Theory of Electromagnetics (4.0credits) (電磁理論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The purpose is not only to deeply understand electromagnetics as fundamentals of broad applications to energy, electronics and so on, but also to learn utilization techniques for "practical elecromagnetics". Group works on different subjects without guidelines will be done. Through repetitive consideration, investigation, presentation and discussion based on electromagnetic theory, the solution of the selected subject is pursued.

●Prerequisite Subjects

Electromagnetic theory, Vacuum electronics, High voltage engineering, Plasma physics and engineering, Computer literacy, Electric circuits

●Course Topics

1. Introduction, grouping, subject selection
2. Investigations on basic theory and related references to the selected subject
3. Interim report and discussion on investigations
4. Analysis and verification using different approaches
5. Final presentation

●Textbook

Textbook will be introduced in class.

●Additional Reading

Reference will be introduced in class.

●Grade Assessment

By report and/or presentation, an understanding of electromagnetic theory and the solution of the selected subject are evaluated.
The criteria for passing is to be able to discuss the subject using the knowledge and concepts gained during class.

●Notes

It is better that you have already studied fundamentals of electromagnetic theory.

●Contacting Faculty

Questions will be taken after class.

Contact email address:
Taro Yamashita: yamashita@nuee.nagoya-u.ac.jp
Masamitsu Tanaka: masami_t@nagoya-u.jp

Theory of Quantum Systems (4.0credits) (量子理論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

In order to deepen the understanding of quantum mechanics for the students who mastered elementary quantum mechanics, this lecture provide the knowledge from basic concept to advanced contents of the quantum mechanics, and is designed to acquire applied skills in actual electronic materials. Moreover, this lecture is designed to acquire the skills to predict the physical phenomenon in actual electronic materials by visualizing the electron transport and the wave function based on the computer simulation.
After successfully studying this lecture, students will be able to:
1. Understand and Describe quantization phenomena in actual electronic materials and devices.
2. Cultivate the skills to visualize wave functions in simple quantum devices.

●Prerequisite Subjects

Quantum mechanics, Solid state electronics, Magnetic materials, Electromagnetics

●Course Topics

1. Basic quantum theory (Wave-particle duality in photon and electron, Schrodinger equation, Uncertainty principle, etc.)
2. Matrix and state vector (Matrix element, Diagonalization, Heisenberg representation)
3. Electron spin and angular momentum (Spin operator, spin-orbit interaction, etc.
4. Electron scattering and tunnel effect (Rutherford scattering, Matrix element in scattering problem, etc.)
5. Perturbation theory (Electron scattering, Absorption and emission of photons)
6. Many-particle system and many-body problem (Bose particles, Fermi particles, Second quantization, etc.)
7. Quantum device (Optical devices, Electron devices)

●Textbook

Quantum mechanics I, II: Shoichiro Koide, Shokabo Co., Ltd

●Additional Reading

in Japanese
Elements of Advanced Quantum Theory: J. M. Ziman, Cambridge Univ. Press

●Grade Assessment

Evaluation will be based on the report or final examination.
<enrolled student after 2020.4>
A+: 100-95, A: 94-80, B: 79-70, C: 69-65, C-: 64-60, F: 59-
<enrolled student before 2020.3>
S:100-90, A:89-80, B:79-70, C:69-60, F:59-

●Notes

You have to join the course site .

●Contacting Faculty

Questions will be asked diromg the lecture or in the office hour. If necessary, students should book an appointment for your questions in advance via e-mail.

Contact:
Hiroshi Amano 3321 amano_at_NUEE
Kodo Kawase 4211 kawase_at_NUEE

Jun Suda 9670 suda_at_NUEE
Takeshi Kato 3304 takeshik_at_NUEE
Yoshio Honda 5275 honda_at_NUEE
Kiichi Niitsu 2794 niitsu_at_NUEE
Masahiro Horita 9672 horita_at_NUEE

Thermodynamics and Statistical Mechanics (4.0credits) (熱・統計力学)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Thermal and statistical dynamics is a branch of physics and provides us important fundamental concepts in various fields including energy, plasma and electric materials at the heart of electronics. The purpose of this course is not only to understand basics of thermal and statistical dynamics but also to learn how to use them in various applications with gaining a computer simulation skill. Students can acquire the above issues.

●Prerequisite Subjects

Mathematics 1, Fundamentals of Electric Energy with Exercises, Fundamental Computer Programing with Exercises. You should take the above subjects, but you can take this subject even if you have not taken above subjects.

●Course Topics

1. basics of thermal dynamics (ideal gas, entropy, thermal cycle)
2. thermal dynamics on material science
3. microscopic expressions of equilibrium system
4. molecular dynamics
5. energy distribution functions and density of energy state
6. Boltzmann transport equation and scattering, transition process
7. thermal transportation in fluid mediums
8. basics of numerical calculation on thermal transportation

As homework will be assigned during or after class, submit as a report each time or by the designated date.

●Textbook

to be introduced in the lecture.
In a lecture on molecular dynamics, you need to prepare UNIX, g++ and make environment on your own computer.

●Additional Reading

to be introduced in the lecture.

●Grade Assessment

Grading by Exercises, Reports and Examinations.
(enrolled student after 2020.4)
A+:100-95, A:94-85, B:84-75, C:74-65, C-:65-60, F: 59
(enrolled student after 2011.4)
S:100-90, A:89-80, B:79-70, C:69-60, F:59-
(enrolled student before 2011.3)
A:100-80, B:79-70, C:69-60, D:59-

●Notes

There are no limitations for taking this course.
Lectures will be given both face-to-face and remotely (on-demand via NUCT).
For both questions to the teacher and the exchange of opinions on the lectures among the students, use the message function of the NUCT.

●Contacting Faculty

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

Mathematical Methods in Electrical and Electronic Engineering (4.0credits) (電気物理数学)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The purpose is to understand the various physical phenomena related to electrical and electronic engineering and the principles of mathematical methods used for them, and to cultivate the basic skills necessary for research in this field through the following items.
1. To develop the ability of making good use of major mathematical methods for analyzing physical phenomena in electrical and electronic engineering:
2. To understand the universality and physical meanings of major mathematical methods by applying the methods in various physical phenomena:
3. To study how to model physical phenomena for analysis using mathematical methods:
4. To obtain intuitive understanding of physical phenomena through exercises using computer simulation and visualization

In this lecture, the goal is for students to have the following knowledge and skills at the end of the lecture.
1. Students can visualize and theoretically explain physical phenomena.
2. Students can simulate electronic circuit by optimum modeling
3. Students can formulate surface and interface phenomena and evaluate them quantitatively.
4. Students can understand quantum effects and run device simulation based on numerical computing.

●Prerequisite Subjects

Mathematics 1 and 2, Electromagnetic Theory, Fundamentals of Electronic Materials, Linear Circuit Theory, Electronic Circuits, Quantum mechanics

●Course Topics

1. Visualization of phenomena in electric circuit and its theoretical understanding
2. Modeling of device and numerical solutions of algebraic equations and ordinary differential equations (linear, non-linear)
3. Theoretical understanding and formulation of surface and interface phenomena, such as photoelectric effect
4. Fundamentals of semiconductor device simulation: Semiconductor equations and numerical analysis methods
5. Optical beam propagation and spectral analysis based on fast Fouriertransform (FFT)
6. Students can understand the AC impedance spectroscopy method for electrochemical reactions.

Review the contents of the previous lesson and understand the principles of each process.

●Textbook

Lecture materials are handed out as needed.

●Additional Reading

References will be assigned as needed.

●Grade Assessment

Degree of achievement is examined by the submitted report.
The minimum acceptance criterion is to correctly understand and discuss the physical phenomena related to electrical and electronic engineering and principles and characteristics of mathematical methods.
The report at each class is scored out of 100, and 60 of average score of all reports is appraised as passable.

The grade evaluation criteria are as follows,

Students enrolled in or after the 2020 school year:
100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: F

Students enrolled in or before the 2019 school year:
100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the class, and also available out of the class.

Theory of Discrete Systems (4.0credits) (離散システム論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty Tetsu IWATA Associate Professor	Associated Faculty	Associated Faculty

●Course Purpose

With the growth of information and communications technology, the amount of data that systems need to collect and process increases. Then, the processing and modelling technologies of a vast amount of data, and analysis and design techniques using computers become more important.

The purpose of this course is to review several basic topics listed as 1 to 7 in the following list, and practice their application topics with some exercises.

Students understand and explain the following topics:
1. An example of control system, design flow of the "system" method of modeling, simulation, analysis and design techniques and understanding
2. Algorithm techniques for programming
3. Architectures of distributed systems that integrate computers and networks, and protocols for communication, synchronization, and maintaining consistency
4. Minimization of boolean functions by the Quine–McCluskey algorithm
5. Data analysis algorithms and analysis tools
6. Basic discrete mathematics and its applications
7. Fundamentals of interactive systems such as robots, and techniques for expressing their movements

●Prerequisite Subjects

Discrete Mathematics with Exercise, Fundamental Computer Programing with Exercises, Digital Circuits with Exercises

●Course Topics

1. Modeling, analysis and design of system
2. Algorithm techniques
3. Architectures of distributed systems and protocols
4. Boolean function minimization
5. Data analysis algorithms and tools
6. Basic discrete mathematics and its application
7. Fundamentals of interactive systems and techniques for expression

For each topic, students will submit reports or there will be oral presentation.

●Textbook

Will be specified during the lecture when necessary.

●Additional Reading

David A. Patterson and John L. Hennessy. "Computer Organization and Design", Morgan Kaufmann

●Grade Assessment

Evaluate the degree of achievement with reports, oral presentation and discussion. Pass if it is greater than or equal to 60%.

●Notes

There is no prerequisite, however, it desirable that students have knowledge on the subjects listed in the "Prerequisite Subjects" field.

●Contacting Faculty

During and after lectures.

Theory of Signal Processing and Waveform Transmission (4.0credits) (信号処理・波形伝送論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

Image media systems and communication networks are technical bases of the modern society. The aims of the course are to learn the fundamental principles of information theory, signal/image processing, and communication systems, and to obtain the essential knowledge of the current ICT society.

Goal
- To understand the basics of signal processing and waveform transmission.
- To implement a simple system that performs signal processing and waveform transmission.

●Prerequisite Subjects

●Course Topics

Lectures:
- Fundamentals of image signal processing
- Fundamentals of information networking
- Fundamentals of wireless communication systems

Exercises and final presentation:
- Implementation of image signal processing and wireless communication systems on a pair of laptop PCs with C language.
- For the final presentation, a poster presentation on the above systems and a demonstration with it will be requested.

All the reports should be submitted without delay.

●Textbook

Books of lectures will be suggested during the lectures whenever necessary.

●Additional Reading

References will be suggested during the lectures whenever necessary.

●Grade Assessment

The judgement will be conducted based on the quality of submitted reports and that of the final presentation. All of the reports should be submitted without delay.

●Notes

It is necessary to attend the guidance for the basic courses at the beginning of the semester.
Please refer to the NUCT website for details.

●Contacting Faculty

Use message function on NUCT to ask questions.
Keita TAKAHASHI: keita.takahashi-at-nagoya-u.jp
Hiraku OKADA: okada-at-nuee.nagoya-u.ac.jp
Yojiro MORI: mori-at-nuee.nagoya-u.ac.jp
Replace "-at-" with an "at sign".

Theory of Data Analysis and Processing (4.0credits) (データ解析処理論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
	Automotive Engineering		
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The purpose of this class is to deepen the understanding of the techniques that are necessary for data acquisition and analysis in experiments, and to obtain practical skills. The signal measurement of voltage / current etc. in the experiment is important for the electrical engineering, electronics, information and communication engineering. Students will be able to 1) understand the principle of the signal measurement method, 2) understand the evaluation method of the error on the signal measurement; and 3) process and analyze the measured data using software (LabVIEW and Scilab).

●Prerequisite Subjects

electromagnetics, electric circuits, electronics circuits, mathematics1 & 2, programming, probability / statistics

●Course Topics

1. Signal measurement
1.1 Measuring instrument definition and specification
1.2 Basics of circuit design
1.3 Voltage measurement, current measurement, resistance measurement
1.4 Error source in measurement
1.5 Configuration of PC-based instrument
1.6 Collection and programming of experiment data
2. Data analysis
2.1 Statistical analysis (error, least-square fitting, basic statistics and test)
2.2 Time series analysis (FT, FFT, WT, transfer function, chaos)
2.3 Correlation analysis (autocorrelation, cross-correlation)
2.4 Spectral analysis (fourier analysis, fourier transform, spectral density function)
2.5 Simulation・Observation Experimental Data Analysis (Basic)
2.6 Simulation / Observation Experimental Data Analysis (Application)

Procedures of online lectures and exercises
The documents of the online lectures and exercises will be uploaded onto the NUCT by the dates shown in the seminar.
Please take these online lectures and exercises, and submit your report by the dates shown in the seminar.
Students are considered to have taken the lectures and exercises by submitting the report.

●Textbook

"Low Level Measurements Handbook (6th Ed.), Keithley" and data analysis prints will be distributed.
"Atarashii Gosa-Ron (in Japanese)" by K. Yoshizawa (Kyoritsu)
"Spectral Analysis (in Japanese)" by M. Hino (Asakura)
"Random Data: Analysis and Measurement Procedures" by J. S. Bendat and A. G. Piersol (John Wiley and Sons)

●Additional Reading

LabView Programming Guide ASCII

●Grade Assessment

Evaluate the target achievement level by comprehensively summarizing the presentation content of the seminar, the degree of understanding of the lecture, and the analysis result report of the exercise. Pass score of 60 points or more with 100 full marks.

