linear Algebra 1, 2; Fundamentals of Physics 1, 2, 3, 4  
Fundamentals of Chemistry 1, 2; Thermodynamics;  
Elementary fluid mechanics/dynamics

### Course Topics

1. Vortex, circulation and integral of motion equation
2. Flow of incompressible non-viscous fluid
3. Flow of viscous fluid
4. Flow of compressible fluid

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

### Textbook

Printed handouts will be provided.

### Additional Reading

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

### Grade Assessment

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

30% for attendance

30% for assignments

40% for final report

### Notes

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

### Contacting Faculty

Students can ask questions at any time during classes.

Questions during off-class hours can be asked at the lecturer's room (Engineering

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

## 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	Hiroki YAMAGUCHI Associate Professor	Katsunori MAKIHARA Associate Professor

### Course Purpose

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

Achievement Objectives:

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

### Prerequisite Subjects

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

### Course Topics

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

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

### Textbook

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

### Additional Reading

Listed in a text book

### Grade Assessment

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

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

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

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

### Notes

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

### Contacting Faculty

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

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

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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	

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### Course Purpose

By applying knowledge learned by the Design Practice 1st, 2nd and specialized subjects etc, through experience a series of system design, machine (electric) design, manufacturing and evaluation for the given theme, master the basics of manufacturing. This lecture corresponds to the lecture Design Practice III for Japanese. G30 students (English class) will be supported by TAs and a Translator.

### Prerequisite Subjects

Design Practice 1

### Course Topics

1. Overview of Design Practice 3rd (@241 lecture room / Oct.7. 9:30-12:00)2. Theme explanation 4. Introduction to system design 5. Introduction to mechanical design 6. Introduction to mechatronics design 7. Introduction to processing method 8. Design and manufacturing by group 9. Demonstration of production  
After class ours: Each student continues his/her own analyses, simulations, and designs. For preparation before class: Methods of the subject in charge of each student should be prepared by reading the corresponding text books and/or internet.

### Textbook

Distributed in each class or updated on NUCT

### Additional Reading

Distributed in each class or updated on NUCT

### Grade Assessment

Grades will be based on reports of design and drawing. Students must obtain a score of 60 or higher to pass the course. Grades: S:100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

### Notes

### Contacting Faculty

Students can contact with lecturers via email: MORI: koichi.mori@mae.nagoya-u.ac.jp

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

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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	

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### Course Purpose

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

### Prerequisite Subjects

Introduction to Automotive Engineering

### Course Topics

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

### Textbook

Documents are supplied if necessary.

### Additional Reading

Not required

### Grade Assessment

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

### Notes

No other specific requirements

### Contacting Faculty

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



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

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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	

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### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

Documents are supplied if necessary.

### Additional Reading

Not required

### Grade Assessment

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

### Notes

No additional requirements

### Contacting Faculty

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

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

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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	

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### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

Documents are supplied if necessary.

### Additional Reading

Not required

### Grade Assessment

Grading will be decided based on attendance to the training.

### Notes

No other specific requirements

### Contacting Faculty

Please contact program organizers if necessary.

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

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

### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

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

### Additional Reading

Additional references will be introduced in class.

### Grade Assessment

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

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

### Notes

No additional requirement

### Contacting Faculty

Students can reach instructors through the NUCT tools, or by email ([kawajiri@nagoya-u.jp](mailto:kawajiri@nagoya-u.jp)). Office hours will be held at the end of the course to support students to write their reports.

## Organic Materials (2.0credits) (有機材料)

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

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### Course Purpose

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

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

### Prerequisite Subjects

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

### Course Topics

Course Topics

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

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

Quizzes during classes.

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

### Notes

There are no requirements for taking this course.

### Contacting Faculty

Students can communicate with their lecturers after lectures.

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

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

### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

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

### Additional Reading

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

### Grade Assessment

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

### Notes

No special requirement is given.

### Contacting Faculty

When you have an inquiry on the class or lecture contact the lecturer, Professor Enokida by e-mail of addressing [yenokida@nagoya-u.jp](mailto:yenokida@nagoya-u.jp) Direct visiting is welcomed; Concerning to the Office Hours, open door policy from 7:30 a.m. to 4 p. m.-- when he is there, He is usually available. To guarantee availability, make an appointment by sending an e-mail to [yenokida@nagoya-u.jp](mailto:yenokida@nagoya-u.jp)

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

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

### Course Purpose

The purpose of this course is to review state of the art Intelligent Transport Systems (ITS) and to learn the fundamentals of traffic flow theory, traffic accident analysis and traffic and transportation management using ITS technologies.

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

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

### Prerequisite Subjects

None

### Course Topics

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

### Textbook

Lecture materials will be provided.