Grading by Exercises and Reports.
(enrolled student after 2020.4)
A+:100-95, A:94-85, B:84-75, C:74-65, C-:65-60, F: 59
(enrolled student after 2011.4)
S:100-90, A:89-80, B:79-70, C:69-60, F:59-

●Notes

It is necessary to attend the guidance for the basic courses at the beginning of the semester.

To G30 and NUPACE students who hope to be enrolled in the course "Theory of Data Analysis and Processing"

●Contacting Faculty

Professors will answer the questions.
Contact: Muneaki KURIMOTO, mail(kurimoto(at)nuee.nagoya-u.ac.jp)
It is accepted during lecture time or at the end in face-to-face classes.

Seminar on Plasma Electronics 1A (2.0credits) (プラズマエレクトロニクスセミナー1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 1B (2.0credits) (プラズマエレクトロニクスセミナー1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 1C (2.0credits) (プラズマエレクトロニクスセミナー1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 1D (2.0credits) (プラズマエレクトロニクスセミナー1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Nano Process 1A (2.0credits) (ナノプロセスセミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 1B (2.0credits) (ナノプロセスセミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 1C (2.0credits) (ナノプロセスセミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 1D (2.0credits) (ナノプロセスセミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Optical Electornics 1A (2.0credits) (光エレクトロニクスセミナー1A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Responding to questions: Always available in person or by email at kawase@nuee.nagoya-u.ac.jp.

Seminar on Optical Electornics 1B (2.0credits) (光エレクトロニクスセミナー1B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 1C (2.0credits) (光エレクトロニクスセミナー1C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 1D (2.0credits) (光エレクトロニクスセミナー1D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 1A (2.0credits) (ナノ情報デバイスセミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics and exercises, Semiconductor electronics, Electronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare anything.

●Contacting Faculty

Please send question to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 1B (2.0credits) (ナノ情報デバイスセミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic devices, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare anything.

●Contacting Faculty

Send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 1C (2.0credits) (ナノ情報デバイスセミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic devices, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 1D (2.0credits) (ナノ情報デバイスセミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Intelligent Device 1A (2.0credits) (知能デバイスセミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　In order to understand systems such as intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　By learning this lecture, the goal is to be able to: 1. Understand the operation of CMOS electronic circuits that form the basis of intelligent devices. 2. Understand the technology for designing CMOS integrated circuits and design analog　circuits. 3. Understand the types and functions of sensor devices.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1 Fundamentals of physics and operation of CMOS devices2 Analog CMOS integrated circuit3. Application of sensor device and systemPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Intelligent Device 1B (2.0credits) (知能デバイスセミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The objective is to be able to do the following by learning the Intelligent Device Seminar 1B. 1 Understand CMOS integrated circuit design technology and be able to design analog integrated circuits. 2. Understand the structure and function of various sensor devices and apply them according to the application.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1.Design of analog CMOS integrated circuit2.Application of sensor device and systemPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours

Seminar on Intelligent Device 1C (2.0credits) (知能デバイスセミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The goal is to be able to do the following by learning the intelligent device seminar IC lecture. 1. Understand the design technology of CMOS integrated circuits and design analog integrated circuits with ultra-low power consumption. 2. Understand the operating principle of CMOS integrated sensor devices. 3. Understand how to design ultra-small CMOS sensor devices.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1. Application design of analog CMOS integrated circuits2. Ultra low power consumption and ultra small CMOS integrated sensor devicePlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours

Seminar on Intelligent Device 1D (2.0credits) (知能デバイスセミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The goal is to be able to do the following by learning the Intelligent Device Seminar 1D. 1. Understand the design technology of CMOS integrated circuits and design new CMOS integrated circuits. 2. Learn about on-chip integration of various sensor devices and CMOS circuits, and apply sensor systems to IoT.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1. A new analog CMOS integrated circuit design method.2. On-chip integration of sensor devices and systems3. IoT application of sensor systemPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Quantum Opto-Electronics 1A (2.0credits) (量子光エレクトロニクスセミナー1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the expert knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 1B (2.0credits) (量子光エレクトロニクスセミナー1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the expert knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 1C (2.0credits) (量子光エレクトロニクスセミナー1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the expert knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 1D (2.0credits) (量子光エレクトロニクスセミナー1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the expert knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Integrated Quantum Device System 1A (2.0credits) (量子集積デバイスセミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose
Textbooks and papers on superconducting electronics will be read intensively in turn to understand principle and physics of superconducting electronics.

Goal: Understanding of fundamental physics in superconducting phenomena.

●Prerequisite Subjects
Quantum Physics, Solid State Physics

●Course Topics
1. Superconducting Phenomena
2. Josephson Junctions
3. Josephson Circuits
4. Superconducting nano devices

Review of contents in previous classes is required before each of classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
not imposed

●Contacting Faculty
Questions are accepted in the seminar.

Seminar on Integrated Quantum Device System 1B (2.0credits) (量子集積デバイスセミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose
Textbooks and papers on superconducting electronics will be read intensively in turn to understand superconducting devices and circuits.

Goal: Understanding of physics of Josephson junction as an element device in the superconducting electronics.

●Prerequisite Subjects
Quantum Physics, Solid State Physics, Electric Circuits

●Course Topics
1. Physics and Application of Josephson Junctions
2. Josephson Integrated Circuits
3Physics and Application of Magnetic Josephson Junctions

Review of contents in previous classes is required before each of classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
not imposed

●Contacting Faculty
Questions are accepted in the seminar.

Seminar on Integrated Quantum Device System 1C (2.0credits) (量子集積デバイスセミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose
Textbooks and papers on ultra-thin-film superconducting devices will be read intensively in turn to understand principle and physics of high-temperature superconducting devices.

Goal: Understandings of a fabrication of high-critical-temperature superconducting films and devices.

●Prerequisite Subjects
Quantum Mechanics, Solid-State Physics

●Course Topics
1. Superconducting Phenomena
2. Two-dimensional Superconductors
3. Ultra-thin-film Superconducting Devices

Review of contents in previous classes is required before each of classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
not imposed

●Contacting Faculty
Questions are accepted in the seminar.

Seminar on Integrated Quantum Device System 1D (2.0credits) (量子集積デバイスセミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose
Textbooks and papers on superconducting quantum information processing will be read intensively in turn to understand principle of quantum information processing.Goal: Understanding of a principle of the superconducting quantum information processing.

●Prerequisite Subjects
Quantum mechanics

●Course Topics
1. Review of Quantum Mechanics2. Quantum Entanglement3. Quantum Communications4. Quantum ComputingReview of contents in previous classes is required before each of classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
not imposed

●Contacting Faculty
Questions are accepted in the seminar.

Seminar on Semiconductor Engineering and Integration Science 1A (2.0credits) (機能集積デバイスセミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain better understanding of electrical and optical properties of semiconductors, the basic knowledge of chemical bonding features and energy band structures is obtained and expanded through explanation and discussion based on publications. Goal; To understand basics of chemical bonds and energy band structures in semiconductors and to explain the fundamental properties of semiconductors from viewpoints of their energy band structures.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices in your undergraduate course.

●Course Topics

Crystal Structures Covalent and Ionic Bonds Elastic and Piezoelectric Constants Lattice Vibrations Energy BandsAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Bonds and Bands in Semiconductors, J. C. Phillips, Academic press

●Additional Reading

Electronic Structure and the Properties of Solids, Ed. Walter Ashley Harrison, W.H.Freeman and Company

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 1B (2.0credits) (機能集積デバイスセミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain better understanding of fundamental physical properties of semiconductors and their device applications, the basic knowledge of electronic states in semiconductors and potential barriers at heterojunctions is obtained and expanded through explanation and discussion based on publications. Goal; To understand basics of electronic states in semiconductors and to explain how semiconductor properties can be controlled.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices in your undergraduate course.

●Course Topics

Pseudopotentials and Charge Densities Fundamental Optical Spectra of Semiconductors Thermochemistry of Semiconductors Impurites in Semiconductors Potential Barriers and JunctionsAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Bonds and Bands in Semiconductors, J. C. Phillips, Academic press

●Additional Reading

Electronic Structure and the Properties of Solids, Ed. Walter Ashley Harrison, W.H.Freeman and Company

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 1C (2.0credits) (機能集積デバイスセミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain better understanding of semiconductor processing, the basic knowledge of the processing principle and the equipment concept in each of major process technologies for semiconductor devices and integrated circuits is obtained and expanded through explanation and discussion based on publications. Goals; 1. To understand the basics of semiconductor processing and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor processing.

●Prerequisite Subjects

Semiconductor Process and ULSI process in your undergraduate course.

●Course Topics

Crystal Growth and Wafer Preparation Surface Cleaning Epitaxy Oxidation/Nitridation Chemical Vapor DepositionAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

VLSI Technology, Ed. by S. M. Sze, McGraw-Hill

●Additional Reading

Semiconductor Devices-Physics and Technology, Ed. by S. M. Sze, John Wiley & Sons. Inc.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 1D (2.0credits) (機能集積デバイスセミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain better understanding of semiconductor processing, the basic knowledge of the processing principle and the equipment concept in each of major process technologies for semiconductor devices and integrated circuits is obtained and expanded through explanation and discussion based on publications. Goals; 1. To understand the basics of semiconductor processing and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor processing.

●Prerequisite Subjects

Semiconductor Process and ULSI process in your undergraduate course.

●Course Topics

Lithography Reactive Plasma Etching Diffusion Ion Implantation Metalization Process IntegrationAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

VLSI Technology, Ed. by S. M. Sze, McGraw-Hill

●Additional Reading

Semiconductor Devices-Physics and Technology, Ed. by S. M. Sze, John Wiley & Sons. Inc.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Advanced Devices 1A (2.0credits) (先端デバイスセミナー1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor devices. After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students.

●Course Topics

Current-Voltage and Voltage-Capacitance characteristics (steady state) of semiconductor Schottky junction and pn junction.

●Textbook

S.M.Sze, Physics of Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 1B (2.0credits) (先端デバイスセミナー1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor devices. After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students.

●Course Topics

Current-Voltage and Voltage-Capacitance characteristics (transient) of semiconductor Schottky junction and pn junction.

●Textbook

S.M.Sze, Physics of Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 1C (2.0credits) (先端デバイスセミナー1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor devices. After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students.

●Course Topics

Characterization methods of deep level traps in semiconductor and impact of deep level traps on semiconductor device characteristics.

●Textbook

S.M.Sze, Physics of Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 1D (2.0credits) (先端デバイスセミナー1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students.

●Course Topics

Characteristics of JFETs, MOSFETs, HEMTs.

●Textbook

S.M.Sze, Physics of Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Quantum Spin Information 1A (2.0credits) (量子スピン情報セミナー1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetizationBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 1B (2.0credits) (量子スピン情報セミナー1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetizationBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 1C (2.0credits) (量子スピン情報セミナー1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Dynamic Magnetization Processes2. Advanced measurement techniques3. Hard Magnetic Materials4. Elecronic Transport in Magnetic Materials5. Surface and Thin-film Magnetism6. Magnetic RecordingBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 1D (2.0credits) (量子スピン情報セミナー1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Dynamic Magnetization Processes2. Advanced measurement techniques3. Hard Magnetic Materials4. Elecronic Transport in Magnetic Materials5. Surface and Thin-film Magnetism6. Magnetic RecordingBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Electron Beam Applications 1A (2.0credits) (電子線応用工学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physicsElectronic devicesquantum physics for electron scattering and diffraction.Review the designated range after the class.

●Textbook
Instruct during the class as needed.

●Additional Reading
Instruct during class as needed

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Electron Beam Applications 1B (2.0credits) (電子線応用工学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physicsElectronic devicesquantum physics for electron scattering and diffraction.Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Electron Beam Applications 1C (2.0credits) (電子線応用工学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose

The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects

Electronics, quantum physics, condensed matter physics

●Course Topics

basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook

Instruct during class as needed.

●Additional Reading

Instruct during class as needed.

●Grade Assessment

Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty

questions will be answered during lectures.

Seminar on Electron Beam Applications 1D (2.0credits) (電子線応用工学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Nano-Electronics Devices 1A (2.0credits) (ナノ電子デバイスセミナー1A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 1B (2.0credits) (ナノ電子デバイスセミナー1B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 1C (2.0credits) (ナノ電子デバイスセミナー1C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 1D (2.0credits) (ナノ電子デバイスセミナー1D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by studying in an abroad laboratory and learn different methods and ways of thinking, as well as communicate on a daily base with foreign researchers.

By completing the course, the students are expected to acquire various research methods and ways of thinking, gain the ability to tackle research problems from multiple angles, and acquire a broad international perspective.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject, English, Advanced Lectures on Scientific English

●Course Topics

Students will stay in an abroad laboratory that will be chosen based on the participant’s research field and interest. The course consists of the following contents.

1. Theme setting and literature review
2. Formulating a research plan
3. Analyzing the results and discussion
4. Presentation of the results

After the class, students should review the analyzing processes of the research results and investigate related literatures.

●Textbook
Will be introduced at the host laboratory depending on the research subject

●Additional Reading
Will be introduced at the host laboratory if necessary

●Grade Assessment
Conducting research in an abroad laboratory for one semester and submitting a report is a prerequisite. Evaluation will be based on the student's report (50%) and oral presentation (50%). To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results.

●Notes

●Contacting Faculty
Questions will be answered by the supervisors at the host laboratory during the course.

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by studying in an abroad laboratory and learn different methods and ways of thinking, as well as communicate on a daily base with foreign researchers.

By completing the course, the students are expected to acquire various research methods and ways of thinking, gain the ability to tackle research problems from multiple angles, and acquire a broad international perspective.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject, English, Advanced Lectures on Scientific English

●Course Topics

Students will stay in an abroad laboratory that will be chosen based on the participant’s research field and interest. The course consists of the following contents.

1. Theme setting and literature review
2. Formulating a research plan
3. Analyzing the results and discussion
4. Presentation of the results

After the class, students should review the analyzing processes of the research results and investigate related literatures.

●Textbook
Will be introduced at the host laboratory depending on the research subject

●Additional Reading
Will be introduced at the host laboratory if necessary

●Grade Assessment
Conducting research in an abroad laboratory for two semesters and submitting a report is a prerequisite. Evaluation will be based on the student's report (50%) and oral presentation (50%). To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results.

●Notes

●Contacting Faculty
Questions will be answered by the supervisors at the host laboratory during the course.

Advanced Lectures on Process Plasma Engineering (2.0credits) (プロセスプラズマ工学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Electronics
Starts 1	Spring Semester ,every other year
Lecturer	Hirotaka TOYODA Professor

●Course Purpose

Plasma dynamics, plasma-surface interactions and plasma application to materials processing are lectured with basic knowledge on plasma engineering given in undergraduate course. Purpose of this lecture is that students can explain configuration of the plasma sources and can explain the physics occuring in the plasma.

●Prerequisite Subjects

Plasma Engineering, Electromagnetic Theory with Exercises 1,2.

●Course Topics

1. Particle Collisions:
2. Basic Equations for Plasma:
3. Plasma Kinetics:
4. Diffusion and Transport:
5. Sheath:
6. Plasma Source 1 (Capacitively coupled plasma):
7. Plasma Source 2 (Inductively coupled plasma):
8. Plasma Source 3 (Wave-generated plasma):
9. Plasma application (Plasma CVD)
10. Plasma application (Plasma etching)

●Textbook

Hideo Sugai, Plasma Electronics (Ohmsha, 2000)

●Additional Reading

M. A. Lieberman and A. J. Lichtenberg, Principles of Plasma Discharges and Materials Processing (John Wiley & Sons, Inc., 1994):F. F. Chen and J. P. Chang, Lecture Notes on Principles of Plasma Processing (Kluwer Academic/ Plenmum Publishers,2003)

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Lecture on Nanoprocess Engineering (2.0credits) (ナノプロセス工学特論)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Hiroki KONDOH Associate Professor
	Makoto SEKINE Designated Professor	Kenji ISHIKAWA Professor	

●Course Purpose

The purpose of this course is to study the principles of nano-processes and practical applications in order to form the basis of nanoelectronics, nanophotonics and bio-nanotechnology. Specifically, students learn not only top-down nanofabrication techniques, such as etching, thin film deposition and, surface and interface control techniques, which enable the advanced silicon devices, but also nano-materials processes developing in recent years. Atomic-level analyzing techniques of nanostructures and experiments using synchrotron radiation are also lectured. In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson. #1. Nanoprocesses can be designed using the appropriate atomic / molecular reaction control techniques. #2. Understand and explain trends and technological issues in advanced devices and processes. #3. Atomic level structural analysis of nanodevices and nanomaterials can be performed.

●Prerequisite Subjects

Semiconductor engineering, Plasma engineering, Solid-state physics

●Course Topics

1. Fundamentals of reaction fields with atoms, molecules and radicals,2. Control techniques of atoms and molecules3. Advanced device processes for ULSI, Quantum computer, Nano-Bio devices, Photonic devices)4. Plasma nano-processes5. Self-organization techniques6. Measuring techniques of nano-reaction fieldsReview the contents of the previous lesson and understand the principles of each process.

●Textbook

Materials will be distributed as needed.

●Additional Reading

References will be provided as needed.

●Grade Assessment

Goal attainment levels are examined by reports. The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the class, and also available out of the class.

Electron Device Engineering (2.0credits) (電子デバイス工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor

●Course Purpose

The evolution of electronics is indubitably based on the advancement of electron devices with higher performance and higher functionality. In this lecture, major electron devices consisting of semiconductor(s) and dielectrics such as transistors. solar cells and solid state sensors will be focused and to get a better understanding of their device physics, the fundamental properties of semiconductors and dielectrics are reviewed in relation to the principle for device operations.Achievement target:1. Understand and explain the operating principles and basic performance of major electronic devices.2. Understand and explain the relationship between electronic device structure and operation principle.3. Understand and explain electronic device characteristics in relation to material properties.

●Prerequisite Subjects

It is desirable to have basic knowledge about Solid-state Electronics, Semiconductor Electronics and/or Electronic Device Engineering in your undergraduate course.

●Course Topics

Fundamental properties of semiconductors and dielectricsSchottky and PN junctionsMOS capacitors and transistorsSemiconductor memoriesSolar cellsSemiconductor sensorsOther functional devices Quantum effect devices, high frequency devices, light emitting devices etc.As practice problem(s) will be assigned during and/or after class, your answer or response should be submitted as a brief report in each time or by the designated date.

●Textbook

Selected materials for each lecture will be distributed.

●Additional Reading

Semiconductor devices: physics and technology, SM Sze - 2009 - WileyPhysics of Semiconductor Devices 3rd Edition, Eds.Simon M. Sze , Kwok K. Ng - Wiley

●Grade Assessment

The achievements of the above objectives are equally measured. Evaluations based on quizzes in each lecture, drills and reports will be made for overall rating.The credit of this class is given if basic operation principle and fundamental characteristics of semiconductor devices can be explained based on device structures properties of semiconductors. The understanding levels of performance and reliability of semiconductor devices as well as issues for their practical use are reflected in the evaluation score.

●Notes

There are no limitations for taking this course.Lectures will be given both face-to-face and remotely (on-demand via NUCT).For both questions to the teacher and the exchange of opinions on the lectures among the students, use the message function of the NUCT.

●Contacting Faculty

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

Advanced Lecture on Charged Beam Engineering (2.0credits) (粒子線工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor

●Course Purpose

A charged particle beam has widely been used for studying the structures and properties of materials. This course provides the theory and application of charged beam engineering with a focus on transmission electron microscopy and diffractometry. This course will also provide a basic knowledge of crystallography. The goal of this lesson is for the students to have the above knowledge and skills.

●Prerequisite Subjects

Electromagnetics, Vacuum electronics(not mandatory)

●Course Topics

1.Physics of scattering and diffraction of charged particles. Dispersion relation of electron waves in a crystal.
2.Basics of TEM (electron source, optics. High-resolution imaging)
3.Crystallography (lattice systems and crystal symmetry)
4.Application of TEM to the nanoscale analysis of semiconducting materials (electron holography and electron energy-loss spectroscopy etc.)

●Textbook

No specific textbooks will be used.

●Additional Reading

Transmission Electron Microscopy: A Textbook for Materials Science (David B. Williams, and C. Barry Carter, Springer)

●Grade Assessment

Examination and reports. A passing mark is 60/100.

●Notes

Classes are basically face-to-face, but some classes may be conducted online.

●Contacting Faculty

Questions can be asked through NUCT Message.
ikarashi[at]imass.nagoya-u.ac.jp

Advanced Lectures on Magnetic Materials (2.0credits) (磁性体工学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Takeshi KATO Professor

●Course Purpose

This lecture is designed to learn advanced expertise on the magnetism, magnetic materials, and advanced magnetic devices. This lecture assumes the students have studied Electromagnetic Theory with Exercise, Quantum Mechanics with Exercise, Solid-state Electronics and Tutorial, Magnetic Materials in the faculty course or equivalent.

After successfully studying this lecture, students will be able to:

1. Understand microscopic theory of magnetic moments and its ordering.
2. Understand phenomenological and microscopic theories of magnetic anisotropy and magneto-striation.
3. Understand the dominant contributions to determine the magnetization process.
4. Describe the principle of magnetic recording.
5. Understand the physics of giant magneto-resistance and tunnel magneto-resistance.
6. Describe the features and principle of magnetic random access memories.
7. Understand the physics of new phenomena on spintronics, such as spin Hall effect.
8. Cultivate the creativity and practical skills to develop advanced magnetic devices using spintronics.

●Prerequisite Subjects

Electromagnetic Theory with Exercise, Quantum Mechanics with Exercise, Solid-state Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Microscopic origin of magnetic moments
2. Exchange coupling and magnetic orders
3. Magnetic anisotropy and magneto-striction
4. Magnetic domain structure and magnetization process
5. Spin dynamics
6. Magneto-optical effect
7. Magnetic thin films and their fabrication methods
8. Microscopic experimental techniques to study magnetic materials
9. Magnetic superlattices
10. Magnetic recording
11. Giant magneto-resistance and tunnel magneto-resistance
12. Magnetic random access memories
13. Spin transfer torque and spin orbit torque

Before learning each topic in the lecture, students should read handout pages corresponding to the topic. Homework reports will be issued to check the level of the understanding.

●Textbook

No required text book for the course, and daily outlines will be posted for download.

●Additional Reading

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New York
Modern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Grade Assessment

Evaluation will be based on the reports and final examination. To pass the grade, students should answer the basic problems on the magnetic properties of magnetic materials. Answering the problems on the advanced

spintronics will affect your grade for the course.

●Notes
No requirements to take this course.

●Contacting Faculty
Questions will be answered via e-mail.
Students should contact to Prof. Kato
kato.takeshi.i6_at_f.mail.nagoya-u.ac.jp (please change _at_ to @).

Advanced Lecture on Semiconductor Electronics (2.0credits) (半導体工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor

●Course Purpose

Fundamental physical properties of semiconductors and physics of optoelectronic, high-frequency and power devices are studied. A guideline of novel device design is mastered in this lecture.

The final goal of this lecture is as follows;
1. To get the ability to explain the semiconductor device physics
2. To get the ability to design semiconductor devices

●Prerequisite Subjects

Electromagnetic, Quantum mechanics and exercises, Solid state electronics and exercises, Semiconductor engineering, Electron device engineering

●Course Topics

0. Structural Properties of Semiconductors
1. Semiconductor Band structure
2. Band structure Modifications
3. Transport: General Formalism
4. Defect and Carrier – Carrier Scattering
5. Lattice Vibrations: Phonon Scattering
6. Velocity – Field Relations in Semiconductors
7. Optical Properties of Semiconductors
8. Excitonic Effects and Modulation on Optical Properties
9. Semiconductors in Magnetic Fields

Students should download each lecture note and read it carefully before the c
lass. After the class, exercises during the class should be reviewed.

●Textbook

Electronic and Optoelectronic Properties of Semiconductor Structures, Jasprit Singh (Cambridge University Press)

●Additional Reading

Physics of low dimensional semiconductors, J. H. Davis (Springer)
The Physics of Semiconductors, Marius Grundmann (Springer)
Basic Semiconductor Physics, C. Hamaguchi (Springer)
Semiconductor Device Physics and Design, Umesh Mishra and Jasprit Singh(Springer)

●Grade Assessment

The final goal of this lecture is as follows;
1. To have the ability to explain the semiconductor device physics
2. To have the ability to design semiconductor devices

The record is evaluated by the following three reports(100%).
1st report: To explain the temperature dependence of carrier mobility based on quantum mechanics
2nd report: To explain the difference of the transition property in direct and indirect semiconductors

3rd: To design the new functional devices having energy harvesting ability

●Notes

There is no need to take this class.

●Contacting Faculty

Please ask after the class

Use phone or e-mail.
ext.3321amano@nuee.nagoya-u.ac.jp

Office is C-TECs 6th Floor Room 610

Advanced Lecture on Information Devices (2.0credits) (情報デバイス工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Silicon CMOS LSI will be lectured. The operation principles of devices and basic CMOS circuits will be described.The objective of this lecture is to understand the following. \ 1.Operation characteristics of CMOS device from device structure \ 2.Design method of CMOS integrated circuit

●Prerequisite Subjects

Electromagnetism, Magnetics, Semiconductor Engineering, Electronics Circuit Engineering

●Course Topics

1.Introduction 2.Analog and digital 3.Trends of MOS technology 4.MOS device physics 5.MOS process technology 6.Basics of CMOS integrated circuits 7.Fundamental properties of CMOSFET and TCAD 8.Foundamental CMOS integrated circuits 9.Logic

Please read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated Circuits
Behzad Razavi
: McGraw-Hill Companies (2003/10)
:
ISBN-10: 0071188398
ISBN-13: 978-0071188395

●Additional Reading

M.Koyanagi,"Submicron devices I, II," Maruzen W.J.Dally and J.W.Poulton, "Digital Systems Engineering," Cambridge University Press, 1998 \ B.Razavi,"Design of Analog CM

●Grade Assessment

report

If the answer to the issue in the report can be obtained accurately, the result will be accepted. If a solution to the issue can be found in a more advanced way, it will be reflected in the grade accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Advanced Lectures on Quantum Optoelectronics (2.0credits) (量子光エレクトロニクス工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Norihiko NISHIZAWA Professor	Yutaka ONO Professor

●Course Purpose

Quantum Opto-Electronics, which is the fusion of opto-electornics, nano-electronics, and quantum engineering, is an important subject suporting the current and future advanced information society.In this class, we learn the fundamental characteristics of optics and electronics, priciples and function of lasers, ultrashort pulses, nano-materials, and devices, theory and technology of optical measurement method and novel functional devices.