### Additional Reading

The following books are recommended as references:

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

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

### Grade Assessment

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

## Notes

Not required

## Contacting Faculty

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

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

Takayuki Morikawa (ext. 3564, morikawa@nagoya-u.jp),

Hideki Nakamura (ext. 2771, nakamura@genv.nagoya-u.ac.jp)

Toshiyuki Yamamoto (ext. 4636, yamamoto@civil.nagoya-u.ac.jp),

Tomio Miwa (ext. 5018, 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.

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

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

### Prerequisite Subjects

Vehicle Dynamics, Control Engineering

### Course Topics

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

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

### Textbook

No text-book.

### Additional Reading

As handed out from each lecturer.

### Grade Assessment

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

Letter grades are assigned based on the percentages:

S:100-90

A:89-80

B:79-70

C:69-60

F:59-0

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

Notes

No other specific requirements

Contacting Faculty

Questions via email are welcomed any time: [akatsu@nuem.nagoya-u.ac.jp](mailto:akatsu@nuem.nagoya-u.ac.jp)

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

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

### Course Purpose

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

Through the course, students will be

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

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

### Prerequisite Subjects

Thermodynamics, Fluid mechanics/dynamics

### Course Topics

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

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

### Textbook

Printed handouts will be provided.

### Additional Reading

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

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

Fuel Cell Systems Explained 2nd Edition, SAE International

Internal Combustion Engine Handbook, SAE International

### Grade Assessment

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

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

30% for attendance

30% for interim report

40% for final report

### Notes

No other specific requirements

### Contacting Faculty

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

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Students can ask questions at any time during classes.

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

Submit the assignments within 2 weeks after presenting them.

### 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



## 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	Hiroki YAMAGUCHI Associate Professor	Katsunori MAKIHARA Associate Professor

### Course Purpose

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

Achievement Objectives:

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

### Prerequisite Subjects

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

### Course Topics

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

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

### Textbook

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

### Additional Reading

Listed in a text book

### Grade Assessment

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

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

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

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

### Notes

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

### Contacting Faculty

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

## Design Practice III (1.0credits) (設計製図 3)

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

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### Course Purpose

This course focuses on design practice through diesel engines. Students will learn how to determine the dimensions of a small diesel engine for common purposes.

### Prerequisite Subjects

Introduction to Automotive Engineering Design Practice 1 Design Practice 2

### Course Topics

1 Outline of diesel engines 2 General design for practical motorcars 3 Calculation of diagrams for pressure 4 Sketches of engine parts 5 Design of main parts (\*A piston and a combustion chamber, a coupling rod, a crank shaft, and a balance weight) 6 Exercises of technical drawings You may need to do drawing outside the course hours.

### Textbook

### Additional Reading

### Grade Assessment

Grades will be based on practice performance. Students must obtain a score of 60 or higher to pass the course. Grades: S: 100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

### Notes

No other specific requirements

### Contacting Faculty

Students can contact their lecturer via email.



## Vehicle Safety (2.0credits) (自動車安全工学)

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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

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### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

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

### Additional Reading

It will be announced in the class.

### Grade Assessment

Evaluation is based on two written reports. You need more than mark of 60 out of 100 points. If the fundamental topics are successfully understood, credit will be awarded. Higher grade will be provided depending on the level of understood topics. 50% for 1st report 50% for 2nd report

### Notes

Nothing particular.

### Contacting Faculty

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

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

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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	

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### Course Purpose

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

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

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

### Prerequisite Subjects

Design practice 1

Design practice 2

Design practice 3

Creative Design and Practice on Automobiles 1

Creative Design and Practice on Automobiles 2

Vehicle dynamics, Vibration, Kinematics of nmachine, Control engineering

### Course Topics

1 Vehicle dynamics performance from suspension design point of view

2 Passive safety performance from body design point of view

3 Active safety performance from body design point of view

5 Human factor design from safety and usability point of view

6 Strength and reliability experiment

7 Standard and regulation issues

8 HV car design from energy consumption and power train performance point of view

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

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

### Textbook

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

### Additional Reading

None

### Grade Assessment

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

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

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

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

### Notes

No other specific requirements

### Contacting Faculty

Students can contact their lecturer via email.

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

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

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### Course Purpose

The aim is to learn how to research and how to present the contents of the research on topics in Automotive Engineering. At the end of this course, students are supposed to acquire the following knowledge: 1. Understand the nature of research activities related to automotive engineering. 2. Understand how to proceed a research project and present results obtained.

### Prerequisite Subjects

All the subjects that students have learned.

### Course Topics

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

### Textbook

Textbooks may be provided by the supervisor.

### Additional Reading

None

### Grade Assessment

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

### Notes

No other specific requirements

### Contacting Faculty

Students can contact their supervisor.

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

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

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### Course Purpose

The aim is to learn how to research and how to present the contents of the research on topics in Automotive Engineering. At the end of this course, students are supposed to acquire the following knowledge: 1. Understand the nature of research activities related to automotive engineering. 2. Understand how to proceed a research project, present results obtained and write a final report as the dissertation.