●Prerequisite Subjects

Electromagnetic, Quantum mechanism, Optoelectronics, Solid-state electronics, Semiconductor engineering, Electron devices

●Course Topics

Topics will be selected from fields listed below. The detail will be informed in the first lecture.1. Fundamental theory of emission of electromagnetic wave (classical and quantum theory)2. Fundamentals of laser3. Fundamentals and application of ultra-fast pulse laser4. Fundamentals and application of optical measurements5. Electron transport in solid state materials6. Nano-structure materials and their functionalities7. Fundamentals of electron devices8. Fundamentals and application of nano-material devices

●Textbook

Selected materials for each lecture will be distributed.

●Additional Reading

A. Yariv, “Photonics, 6th Ed.”S. M. Sze, “Physics of Semiconductor Devices, 3rd Ed.”

●Grade Assessment

The score will be evaluated by reports and/or exams.

●Notes

There is no requirement for registration.Classes will be in-person or online over Zoom. The detailed schedule will be notified on NUCT.

●Contacting Faculty

Questions are welcome in/after lectures, or in the lecture's office.

Advanced Lectures on Integrated Quantum Devices (2.0credits) (量子集積デバイス工学特論　)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor

●Course Purpose
To understand the fundamentals of superconductive integrated circuits using Josephson devices and superconducting nanowire devices that are based on quantum effects. Students learn the fundamentals of superconductivity, Josephson junctions, and principle and characteristics of Josephson devices based on the behavior of magnetic flux quanta and superconducting nanowire devices.

●Prerequisite Subjects
Quantum Physics, Solid State Physics, Electronic Device Engineering, Electronic Circuits

●Course Topics
1. Physics of Superconductivity
2. Flux Quantization
3. Josephson Junction
4. Superconducting Quantum Interfering Device (SQUID)
5. Single Flux Quantum (SFQ) Circuits
6. Superconducting Quantum Computers
7. Superconducting Nanowire Devices

Review of contents in previous classes is required before each of the classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Reports (100%). Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
The lectures are held online (NUCT). Please refer to the NUCT website for details.

●Contacting Faculty
Use message function on NUCT to ask questions.

Masamitsu Tanaka: masami_t-at-nagoya-u.jp
Replace "-at-" with an "at sign".

The office hour is set from 9 am to noon every Monday. You are requested to inform us beforehand.

Advanced Lectures on Optical Quantum Engineering (2.0credits) (光量子工学特論　)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Electronics
Starts 1	Autumn Semester ,every other year
Lecturer	Kodo KAWASE Professor

●Course Purpose
On the basis of nonlinear optics, a lecture of advanced contents on basic theory, techniques and applications of laser wavelength conversion is made. Further, lectures on terahertz wave engineering are made. The goal is to sufficiently acquire the required performance for experiments and discussion on terahertz waves.

●Prerequisite Subjects
Electro-Magnetic Theory:Optics :Spectroscopy

●Course Topics
1.Nonlinear Optics: 2.Parametric Process:3.Difference Frequency Generatoin:4.Terahertz Optics:5.Terahertz Applications

●Textbook
The text is introduced in the class.

●Additional Reading
The references are introduced in the class.

●Grade Assessment
Report.
A score of 60 or higher on a 100-point scale is considered a passing grade.

●Notes
No course requirements.

Lectures will be offered on-demand at NUCT (subject to the status of Corona)

Questions from students to faculty will always be accepted via e-mail.

Opportunities for students to exchange opinions will be set up as needed, while monitoring the status of the corona and questions.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Advanced Lecture on Power Devices (2.0credits) (パワーデバイス工学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Jun SUDA Professor

●Course Purpose

Fundamental properties of semiconductors power devices are studied. A guideline of device designs is mastered in this lecture.
Aims:
-Understand of basic concepts and physics of power devices
-Design skills of fundamental power devices

●Prerequisite Subjects

Electromagnetics, Quantum mechanics, Quantum field theory of solids, Solid state electronics, Semiconductor electronics

●Course Topics

difference between power semiconductor devies and normal devices
Fundamentals of various types of power devices
Breakdown phenomena
Blocking voltage vs on resistance
Edge termination
Power MOSFET, characteristics and basic design guidlines
Power pin diodes, characteristics and basic design guidlines
Reports and mini tests will be subjected.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices (purchase is not necessary)

●Additional Reading

S. M. Sze and K. K. Ng, Physics of Semiconductor Devices Third Edition

●Grade Assessment

Attendance, Reports and mini quiz during class. Understanding of basic concepts and physics of power devices and fundamental design of power devices are required.

●Notes

Fundamentals of semiconductor devices (solid state electronics, semiconductor engineering, device engineering) are required.
Both face-to-face and on-line lectures will be used. NUCT will be used for distribution of materials as well as submission of assignments (homework).

●Contacting Faculty

Questions are welcome after classes. You can ask questions by e-mail (suda@nuee.nagoya-u.ac.jp).

ected Topics in Electrical/Electronic/and Information Engineering (2.0credits) (電気／電子／情報・通信工学特別講

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Part-time Faculty	Part-time Faculty	Part-time Faculty

●Course Purpose

Lectures by instructors who are active in various fields on the latest research and development trends in electrical engineering, electronic engineering, and information and communication engineering, are aimed at cultivating creativity, comprehensive power, and oversight.The objective of this course is to gain a deep understanding of the attractiveness and trends of research and development in this field, and to utilize it in future courses and research.

●Prerequisite Subjects

No specific requirements.

●Course Topics

Each time, lecturers who are active in related field will introduce the latest research and development contents.Before each lecture, check the web page about the company to which the lecturers belongs. After the lecture, a report will be imposed every time, so submit the contents that you understood.

●Textbook

Textbooks are not specified, but some materials will be distributed as needed.

●Additional Reading

Some books will be introduced in the lecture.

●Grade Assessment

Evaluation will be based on the submitted report.Pass if the goal (60%) is achieved.

●Notes

No specific requirements.

●Contacting Faculty

Each lecturer will answer your questions during the break time after the lecture.

Advanced Experiments and Exercises in Electronic Engineering (2.0credits) (電子工学特別実験及び演習)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Electronics
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose

Perform experiments and exercises on the latest issues in the field. The aim is to acquire skills related to these issues through experiments and exercises, deepen understanding through exercises, and acquire basic and applied skills to carry out research in this field.Through this experiment and practice, the goal is to be able to learn and utilize the related technologies required for conducting one's own research.

●Prerequisite Subjects

Although there is nothing in particular, general subjects of this department are the background.

●Course Topics

In each belonging laboratory, for a given research theme, conduct experiments and exercises.At that time, if necessary, a literature search and its consideration are expected. In addition, perform some computer simulations and experiments for evaluate the contents and the your ideas.Read textbooks and documents in related fields to facilitate experiments and exercises on your own. In addition, discussions on the contents research will be conducted as appropriate. Therefore, the contents should be organized and compiled according to the progress of the research.

●Textbook

Specified when necessary.

●Additional Reading

Specified when necessary.

●Grade Assessment

Evaluate the degree of achievement for achievement goals based on daily experiments and exercises, the report and the presentations. Pass if the goal is achieved.

●Notes

●Contacting Faculty

Staffs in your lab will answer your questions appropriately.

Innovation Practice Course (4.0credits) (イノベーション体験プロジェクト)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Under the instruction of the company engineer (DP, Directing Professor), I carry out the project for the problem solution by the team of several people consisting of different specialisms. In this way, it is intended to let you sense ability for problem discovery, the importance of the general intellectual power of compound eyes on the basis of real world bodily.
I know a point of view, the plan as the company and perform a discussion, exchange of opinions between the different specialty and aim for the breeding of the viewpoint general, to see engineering by examining it as the problem solution person concerned from different angles.

●Prerequisite Subjects

It is strongly recommended to take the industry-university joint educational courses such as Focus on Venture Business and ,etc.

●Course Topics

I organize different specialty, the team (several/team) consisting of the students of the department several sets, and DP is the instruction in each each team. Based on the project theme that DP determined, I set the problem that a student carries out concretely. For 75 hours (principle one day a week), I accomplish the project for the problem solution.
Prior lecture to affect a project theme by the DP
Setting (opinion, information exchange, allied investigation, examination, discussion) of the concrete problem by the student
Enforcement of the problem solution project
Summary, report of the result

I assume this a main component.
In addition, I may be given an investigation and the consideration in conjunction with the theme as a problem from DP. Report it in a date (the next time lectures) when it was appointed, and announce it; and a thing corresponding to the exchange of opinions in the team.

●Textbook

Papers, books and/or documents that the lecturer (DP) will introduce.

●Additional Reading

Papers, books and/or documents that the lecturer (DP) will introduce.

●Grade Assessment

I evaluate it through accomplishment, the discussion of the project, result announcement. If a consideration power, the adjustability for the problem solution, the expansion of the field of vision are accepted, it is said that I pass.

●Notes

No specific requirements.

●Contacting Faculty

The lecturer (DP) and the project staff of the university accept questions at any time.

Research Internship１ U2 (2.0credits) (研究インターンシップ１ U2)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Through the training to affect technology development, the study of the company in the company is advanced, and experience the challenge to a practical problem. In this way, it is aimed for upbringing of human resources tying engineering to creation of the social value.
It is wider in a technique and a study, and a consciousness, ability to catch in a general viewpoint (utility, economy) and communication power is bred and aims for what is reflected by a study, the study at the university.

●Prerequisite Subjects

It is strongly recommended to take the industry-university joint educational courses such as Focus on Venture Business and ,etc.

●Course Topics

In the company accepting an intern, I make the training (study) about the study theme that a company shows.
Orientation to affect the overall company concerned and the training medium
Enforcement (including cooperation, the adjustment with the company staff) of the training theme
Summary, report of the training result
I assume a report (presentation) of the training result to the university a main component.
As the associated document, documents investigation may not support during the working hours that a company sets, I do the attendance of the lecture about "the handling, a point to keep in mind by basic knowledge and the study internship of intellectual property rights" to need what I study in the training overtime by oneself, and to perform on the university side prior to the company training again with

requisiteness.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

I am given in the following on 20th in the total days that engaged in the training in the company.
I do that I announce the result to the university in a result briefing session to perform after the training if essential.
I evaluate it based on result announcement contents and an evaluation book of the training staff making. I recognize an experience-based effect in the training by oneself, and will to plan reflection to a study, the study at the university does it with a pass if admitted.

●Notes

No specific requirements.

●Contacting Faculty

The training staff of the company and the study internship staff of the university accept questions at any time.

Research Internship１ U3 (3.0credits) (研究インターンシップ１ U3)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Through the training to affect technology development, the study of the company in the company is advanced, and experience the challenge to a practical problem. In this way, it is aimed for upbringing of human resources tying engineering to creation of the social value.
It is wider in a technique and a study, and a consciousness, ability to catch in a general viewpoint (utility, economy) and communication power is bred and aims for what is reflected by a study, the study at the university.

●Prerequisite Subjects

It is strongly recommended to take the industry-university joint educational courses such as Focus on Venture Business and ,etc.

●Course Topics

In the company accepting an intern, I make the training (study) about the study theme that a company shows.
Orientation to affect the overall company concerned and the training medium
Enforcement (including cooperation, the adjustment with the company staff) of the training theme
Summary, report of the training result
I assume a report (presentation) of the training result to the university a main component.
As the associated document, documents investigation may not support during the working hours that a company sets, I do the attendance of the lecture about "the handling, a point to keep in mind by basic knowledge and the study internship of intellectual property rights" to need what I study in the training overtime by oneself, and to perform on the university side prior to the company training again with

requisiteness.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 21 and 40 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The training staff of the company and the study internship staff of the university accept questions at any time.

Research Internship１ U4 (4.0credits) (研究インターンシップ１ U4)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Through the training to affect technology development, the study of the company in the company is advanced, and experience the challenge to a practical problem. In this way, it is aimed for upbringing of human resources tying engineering to creation of the social value.
It is wider in a technique and a study, and a consciousness, ability to catch in a general viewpoint (utility, economy) and communication power is bred and aims for what is reflected by a study, the study at the university.

●Prerequisite Subjects

It is strongly recommended to take the industry-university joint educational courses such as Focus on Venture Business and ,etc.

●Course Topics

In the company accepting an intern, I make the training (study) about the study theme that a company shows.
Orientation to affect the overall company concerned and the training medium
Enforcement (including cooperation, the adjustment with the company staff) of the training theme
Summary, report of the training result
I assume a report (presentation) of the training result to the university a main component.
As the associated document, documents investigation may not support during the working hours that a company sets, I do the attendance of the lecture about "the handling, a point to keep in mind by basic knowledge and the study internship of intellectual property rights" to need what I study in the training overtime by oneself, and to perform on the university side prior to the company training again with

requisiteness.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 41 and 60 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The training staff of the company and the study internship staff of the university accept questions at any time.

Research Internship１ U6 (6.0credits) (研究インターンシップ１ U6)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Through the training to affect technology development, the study of the company in the company is advanced, and experience the challenge to a practical problem. In this way, it is aimed for upbringing of human resources tying engineering to creation of the social value.
It is wider in a technique and a study, and a consciousness, ability to catch in a general viewpoint (utility, economy) and communication power is bred and aims for what is reflected by a study, the study at the university.

●Prerequisite Subjects

It is strongly recommended to take the industry-university joint educational courses such as Focus on Venture Business and ,etc.

●Course Topics

In the company accepting an intern, I make the training (study) about the study theme that a company shows.
Orientation to affect the overall company concerned and the training medium
Enforcement (including cooperation, the adjustment with the company staff) of the training theme
Summary, report of the training result
I assume a report (presentation) of the training result to the university a main component.
As the associated document, documents investigation may not support during the working hours that a company sets, I do the attendance of the lecture about "the handling, a point to keep in mind by basic knowledge and the study internship of intellectual property rights" to need what I study in the training overtime by oneself, and to perform on the university side prior to the company training again with

requisiteness.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 61 and 80 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The training staff of the company and the study internship staff of the university accept questions at any time.

Research Internship１ U8 (8.0credits) (研究インターンシップ１ U8)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Through the training to affect technology development, the study of the company in the company is advanced, and experience the challenge to a practical problem. In this way, it is aimed for upbringing of human resources tying engineering to creation of the social value.
It is wider in a technique and a study, and a consciousness, ability to catch in a general viewpoint (utility, economy) and communication power is bred and aims for what is reflected by a study, the study at the university.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

In the company accepting an intern, I make the training (study) about the study theme that a company shows.
Orientation to affect the overall company concerned and the training medium
Enforcement (including cooperation, the adjustment with the company staff) of the training theme
Summary, report of the training result
I assume a report (presentation) of the training result to the university a main component.
As the associated document, documents investigation may not support during the working hours that a company sets, I do the attendance of the lecture about "the handling, a point to keep in mind by basic knowledge and the study internship of intellectual property rights" to need what I study in the training overtime by oneself, and to perform on the university side prior to the company training again with

requisiteness.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days more than or equal to 81 daysin the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The training staff of the company and the study internship staff of the university accept questions at any time.

Advanced Lectures on Frontier Technologies and Sciences (1.0credits) (最先端理工学特論)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Manato DEKI Associate Professor		

●Course Purpose

To research in advanced engineering, it is necessary to learn the latest research trends through practice. Through symposium-style academic discussions, students will be able to study cutting-edge science and engineering research and discuss the latest trends in the subject areas.

●Prerequisite Subjects

Knowledge of the subject areas.

●Course Topics

Participated in special lectures set every year from the fields of biochemistry, analysis, semiconductors, polymers, and startups related to cutting-edge science and engineering, and participated in a symposium where research presentations on cutting-edge engineering were presented. By participating, students will study cutting-edge science and engineering research and discuss the latest trends in the subject areas. After taking the course, study and study the relevant field in detail.

●Textbook

Distribute as appropriate.

●Additional Reading

Distribute as appropriate.

●Grade Assessment

Participate in the VBL Symposium held around November, attend supplementary lectures, and submit a report.

Report. A score of 60 or more out of 100 will be passed. Pass if you have a broad understanding of the subject area. Highly appreciate the point of contact with your own research, new business and research proposals.

●Notes

There are no special requirements. Students who are interested in startups are preferred.

Important Notes
Students who wish to take the course will be able to register for the "Advanced Lectures on Frontier Technologies and Sciences" at NUCT after they have registered for the course.
Note that all contacts from NUCT are available for the lectures.
Students who missed the registration period should register the page of "Advanced Lectures on Frontier Technologies and Sciences" on the NUCT website.

●Contacting Faculty

Arranging the schedules by e-mail and etc.

Advanced Experiments for Frontier Technologies and Sciences (1.0credits) (最先端理工学実験)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Experiment		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Manato DEKI Associate Professor		

●Course Purpose

In order to advance research in engineering, it is necessary to learn about the latest research trends through practice. The purpose of this experiment is to conduct research experiments using the most advanced experimental equipment and simulators. Through this experiment, students will be able to understand the principles and learn how to use the equipment owned by VBL (maskless exposure system, dry etching system, atomic layer deposition system, metal deposition system) and device simulators. In addition, the goal is to comprehensively acquire knowledge and skills related to advanced experiments and presentation techniques for the assigned research by reporting the results.

●Prerequisite Subjects

it is advisable to acquire basic knowledge on the subject research.

●Course Topics

The experiment will be conducted at the Venture Business Laboratory building.
The report meeting will be held online or at the above building.
If you choose an assigned experiment with a predetermined task, the required curriculum includes the use of either a maskless exposure system, ICP etching system, or atomic layer deposition system. Students will use these devices to perform their assignments and learn the principles and practical use of these devices. In the case of experiments proposed by the students (original experiments), the students will propose their own device simulation experiments and research using the above equipment, and work with the instructor to produce experimental results. In the end, students will organize and discuss the results, present their findings, and learn how to practically use state-of-the-art equipment and simulation skills.

Students should learn the basic knowledge of the research they are assigned.

●Textbook
Distribute as needed. Please check the required documents by yourself.

●Additional Reading
Distribute as needed. Please check the required documents by yourself.

●Grade Assessment
Exercise (50%) and presentation of research results (50%) will be evaluated. Understanding the measurement principle and usage is used as a criterion for acceptance, but the research achievements and new approaches to research are highly evaluated. A score of 60 or more out of 100 is a passing score.

●Notes
Course Registration
No course requirements.
The number of registered students should be about 10.

Important Notes
Students who wish to take the course will be able to register for the "Advanced Experiments for Frontier Technologies and Sciences" at NUCT after they have registered for the course.
Note that all contacts from NUCT are available for the lectures.
Students who missed the registration period should register the page of "Advanced Experiments for Frontier Technologies and Sciences" on the NUCT website.

●Contacting Faculty
We will respond via NUCT's message system and e-mail.

Introduction to Academic Communication (1.0credits) (コミュニケーション学)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	Graduate Chemistry
	Automotive Engineering	Automotive Engineering	Civil and Environmental Engineering Graduate
	Physical Engineering Graduate		
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester		
Lecturer	ReikoFURUYA Associate Professor		

●Course Purpose

Students will learn presentation skills for academic purposes, which may include giving academic presentations.
Japanese students are expected to present in English and international students in Japanese in the seventh or eighth class meeting.
By taking this class, students are expected to be able to do the following:
-Give a solid presentation with confidence and without hesitance
-Grasp the characteristics of successful presentations
-Use techniques learned in class in their own presentation

●Prerequisite Subjects

English language classes for Japanese students
Japanese language classes for international students

●Course Topics

(1) Ways to convey messages in presentation
(2) The language of a presentation
(3) Tips for making effective slides
(4) Observation and analysis of video-taped presentation by a past student
(5) Paper vs presentation
(6) Preparation for individual presentation

(7) Individual presentations I
(8) Individual presentations

This course requires students to work outside of the classes for individual presentation.

●Textbook

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

●Additional Reading

1The Japan Times
2:

●Grade Assessment

Individual presentation: 50%
Active class participation: 50%

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

Grading will be decided based on the ability to give an effective academic presentation.

●Notes

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

●Contacting Faculty

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

Latest Advanced Technology and Tasks in Automobile Engineering (3.0credits) (先端自動車工学特論)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	Automotive Engineering
	Automotive Engineering		
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Lecturer	Yasuhiko SAKAI Designated Professor		

●Course Purpose

This course is intended to study the latest advanced technology of automobile engineering from top researchers of universities and industries. The topics of lectures are related to almost all fields of automotive industries, such as hibrid cars, electric cars, automated driving and crash safety. It is asle intended to develop the English hearing/speaking ability. The attainment targets are as follows:

1. Understand the latest technology of automotive engineering.
2. Underatand company's automotive production system.
3. Improve English ability in the field of socience and engineering.
4. Strengthen communication skills and presentation skills in English by studying with international students.

●Prerequisite Subjects

lectures related to fundamental physics, mechanical, electrical and information engineering.

●Course Topics

A. Lectures

1. The Car Industry, Market Trend, Circumstance and Its Future.
2. Overview of Automotive Development Process.
3. Observation and Evaluation of Drivers' Behavior Perspective.
4. Car Materials and Processing.
5. Movements and Control of a Car.
6. Safety Engineering for the Prevention of Accidents.
7. Crash Safety.
8. Automobile Embedded Computing System.
9. Wireless Technologies in ITS.

10.Applications of CAE to Vehicle Development.
11.Energy Saving Technology for Automobiles.
12.Automated Driving.
13.Traffic Flow Characteristics.
14.Cars and Roads in Urban Transportation Context.
15.Automobile in Aging Society.
B. Factory Visits
1.Toyota Motors Corp., 2. Mitsubishi Motors Corp., 3. Toyota Boshoku Corp., 4.Suzuki Museum,
5.Toyota Commemorative Museum, 6. Traffic Safety and Environmental Lab.
C. Group Research Project
Several students form one group and each group selects one topic. They investigate and discuss about this topic and make presentations.
After each lecture is finished, read the handout and write a repor about each lecture with your comments.

●Textbook
Handout delivered in each lecture

●Additional Reading
Introduced in the lectures

●Grade Assessment
Evaluation will be based on (a) Discussions in the lectures 20%, (b) report for each lecture 20%, (c) group presentation 30%. and (d) report on research subject 30%. It is necessary to attend factory visits.In each item, the undastanding of the concepts is especially evaluated.
Summing up the all scores from (a) to (d) and the students with evaluation A, B, or C can pass this subject.

●Notes
1. There are limits of enrollment capacity.Full course student limit is about 10.Auditor limit for each lecture is about 10.
2. English ability is checked before accepted as a student.

●Contacting Faculty
The lecturer will answer questions about the content of the lesson, and the instructor in charge will answer other questions.

ysakai@mech.nagoya-u.ac.jp

Advanced Lectures on Scientific English (1.0credits) (科学技術英語特論)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	Automotive Engineering
	Automotive Engineering	Civil and Environmental Engineering Graduate	Physical Engineering Graduate
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
Lecturer	Part-time Faculty		

●Course Purpose

This course aims to help students write a well-structured research paper in English and expand their vocabulary and expression list relating to academic writing.
By the end of the course, students will be able to:
- explain the basic structure of a research paper
- explain the characteristics of each component
- use vocabulary adequately
- use expressions adequately
- choose the most relevant citation style
- write a mini research paper

●Prerequisite Subjects

"English (basic)" and "English (intermediate)" (or equivalent)

●Course Topics

English is the language of instruction in this course.
After reviewing the basics of academic writing, students will understand the fundamental structure of the research paper. Students will improve their vocabulary and expressions to write a well-structured paper as they analyze sample research papers. Additionally, students will understand the citation styles by exploring the descriptions in the instructions for authors in the academic journals of their choice. In the classroom activities, students will exchange ideas, give an oral presentation, practice their writing skills, and give feedback to each other.
1. Basics of academic writing in English 1: Paragraph writing
2. Basics of academic writing in English 2: Making an outline
3. Fundamental structure of research paper: Structural analysis

4. Oral presentation: Journals, instructions for authors, and citation styles
5. Writing 1: Title and abstract
6. Writing 2: Research method
7. Writing 3: Results and discussions
8. Writing 4: Introduction and conclusion

●Textbook

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

●Additional Reading

Glasman-Deal, H. (2021). Science Research Writing: For Non-Native Speakers of English. Imperial College Press.
Paltridge, B. (2019). Thesis and Dissertation Writing in a Second Language. Routledge.
Swales, J.M. & Feak, C.B. (2012). Academic Writing for Graduate Students. The University of Michigan Press.
Wallwork, A. (2013). English for Academic Research: Grammar, Usage and Style. Springer.
Wallwork, A. (2016). English for Writing Research Papers. Springer.

●Grade Assessment

The following evaluation items constitute the maximum score of 100:
Class Participation (25%)
Homework Assignments (35%)
Oral Presentation (10%)
Mini-Research Paper (30%)
A student must evidence a total score of 60 or higher on the final grading scale to pass this course.

●Notes

-No prerequisite.
-There is a chance to redesign the class format, schedule, and grading system depending on the COVID-19 situation.
-There will be approximately six face-to-face classes and two online (synchronous or on-demand) classes.
-Online, synchronous classes will be given on Zoom, whereas the on-demand classes will be given on NUCT.
-The first class will be met face-to-face in the regular classroom on campus, and the class format in the remaining semester will be announced via "Messages" on NUCT.
-Students are expected to express/exchange their ideas and opinions on NUCT and/or on another interactive presentation system to be announced in class.
-An active dialog is highly valued in this class, so your enthusiastic participation is vital to the success of your learning.
-Basically, homework is assigned on a weekly basis.

●Contacting Faculty

Use the "Messages" tool on NUCT to contact the instructor. Only for a limited period of time (until the secondary course registration period ends), you can reach the instructor by email.
smrym(at)lets.chukyo-u.ac.jp
Please replace (at) with @, the at symbol.

Focus on Venture Business I (2.0credits) (ベンチャービジネス特論 I)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Lecturer	Part-time Faculty	Manato DEKI Assistant Professor	

●Course Purpose

People often point out that the layer of startup companies should assume the leading edge is thin. Part of the cause depends on the system, but in many cases, it is due to the difference in perceptions of the entrepreneurship between East and Western researchers. In this course, you study the basic knowledge and goals required as engineers and researchers when commercializing/starting a “university research.” We will show examples of technology development and commercialization based on research results of universities, entrepreneurship in companies and venture startups, and consider venture business utilizing research. Through this lecture, entrepreneurs' mindsets will be formed as well as minimum knowledge of patents.

●Prerequisite Subjects

●Course Topics

Through the trend and environment of venture business in our country, we will consider what is necessary to actually and personally launch a venture business.

1. commercialization and entrepreneurship Why venture business ---Risks and advantages
2. knowledge and preparation for commercialization and entrepreneurship ---points to keep in mind as an engineer/researcher
3. from university research to commercialization/start-up --- how to proceed with R&D in a company
4. promotion of commercialization ---negotiations and market research for commercialization ----.
5. innovation theory
6. case studies in the mobility field
7. biotechnology and medical fields
8. case studies in the field of electronic devices
9. technology management (patents, etc.)
10. summary

A report will be assigned, so students should identify and discuss their own interests and issues while attending the lecture.