### Prerequisite Subjects

All the subjects that students have learned.

### Course Topics

The student is required to report at the laboratory's meetings to be held several times in a semester to get advice from the supervisor and laboratory members. As the research and thesis approach completion, the student prepares an oral presentation of the thesis with the supervisor. The student is required to defend the thesis. You may need to do lab work outside the regular course hours.

### Textbook

Textbooks may be provided by the supervisor.

### Additional Reading

None

### Grade Assessment

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

### Notes

No other specific requirements

### Contacting Faculty

Students can contact their supervisor.

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

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

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### Course Purpose

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

### Prerequisite Subjects

The skill of basic Japanese language is preferable.

### Course Topics

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

Homework is assigned in the lecture.

### Textbook

Some books will be introduced in the lecture.

### Additional Reading

Some books will be introduced in the lecture.

### Grade Assessment

Attendance (10%) Participation in discussion (30%) Written Reports in Japanese (30%) Oral presentation (30%)

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

### Notes

No requirement for this lecture

### Contacting Faculty

Email address to be announced in the first class

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

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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	

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### Course Purpose

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

### Prerequisite Subjects

Japanese language classes G30 students took in Freshman year or equivalent

### Course Topics

Self-introduction I Self-introduction Phone call Appointment Phone call Meeting Meeting Mid-term test Claim 10 Claim 11 Introducing products 12 Negotiation 13 Receiving orders 14 Review 15 Final exam Homework will be assigned at the end of class. Students are expected to submit homework at the beginning of next class.

### Textbook

Handouts will be distributed in class

### Additional Reading

### Grade Assessment

30% active class participation 20% homework 20% mid-term test 30% final exam Grades: + 100% 95% 94% 80% 79% 70% 69% 65% 64% 60% 59 and below Grading will be decided based on the ability to facilitate smooth communication in Japanese in business setting.

### Notes

There are no course requirements for taking this class.

### Contacting Faculty

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

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

Course Type	Related Specialized Courses		
Class Format	Lecture		
Course Name	Chemistry	Fundamental and Applied Physics	Automotive Engineering
Starts 1	Automotive Engineering 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, the current state and future prospects of R&D (research and development) in various sectors related to the field of engineering in Japan. This class consists of “omnibus-style” lectures, all provided in English.

What you will get tips in this lecture for:

- Communication across different engineering fields
- Communication across language barriers (English/Japanese)
- Search skills for locating professional topics and information
- Presentation skills

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

Lecture materials will be distributed during at each lecture.

### Additional Reading

Lecture materials will be distributed during at each lecture.



### Grade Assessment

Credits will be awarded to those students who score over 60 out of 100, based on the evaluation on reports(60%) and final presentation(40%).

### Notes

The students are required to actively join group discussions, reports and presentations.

### Contacting Faculty

Questions are received during or after class time.

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

### Course Purpose

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

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

### Prerequisite Subjects

Physics, Electromagnetics, Mathematics

### Course Topics

This course consists of two parts:

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

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

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

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

### Textbook

Some books will be introduced in the lecture.

### Additional Reading

Some books will be introduced in the lecture.

### Grade Assessment

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

### Notes

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

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

### Contacting Faculty

Students are encouraged to ask questions during and after lectures.

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

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

### Course Purpose

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

### Prerequisite Subjects

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

### Course Topics

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

### Textbook

Directed as needed.

### Additional Reading

Directed as needed.

### Grade Assessment

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

### Notes

Not required

### Contacting Faculty

Coordinator: NAKAMURA Hideki (ext. 2771, nakamura@genv.nagoya-u.ac.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	Associated Faculty	Associated Faculty

### Course Purpose

This course is provided to give a broad overview of activities in chemical and biological industries in Japan. The course is open to both Japanese and foreign students.

Students will understand R&D trend and current status of production activities in chemical and biological industries in Japan.

### Prerequisite Subjects

Not specified.

### Course Topics

This course introduces the state-of-the-art and the future of R&D and production activities of chemical and biological industries in Japan. Their relationships with the human society, how they are involved in the energy and environmental issues, their roles in international societies, etc. are also discussed. Researchers who have ample experience in working abroad are invited to give stimulating lectures in English.

1. R&D process in biotechnology companies
2. Materials design with considering environmental issues
3. Process engineering of Advanced Ceramics

Homework will be assigned.

### Textbook

Not specified. Handouts will be supplied if necessary.

### Additional Reading

Not specified. It will be introduced when necessary.

### Grade Assessment

Grading will be decided based on reports. Reports will be evaluated by the level of comprehension and ability of rational discussion on the subject.

Credits will be awarded to those students who scored 60 or more.

Grades are as follows: A+:100-90, A:89-80, B:79-70, C+:69-65, C-:65-60, F:59-0

### Notes

This course will be taught in English.

Both short stay foreign students and Japanese students will be accepted.

### Contacting Faculty

Ask to the lecturers in the class.