●Textbook
Distribute materials as appropriate.

●Additional Reading

●Grade Assessment
Evaluate based on self-made problem report Understanding the problems and solutions for startups that respond to the problems in the lecture is a criterion for success. The contents of the report are comprehensively evaluated, and a score of 60 or more is considered acceptable. New business proposals will be appreciated.

●Notes
Do not have any special requirements. We hope students who are interested in startups.

Important Notes
Students who wish to take the course will be able to register for the "Focus on Venture Business I" at NUCT after they have registered for the course.
Note that all contacts from NUCT are available for the lectures.
Students who missed the registration period should register the page of "Focus on Venture Business I" on the NUCT website.
In addition, all lectures will be conducted remotely using online conferencing tools.

●Contacting Faculty
the break after the lecture.

Focus on Venture Business II (2.0credits) (ベンチャービジネス特論II)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	
Lecturer	Manato DEKI Assistant Professor		

●Course Purpose

By referring to the examples of commercialization, in-company entrepreneurship and venture entrepreneurship given in the special lecture on venture business I, you study the specialized knowledge necessary for entrepreneurship and start-up from a public accountant, SME consultant, etc. Talks are held with specialists in Japan to acquire the knowledge needed for venture business management.

Lectures will be held in a discussion style.
As a part of this, the maximum number of registered students will be set at 60.
If the number of registered students exceeds 60, students will be selected by lottery. The number of students will be determined by lottery.
Students who wish to take this course should first register at NUCT.
Information on the lottery will be sent to applicants via the NUCT lecture website.

However, students enrolled in the "DII Collaborative Graduate Program for Accelerating Innovation in Future Electronics " may take the course without a lottery.

●Prerequisite Subjects

●Course Topics

1. the japanese economy and venture business
2. current status of venture business
Venture and management strategy
Venture and marketing strategy
Venture Business and Corporate Accounting
Venture and financial strategy
7. case studies (emphasis on management strategy)

8. case study (focus on marketing strategy)
9. case study (focus on financial strategy)
10. case study (focus on capital policy: IPO company)
11. business plan business idea and competitive advantage
Business Plan Profitability Plan
13. business plan financial plan
Business Plan Business Plan Operation and Summary
15. summary

It is necessary for future businesses to research and understand various literature and online information regarding the lecture content.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

Lectures will be held in a discussion style.
As a part of this, the maximum number of registered students will be set at 60.
If the number of registered students exceeds 60, students will be selected by lottery. The number of students will be determined by lottery.
Students who wish to take this course should first register at NUCT.
Information on the lottery will be sent to applicants via the NUCT lecture website.

However, students enrolled in the "DII Collaborative Graduate Program for Accelerating Innovation in Future Electronics " may take the course without a lottery.

●Contacting Faculty

Safety and Reliability in Engineering (2.0credits) (安全・信頼性工学)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
	Department of Energy Engineering	Department of Applied Energy	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Lecturer	"YAMAMOTO Akio" Professor	Masahiro Arai Professor	Takaya INAMORI Associate Professor
	Part-time Faculty		

●Course Purpose

Safety and reliability are one of the most important issues in all engineering fields. In this lecture, the aerospace engineering field and nuclear engineering field, which are the symbolic entities of integrated engineering, will be linked, and the lecturers who have many years of experience in the space, aviation, and nuclear industries will understand students from other fields. The aim is to learn the basics and practice of safety and reliability engineering, while giving consideration to it. In addition, by attending this lecture with assignments and exercises, you can acquire the concept of ensuring safety and reliability in all industrial fields, and acquire useful skills regardless of progress in any field in the future.

By learning this lecture, the goal is to acquire the following skills.
(1) Understand and apply basic concepts of safety and reliability.
(2) Understand and apply safety concepts and application examples in the aerospace field.
(3) Understand and apply safety concepts and application examples in the field of nuclear power.

●Prerequisite Subjects

There are no special subjects required to take this course.

●Course Topics

(1) Basics of Safety and reliability engineering including FMEA and FTA
(2) Safety and reliability in aerospace engineering
(3) Safety fundamentals and safety design in nuclear engineering
(4) Hazard assessments in nuclear engineering
(5) Accidents in nuclear facilities and lessons learned

Gather information on relevant areas before each lecture. After the lecture, review the content and work on the examples again. To submit a report assignment in the first and second half, submit it.

●Textbook

Materials will be distributed in each lecture. Introduce textbooks as necessary.

●Additional Reading

References in Japanese, regarding to reliability analysis and FMEA, FTA.

●Grade Assessment

Evaluate the degree of achievement for the achievement target in the report. Understand the basic concepts of safety and reliability in the aerospace and nuclear fields, and pass if applicable.

●Notes

According to Guidelines for Activities at Nagoya University During the Novel Coronavirus (COVID-19) Pandemic, face-to-face lectures may not be held.
In this case, the web lectures using "Zoom" instead of the face-to-face classes will be used.
The lecture's URL will be notified on NUCT (https://ct.nagoya-u.ac.jp/portal).

No registration requirements.

●Contacting Faculty

As a general rule, it corresponds to the break time during class hours and after the class ends. In other cases, it is possible to respond at any time.

Contact: a-yamamoto[at]energy.(domain name of Nagoya University)

Ethics and Security in Engineering (2.0credits) (工学のセキュリティと倫理)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
	Department of Energy Engineering	Department of Applied Energy	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Hideo KISHIDA Professor		

●Course Purpose

The aim of the lecture is to understand ethics, intellectual property rights, information security required at the start of master thesis research. After taking this course, the students are expected to have abilities on:

1. Understanding of ethics for engineers
2. Understanding of ethics for researchers
3. Understanding of intellectual property rights
4. Understanding of information security

●Prerequisite Subjects

None because this is one of the common basic subject for future activity as a researcher or an engineer.

●Course Topics

1)Introduction
2)Ethics for engineers
3)Ethics for researchers
4)Intellectual property rights
5)Information security
6)Summary

Submission of the report after each class is mandatory.

●Textbook

Instead of using textbook, original lecture notes will be provided at each class.

●Additional Reading

Original lecture notes will be provided at each class.

●Grade Assessment

Credits will be awarded to those students who score 'Pass' based on the reports and /or subjects given by each lecture.

●Notes

None because this is one of the common basic subject for future activity as a researcher or an engineer.

This lecture will be given in an on-demand format using NUCT. In each lecture (1st lecture: Apr. 11), the course materials should be downloaded from the NUCT. If you cannot access the NUCT site of this lecture, please contact the instructor (Kishida, kishida@nagoya-u.jp) by e-mail with your name and student number. Even in this case, the registration is required.

●Contacting Faculty

After each class student can ask questions through the message function of NUCT.
Otherwise, contact to:
Prof. Kishida kishida@nagoya-u.jp

The exchange of opinions among the students can be made through the message function of NUCT.

Internship A (1.0credits) (学外実習A)

Course Type	Comprehensive engineering courses
Division at course	Master's Course
Class Format	Practice
Course Name	Electronics
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose

Through short-term internships and practical training at companies, etc., students will learn how to proceed with work in society, and at the same time, use them for future courses and research, and aim to foster their comprehensive abilities.The objective of this course is to be able to:1. You can learn the work contents and required abilities of engineers in actual research laboratories and factory floors.2. Understand how graduate courses are useful.

●Prerequisite Subjects

All studies that have been offered in this department

●Course Topics

Training according to the instructor of each company.After the internship/training destination is decided, conduct a sufficient survey on the internship/training destination company for your internship/training. During the internship/training period, preparation for the internship/training and summarization after the internship/training are done according to the instructor of the internship/training destination.

●Textbook

Specified when necessary.

●Additional Reading

Specified when necessary.

●Grade Assessment

Evaluation is based on the report submitted from the internship/training site.Pass if the goal is achieved

●Notes

●Contacting Faculty

An instructor will respond appropriately at the internship/training site.

Internship B (1.0credits) (学外実習B)

Course Type	Comprehensive engineering courses
Division at course	Master's Course
Class Format	Practice
Course Name	Electronics
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose

Through short-term internships and practical training at companies, etc., students will learn how to proceed with work in society, and at the same time, use them for future courses and research, and aim to foster their comprehensive abilities.The objective of this course is to be able to:1. You can learn the work contents and required abilities of engineers in actual research laboratories and factory floors.2. Understand how graduate courses are useful.

●Prerequisite Subjects

All studies that have been offered in this department

●Course Topics

Training according to the instructor of each company.After the internship/training destination is decided, conduct a sufficient survey on the internship/training destination company for your internship/training. During the internship/training period, preparation for the internship/training and summarization after the internship/training are done according to the instructor of the internship/training destination.

●Textbook

Specified when necessary.

●Additional Reading

Specified when necessary.

●Grade Assessment

Evaluation is based on the report submitted from the internship/training site.Pass if the goal is achieved

●Notes

●Contacting Faculty

An instructor will respond appropriately at the internship/training site.

Overview of space exploration and research (2.0credits) (宇宙研究開発概論)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Process Engineering
	Chemical Systems Engineering	Electrical Engineering	Electronics
	Information and Communication Engineering	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering
	Aerospace Engineering	Department of Energy Engineering	Department of Applied Energy
	Civil and Environmental Engineering		
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Lecturer	Leading Graduate		

●Course Purpose

This lecture course helps students to acquire a wide-ranging, panoramic knowledge of space research and development given by variety of lecturers from different academic fields.

●Prerequisite Subjects

Basic mathematics, Basic physics

●Course Topics

1. Space Exploration Projects
1.1 Overview of Space Exploration and Research
1.2 Space Projects
1.3 International Satellite and Spacecraft (HTV) Development
1.4 Project Management/Systems Engineering
1.5 Intelectual Properties in Business

2. Space Explorations on Observations
2.1 Space Propulsion Engineering
2.2 Materials Development for Space Applications
2.3 Space Observation Technologies
2.4 Introduction to Radiation Detectors and Electronics

3. Space-related Science
3.1 Foundations of Astrophysics
3.2 Earth and Planetary Science
3.3 Space Environment Science
3.4 Simulation Experiments

Report subject will be given at every lecture. The report should be submitted by the given deadline.

●Textbook

We do not specify the textbook. Lecture notes will be given as necessary.

●Additional Reading

Recommended readings will be give during lectures as necessary.

●Grade Assessment

Report must be submitted for each lecture. Proper understanding of each lecture's contents is evaluated. Passing average point is 60 out of 100.

●Notes

Students in "Leadership program for Space exploration and Research" are required to take this course before the qualifying examination.This course is open to any graduate students in Nagoya University.

●Contacting Faculty

Inquire contact method from the lecturer after the lecture

Advanced Lectures on Transdisciplinary Mobility Innovation I (2.0credits) (超学際移動イノベーション学特論 I)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	
Lecturer	Toshiyuki YAMAMOTO Professor	Faculty of TMI Program	

●Course Purpose

Through the lectures on various super-interdisciplinary mobility innovations for life-style transformation, learn the impacts and changes of life-style caused by the mobility innovations.
The ability to understand the mobility innovations from various perspectives, and to implement them based on the understandings from various disciplines are required to realize the life-style transformations by mobility innovations. The purposes of this class is to obtain the ability as below.
- understand the mobility innovations from various disciplines
- analyze the effects of and forecast the future of mobility innovations

●Prerequisite Subjects

Not required

●Course Topics

Through the lectures on super-interdisciplinary mobility innovations and life-style transformation, various environments and implementations of cutting-edge mobility innovations are discussed.

1. History of technologies on mobility
2. Service design of mobility
3. Product design theory
4. Mobility innovations and diversity
5. Theory on inclusive mobility

Report assignments on the contents explained in the lecture are given.

●Textbook

Materials are provided at classes.

●Additional Reading

Introduced according to the process of the lecture.

●Grade Assessment

Evaluated by reports.

●Notes

Not required.

●Contacting Faculty

Ask questions in the class. There are no fixed schedules for office hour. Make an appointment by e-mail or tel.

Yamamoto: 4636, yamamoto@civil.nagoya-u.ac.jp

Advanced Lectures on Transdisciplinary Mobility Innovation II (2.0credits) (超学際移動イノベーション学特論II)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	
Lecturer	Toshiyuki YAMAMOTO Professor	Faculty of TMI Program	

●Course Purpose

Through the practical lectures on various super-interdisciplinary mobility innovations for life-style transformation, learn more the impacts and changes of life-style caused by the mobility innovations.
The ability to understand the mobility innovations from various perspectives, and to implement them based on the understandings from various disciplines are required to realize the life-style transformations by mobility innovations. The purposes of this class is to obtain the ability as below.
- understand comprehensively the mobility innovations from various disciplines
- analyze deeper the effects of and forecast the future of mobility innovations

●Prerequisite Subjects

Advanced super-interdisciplinary mobility innovation I

●Course Topics

Through the lectures on more diverse super-interdisciplenary mobility innovations and life-style transformation, various environments and implementations of cutting-edge mobility innovations are discussed.

1. Cutting-edge mobility system
2. Ergonomics
3. Mobility and cognitive science
4. Mobility and society
5. Law and institutional design fro mobility

Report assignments on the contents explained in the lecture are given.

●Textbook

Materials are provided at classes.

●Additional Reading

Introduced according to the process of the lecture.

●Grade Assessment

Evaluated by reports.

●Notes

Not required.

●Contacting Faculty

Ask questions in the class. There are no fixed schedules for office hour. Make an appointment by e-mail or tel.

Yamamoto: 4636, yamamoto@civil.nagoya-u.ac.jp

Advanced Mobility Program Basic Course (4.0credits) (先進モビリティ学基礎)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture and Exercise		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester	1 Spring Semester	
Lecturer	Tatsuya SUZUKI Professor	Takeshi KATAKAI Designated Associate Professor	JIANG Meilan Designated Lecturer
	Eiji ABE Assistant Professor	Faculty of Advanced Mobility Program	

●Course Purpose

To train students who can be active in the mobility industry or research institute. This course is aiming to cultivate comprehensive knowledge not only on specialized technical elements but also service and social impact of the mobility. The class will be provided not only by professors but also by engineers in industry. The course is organized as follows:

1. Understand fundamentals of automobile
2. Understand the trend on electrification of automobile
3. Understand the trend on on intelligence for automobile
4. Understand dependability, safety and human factor
5. Comprehensively study the mobility service
6. Comprehensively study the legal system for mobility

●Prerequisite Subjects

Accepted basic engineering classes at Nagoya University Bachelor's degree, or equivalent knowledge.

●Course Topics

1. Fundamentals of automobile
2. Electrification of automobile
3. Intelligence for automobile
4. Dependability, safety and human factor
5. Mobility service
6. Legal system for mobility
7. Discussion and presentation

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

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

Evaluation is based on total score of reports at each class and final presentation. You need more than mark of 60 out of 100 points. Special certificate will be provided for passed students.

●Notes

No particular requirement.

●Contacting Faculty

Mail to:katakai@coi.nagoya-u.ac.jp

bility Program Practical Training Course(Electric Autonomous Vehicle) (2.0credits) (先進モビリティ学実習（EV自

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	1 Autumn Semester
	1 Autumn Semester	1 Autumn Semester	
Lecturer	Tatsuya SUZUKI Professor	Takeshi KATAKAI Designated Associate Professor	JIANG Meilan Designated Lecturer
	Eiji ABE Assistant Professor	Faculty of Advanced Mobility Program	

●Course Purpose

To train the students who can play an active role in the mobility industry or research institute. To provide break down study on the EV using commercial electric vehicles and a university formula car. After understanding the mechanism of the EV structure, to produce a mini car for automatic driving. Students themselves will build a software system that realizes a basic automatic driving such as lane tracking. This course is organized as follows:1. Learn the basics of technological development in the mobility industry2. Understand the structure and driving mechanism of electric vehicles3. Understanding autonomous driving technology through the production of a mini cars for autonomous driving4. Understand the software architecture for autonomous driving5. Understand cognition technology for lane detection / follow-up control and on-board installation6. Understand control technology for obstacle detection / avoidance and on-board installation

●Prerequisite Subjects

Accepted basic engineering classes at Nagoya University Bachelor's degree, or equivalent knowledge.

●Course Topics

After experiencing the break down study using commercial EV and an electric formula car, produce a mini car for autonomous driving and develop autonomous driving algorithm. After learning the basic movements of running, turning, and stopping, develop lane tracing algorithm to follow the white line by image recognition. A contest will be held at the end of the training. A special certificate will be issued to students who have completed the prescribed grades in this course. The content of the class is as follows.1. Electric vehicle structure and running mechanism2. Vehicle characteristic analysis and improvement methods3. Examination of software architecture for autonomous driving4. Understand and implement cognition technology for lane detection5. Understand and implement control technology for follow-up control6. Understand control technology for obstacle detection / avoidance

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

Evaluation is based on the student's effort for solving the tasks, total score of reports, and final presentation. You need more than mark of 60 out of 100 points. Special certificate will be provided for passed students.

●Notes

No particular requirement.

●Contacting Faculty

Mail to:katakai@coi.nagoya-u.ac.jp

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

• To design and conduct an original research project
• To develop experience with experimental/numerical/theoretical techniques
• To develop a working knowledge of relevant research literature
• To practice scientific writing and participate in the peer review process
• To be able to discuss the research and topic with other scientists and engineers
The objective of this project is to increase the capability to find and to solve research problems by learning the research approaches and ideas of different research fields.

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

• Students will develop (with guidance) a research project proposal at the beginning of the semester that will provide initiative, outline and experimental strategy.
• Each student will present oral reports of research progress, relevant readings, and/or challenges at scheduled lab meetings.
• Students will take primary responsibility for conducting research and do so with professional attitudes and time commitments. This is a lab course and you are expected to spend a minimum of 20 hours of productive lab work per week. It is more realistic to expect to spend an average of 25-30 hours per week working and thinking about your project.
• Students will produce a manuscript (with active feedback from the instructor and peers) that can be published in part or whole by a peer reviewed research journal. Publishable manuscripts require many drafts,

reviews, and revisions.
• Students are encouraged to present research results at appropriate scientific meetings.
• Students well be self-motivated and work independently, approaching the instructor for guidance regularly.

●Textbook
Will be designated by each supervisor.

●Additional Reading
Will be designated by each supervisor.

●Grade Assessment
The grade will be calculated according to the following criteria.
Written report following the same format as scientific paper... 50%; Presentation at the Workshop... 50%.
The acceptance standard is to understand the introduced research approaches and ideas.
Evaluation is done by the supervisor(s) at home and visiting universities.

●Notes
No conditions for taking the course.

●Contacting Faculty
Supervisor of visiting university basically takes care.

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

• To design and conduct an original research project
• To develop experience with experimental/numerical/theoretical techniques
• To develop a working knowledge of relevant research literature
• To practice scientific writing and participate in the peer review process
• To be able to discuss the research and topic with other scientists and engineers
The objective of this project is to increase the capability to find and to solve research problems by learning the research approaches and ideas of different research fields.

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

• Students will develop (with guidance) a research project proposal at the beginning of the semester that will provide initiative, outline and experimental strategy.
• Each student will present oral reports of research progress, relevant readings, and/or challenges at scheduled lab meetings.
• Students will take primary responsibility for conducting research and do so with professional attitudes and time commitments. This is a lab course and you are expected to spend a minimum of 20 hours of productive lab work per week. It is more realistic to expect to spend an average of 25-30 hours per week working and thinking about your project.
• Students will produce a manuscript (with active feedback from the instructor and peers) that can be published in part or whole by a peer reviewed research journal. Publishable manuscripts require many drafts,

reviews, and revisions.
• Students are encouraged to present research results at appropriate scientific meetings.
• Students well be self-motivated and work independently, approaching the instructor for guidance regularly.

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

The grade will be calculated according to the following criteria.
Written report following the same format as scientific paper... 50%; Presentation at the Workshop... 50%.
The acceptance standard is to understand the introduced research approaches and ideas.
Evaluation is done by the supervisor(s) at home and visiting universities.

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

• To design and conduct an original research project
• To develop experience with experimental/numerical/theoretical techniques
• To develop a working knowledge of relevant research literature
• To practice scientific writing and participate in the peer review process
• To be able to discuss the research and topic with other scientists and engineers
The objective of this project is to increase the capability to find and to solve research problems by learning the research approaches and ideas of different research fields.

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

• Students will develop (with guidance) a research project proposal at the beginning of the semester that will provide initiative, outline and experimental strategy.
• Each student will present oral reports of research progress, relevant readings, and/or challenges at scheduled lab meetings.
• Students will take primary responsibility for conducting research and do so with professional attitudes and time commitments. This is a lab course and you are expected to spend a minimum of 20 hours of productive lab work per week. It is more realistic to expect to spend an average of 25-30 hours per week working and thinking about your project.
• Students will produce a manuscript (with active feedback from the instructor and peers) that can be published in part or whole by a peer reviewed research journal. Publishable manuscripts require many drafts,

reviews, and revisions.
• Students are encouraged to present research results at appropriate scientific meetings.
• Students well be self-motivated and work independently, approaching the instructor for guidance regularly.

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

The grade will be calculated according to the following criteria.
Written report following the same format as scientific paper... 50%; Presentation at the Workshop... 50%.
The acceptance standard is to understand the introduced research approaches and ideas.
Evaluation is done by the supervisor(s) at home and visiting universities.

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

International special lecture (1.0credits) (国際協働教育特別講義)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Process Engineering
	Chemical Systems Engineering	Electrical Engineering	Electronics
	Information and Communication Engineering	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering
	Aerospace Engineering	Department of Energy Engineering	Department of Applied Energy
	Civil and Environmental Engineering		
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester		
Lecturer	Associated Faculty		

●Course Purpose

Gain basic knowledge of general engineering through English lectures on various hot research topics and leading technologies. The objective of this lecture is to develop research abilities and communication skills, which are essential to carry out international collaborative researches.

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

Depends on the lecturer.This course will be divided in 4 chapters as follows:1. Setting theme and reviewing literature2. Designing research plan3. Analysis and discussion of results4. Brief summary and future prospectsHomework will be given after the class and the report is required to be submitted in next class.

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

Written report and evaluation by the professors.

●Notes

No conditions for taking the course.

●Contacting Faculty

In the class and E-mail.

International language exercise (1.0credits) (国際協働教育外国語演習)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Exercise		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Process Engineering
	Chemical Systems Engineering	Electrical Engineering	Electronics
	Information and Communication Engineering	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering
	Aerospace Engineering	Department of Energy Engineering	Department of Applied Energy
	Civil and Environmental Engineering		
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester		
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to provide Japanese students with the English classes or provide international students with Japanese classes to improve communication skills for both academic and daily life.

●Prerequisite Subjects

English, Technical English, Japanese

●Course Topics

Wide variety of exercises including speaking, listening, writing, reading, and presentation in Japanese/English.Homework will be given after the class and the report is required to be submitted in next class.

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

Report, presentation, participation in discussionGrading will be based on understanding Japanese and English, and communication performance.

●Notes

No conditions for taking the course.

●Contacting Faculty

Acceptance and response in the class or through E-mail.

Seminar on Plasma Electronics 2A (2.0credits) (プラズマエレクトロニクスセミナー2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 2B (2.0credits) (プラズマエレクトロニクスセミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 2C (2.0credits) (プラズマエレクトロニクスセミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Spring Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 2D (2.0credits) (プラズマエレクトロニクスセミナー2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Autumn Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Plasma Electronics 2E (2.0credits) (プラズマエレクトロニクスセミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	3 Spring Semester	
Lecturer	Hirotaka TOYODA Professor	Haruka SUZUKI Lecturer

●Course Purpose

Discussion on textbooks or papers related to plasma science and technology. Purpose is improvement of ability for presentation of own ideas through discussion.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Nano Process 2A (2.0credits) (ナノプロセスセミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences. For example, they read the latest research papers on plasma nano-bio processes, etc., for which research and development is flourishing, to deepen their understanding.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain essences, trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 2B (2.0credits) (ナノプロセスセミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences. For example, they read the latest research papers on plasma nano-bio processes, etc., for which research and development is flourishing, to deepen their understanding.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain essences, trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 2C (2.0credits) (ナノプロセスセミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences. For example, they read the latest research papers on plasma nano-bio processes, etc., for which research and development is flourishing, to deepen their understanding.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain essences, trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 2D (2.0credits) (ナノプロセスセミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences. For example, they read the latest research papers on plasma nano-bio processes, etc., for which research and development is flourishing, to deepen their understanding.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain essences, trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Nano Process 2E (2.0credits) (ナノプロセスセミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	Masaru HORI Professor	HIROMASA Tanaka Professor	Makoto SEKINE Designated Professor
	Kenji ISHIKAWA Professor	Hiroki KONDOH Associate Professor	Takayoshi TSUTSUMI Assistant Professor

●Course Purpose

As a basis for research on integrated process engineering, the purpose of this course is to acquire the basics and applications of plasma process engineering and nano-process engineering through reading academic books and literatures about plasma processing and nano-processing technologies, and discussions. In addition, they also learn and discuss about the latest developments of the related regions, such as solid-state physics, nanomaterial engineering, medical and bio sciences, and so forth, and understand their essences. For example, they read the latest research papers on plasma nano-bio processes, etc., for which research and development is flourishing, to deepen their understanding.In this lesson, the goal is for students to have the following knowledge and skills at the end of the lesson.1. Explain the principles and characteristics of plasma processes and nano processes.2. Understand and explain plasma diagnostic technology and reaction surface analysis technology.3. Understand and explain essences, trends and technical issues in semiconductor device processes, nanomaterial processes, and nano-bio processes.

●Prerequisite Subjects

Electromagnetics, Plasma physics, Laser engineering, Material physics, Quantum electronics, biology, organic chemistry

●Course Topics

1. Atomic and molecular physics2. Plasma diagnostics3. Plasma-surface interaction4. Plasma processing and nanomaterial engineering5. Application of plasma to medical and biotechnologyPreparing for the next lesson and understanding the meaning of technical terms.

●Textbook

Academic books reading in seminar will be selected at the beginning of a new fiscal year. Academic papers are chosen accordingly depending on the progress.

●Additional Reading

References will be provided as needed.

●Grade Assessment

The level of achievement of the goal are evacuated through oral presentations at the seminar and Q & A sessions.The minimum acceptance criterion is to correctly understand and discuss the principles and characteristics of nanoprocesses.The grade evaluation criteria are as follows, and a score of 60 or more out of 100 is considered acceptable.Students enrolled in or after the 2020 school year:100~95: A+, 94~80: A, 79~70: B69~65: C, 64~60: C-, 59~0: FStudents enrolled in or before the 2019 school year:100~90: S, 89~80: A, 79~70: B69~60: C, 59~0: F

●Notes

It is better that you have already taken some of the prerequisite subjects, but you can take this class even if you have not taken them.

●Contacting Faculty

Questions are always invited at the seminar, and also available out of the seminar.

Seminar on Optical Electornics 2A (2.0credits) (光エレクトロニクスセミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 2B (2.0credits) (光エレクトロニクスセミナー2B)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Autumn Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 2C (2.0credits) (光エレクトロニクスセミナー2C)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	2 Spring Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 2D (2.0credits) (光エレクトロニクスセミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	2 Autumn Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Optical Electornics 2E (2.0credits) (光エレクトロニクスセミナー2E)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	3 Spring Semester
Lecturer	Kodo KAWASE Professor Kosuke MURATE Assistant Professor

●Course Purpose
The purpose is to maximize students' skills in knowledge of terahertz engineering from basic to applied knowledge and experimental techniques. The goal is to sufficiently acquire the required performance for experiments on terahertz waves.

●Prerequisite Subjects
Background knowledge of terahertz wave research is extensive, so not specified.

●Course Topics
Knowledge and experimental techniques of terahertz engineering from basic to applied will be taught.Each week, two students will give a presentation on their experiments, which will be discussed by the faculty and graduate students. The presenters will prepare well in advance and prepare slides and materials that are easy to understand for students outside the field, so that the discussion will be meaningful.

●Textbook
Technical books and literature will be provided in the seminar as appropriate.

●Additional Reading
Technical books and literature will be provided in the seminar as appropriate.

●Grade Assessment
A high level of experimentation and discussion will be emphasized. Students will be evaluated on their achievement of the objectives through oral presentations and question-and-answer sessions in the seminar. 60 points or more on a 100-point scale is a passing grade.

●Notes
No course requirements are required.
In principle, lectures will be face-to-face, but depending on the situation in Corona, they may take the form of seminars with Teams.
Students will have ample opportunity to exchange opinions either face-to-face or through Teams.

●Contacting Faculty
Response to questions: Always available via email to kawase@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 2A (2.0credits) (ナノ情報デバイスセミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers. The target of this seminar is as follow3s;1. To get the ability to understand the issues written in the textbook and/or journal papers2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed. 1. Electric properties in semiconductors 2. Optical properties in semiconductors 3. Crystal growth of semiconductors 4. Electronic devices 5. Optoelectronic devices 6. Quantum devices and Nanoelectronics　Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., PublicationJournal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to amano@nuee.nagoya-u.ac.jp honda@nuee.nagoya-u.ac.jpdeki@nuee.nagoya-u.ac.jpkushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 2B (2.0credits) (ナノ情報デバイスセミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers. The target of this seminar is as follow3s;1. To get the ability to understand the issues written in the textbook and/or journal papers2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed. 1. Electric properties in semiconductors 2. Optical properties in semiconductors 3. Crystal growth of semiconductors 4. Electronic devices 5. Optoelectronic devices 6. Quantum devices and Nanoelectronics　Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., PublicationJournal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to amano@nuee.nagoya-u.ac.jp honda@nuee.nagoya-u.ac.jpdeki@nuee.nagoya-u.ac.jpkushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 2C (2.0credits) (ナノ情報デバイスセミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 2D (2.0credits) (ナノ情報デバイスセミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Nano Information Device 2E (2.0credits) (ナノ情報デバイスセミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	Hiroshi AMANO Professor	Yoshio HONDA Associate Professor	Manato DEKI Associate Professor
	Maki KUSHIMOTO Lecturer		

●Course Purpose

The purpose of this seminar is, first, to understand plenty of issues in semiconductor electronics, the text, and/or scientific paper. Then, to get the ability to explain the issues written in textbooks and/or journal papers.

The target of this seminar is as follow3s;

1. To get the ability to understand the issues written in the textbook and/or journal papers
2. To get the ability to explain the issues written in textbooks and/or journal papers.

●Prerequisite Subjects

Solid state electronics, Semiconductor electronics, Electronic device, Optoelectronic devices

●Course Topics

In this seminar, the following issues are discussed.

1. Electric properties in semiconductors
2. Optical properties in semiconductors
3. Crystal growth of semiconductors
4. Electronic devices
5. Optoelectronic devices
6. Quantum devices and Nanoelectronics

Attendees read the textbook/journal paper carefully. The person in charge should explain the details of the issues. During the seminar, discuss the issues in detail. If there are some questions that cannot be clarified, they will be discussed in the next seminar.

●Textbook

Semiconductor Material and Device Characterization, Third Edition, Dieter K. Schroder, A John Wiley & Sons, Inc., Publication

Journal papers are also used suitably.

●Additional Reading

References written in the textbook

●Grade Assessment

The target degree of achievement is estimated by the oral presentation (60%) and the questions and answers (40%) in this seminar.

●Notes

There is no need to prepare.

●Contacting Faculty

Please send questions to

amano@nuee.nagoya-u.ac.jp
honda@nuee.nagoya-u.ac.jp
deki@nuee.nagoya-u.ac.jp
kushimoto@nuee.nagoya-u.ac.jp

Seminar on Intelligent Device 2A (2.0credits) (知能デバイスセミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The objective is to be able to do the following by learning the lecture of the Intelligent Device Seminar 2A. 1. Understand the operation of the CMOS integrated signal processing interface circuit. 2. Design ultra-high sensitivity sensor devices using CMOS integrated circuits.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1 Design of CMOS integrated signal processing interface circuit2. Design of CMOS integrated highly-sensitive sensor devicePlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Intelligent Device 2B (2.0credits) (知能デバイスセミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems. The objective is to be able to do the following by learning the Intelligent Device Seminar 2B. 1. Design of an independent power supply CMOS electronic circuit. 2. Design of an ultra-low power wireless data transmission system. 3. Design of CMOS sensor for Bio-medical application

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1. Design of CMOS sensor circuit with independent power supply2. Design of ultra-low power wireless data transmission system3. CMOS sensor for biomedical applicationPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Intelligent Device 2C (2.0credits) (知能デバイスセミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The goal is to be able to do the following by learning the Intelligent Device Seminar 2C. 1. Biomedical application of CMOS integrated microsensor system　2. Construction of higly sensitive sensor system to measure electrical reactions of brain and nervous system

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1. Biomedical application technology of CMOS integrated microsensor system2. Construction of highly sensitive sensor system to measure brain and nervous systemPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Intelligent Device 2D (2.0credits) (知能デバイスセミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The objective is to be able to do the following by learning the Intelligent Device Seminar 2D. 1. Designing integrated circuits that contribute to medical and healthcare. 2. Construction of sensor system that contributes to the advancement of IoT and AI.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1.Design of integrated circuits that contribute to medical and healthcare2. Construction of a sensor system for the advancement of IoT and AIPlease read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Additional Reading

We will introduce appropriate books as the lecture progresses.

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Intelligent Device 2E (2.0credits) (知能デバイスセミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	Tasufumi TAKAHASHI Professor	Tsuyoshi UCHIYAMA Associate Professor	Kiichi NIITSU Associate Professor

●Course Purpose

Course objectives and objectives　To understand intelligent devices and integrated sensors using them, it is necessary to understand CMOS electronic circuits and various sensor devices and sensing systems.　The objective is to be able to do the following by learning the Intelligent Device Seminar 2D. 1. Optimization design of CMOS integrated sensor system2. Implementation of new signal processing method using AI etc.

●Prerequisite Subjects

Electronic circuit, electromagnetics, semiconductor engineering, magnetic material engineering

●Course Topics

1. Optimization design of CMOS integrated sensor system2. Implementation method of new signal processing technology using AI etc.Please read the designated part of the textbook before each class. Solving textbook examples yourself.

●Textbook

We will introduce appropriate books as the lecture progresses.

●Additional Reading

Design of CMOS Analog Integrated CircuitsBehzad Razavi: McGraw-Hill Companies (2003/10): ISBN-10: 0071188398ISBN-13: 978-0071188395

●Grade Assessment

Evaluate the level of achievement for the goals in a report or presentation format Report content and the presentation)If you can answer the question correctly, you will be accepted, and if you can describe the solution to the problem in a more advanced way, it will be reflected in your grades accordingly.

●Notes

Nothing

●Contacting Faculty

We will respond during breaks after class or office hours.

Seminar on Quantum Opto-Electronics 2A (2.0credits) (量子光エレクトロニクスセミナー2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the advanced knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 2B (2.0credits) (量子光エレクトロニクスセミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the advanced knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 2C (2.0credits) (量子光エレクトロニクスセミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Spring Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the advanced knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 2D (2.0credits) (量子光エレクトロニクスセミナー2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Autumn Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the advanced knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Quantum Opto-Electronics 2E (2.0credits) (量子光エレクトロニクスセミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	3 Spring Semester	
Lecturer	Norihiko NISHIZAWA Professor	Shotaro KITAJIMA Assistant Professor

●Course Purpose

In this class, we learn the advanced knowledge of quantum opto-electronics.
The aim of class is as follows:
1. Learn the fundamentals of optics, and apply them to the specific problems.
2. Learn the fundamentals of opto-electronics, and apply them to the specific problems.
3. Learn the fundamentals of quantum electronics, and apply them to the specific problems.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

There is no requirement for registration.

●Contacting Faculty

Seminar on Integrated Quantum Device System 2A (2.0credits) (量子集積デバイスセミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose

Textbooks and papers on superconducting phenomena will be read intensively in turn to understand physics of superconductivity.

Goal: Understanding of various physics and applications in the superconducting phenomena.

●Prerequisite Subjects

Quantum Mechanics, Solid State Physics

●Course Topics

1. Superconducting Phenomena
2. Macroscopic behavior of superconductors
3. Microscopic theory on superconductivity

Review of contents in previous classes is required before each of classes.

●Textbook

Textbook will be introduced in class.

●Additional Reading

Reference will be introduced in class.

●Grade Assessment

Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes

not imposed

●Contacting Faculty

Questions will be accepted in the seminar.

Seminar on Integrated Quantum Device System 2B (2.0credits) (量子集積デバイスセミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose

Textbooks and papers on high-temperature superconductors will be read intensively in turn to understand physics of high-temperature superconductors.

Goal: Understanding of various physics and applications of the high-critical-temperature superconductivity.

●Prerequisite Subjects

Quantum Mechanics, Solid State Physics

●Course Topics

1. Features on HTS superconductors
2. Anisotropic natures
3. Intrinsic Josephson junctions

Review of contents in previous classes is required before each of classes.

●Textbook

Textbook will be introduced in class.

●Additional Reading

Reference will be introduced in class.

●Grade Assessment

Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes

not imposed

●Contacting Faculty

Questions will be accepted in the seminar.

Seminar on Integrated Quantum Device System 2C (2.0credits) (量子集積デバイスセミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose

Textbooks and papers on Josephson junctions will be read intensively in turn to understand physics of Josephson junctions.

Goal: Understanding of various physics and applications of Josephson junctions.

●Prerequisite Subjects

Quantum Mechanics, Solid State Physics

●Course Topics

1. Classification of Josephson devices
2. The Josephson effects
2.1 DC Josephson effect
2.2 AC Josephson effect
2.3 Magnetic field dependence

Review of contents in previous classes is required before each of classes.

●Textbook

Textbook will be introduced in class.

●Additional Reading

Reference will be introduced in class.

●Grade Assessment

Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes

not imposed

●Contacting Faculty

Questions will be accepted in the seminar.

Seminar on Integrated Quantum Device System 2D (2.0credits) (量子集積デバイスセミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose
Textbooks and papers on applications of Josephson junctions or magnetic Josephson junctions will be read intensively in turn to understand advantages of Josephson-junction-based applications.

Goal: Understanding of various physics and applications of Josephson junctions and magnetic Josephson junctions.

●Prerequisite Subjects
Quantum Mechanics, Solid State Physics

●Course Topics
1. Josephson junction
2. SQUID
3. Single Flux Quantum Circuit
4. Magnetic Josephson junction

Review of contents in previous classes is required before each of classes.

●Textbook
Textbook will be introduced in class.

●Additional Reading
Reference will be introduced in class.

●Grade Assessment
Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes
not imposed

●Contacting Faculty
Questions will be accepted in the seminar.

Seminar on Integrated Quantum Device System 2E (2.0credits) (量子集積デバイスセミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	Akira FUJIMAKI Professor	Taro YAMASHITA Associate Professor	Masamitsu TANAKA Assistant Professor

●Course Purpose

Textbooks and papers on superconducting electronics including quantum information processing will be read intensively in turn to understand superconducting devices, circuits and their applications.

Goal: Understanding of various physics and applications in the superconducting electronics including the quantum information processing.

●Prerequisite Subjects

Quantum Mechanics, Solid State Physics

●Course Topics

1. Superconducting Phenomena
2. Josephson Junction
3. Josephson Integrated Circuit
4. Quantum Information Processing

Review of contents in previous classes is required before each of classes.

●Textbook

Textbook will be introduced in class.

●Additional Reading

Reference will be introduced in class.

●Grade Assessment

Evaluated based on the presentation and Q&A in seminar. Total score of at least 60 points out of a possible 100 is required to pass.

●Notes

not imposed

●Contacting Faculty

Questions will be accepted in the seminar.

Seminar on Semiconductor Engineering and Integration Science 2A (2.0credits) (機能集積デバイスセミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain your knowledge and expertise on semiconductor science and technology, perusing selected publications on semiconductor materials, processing and devices and discussion on their contents are conducted. Goals;1. To understand a basic of semiconductor engineering and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor engineering.

●Prerequisite Subjects

Semiconductor Materials, Semiconductor Process, Semiconductor Devices and Semiconductor Engineering etc

●Course Topics

Properties of Semiconductor, and Surface and Interface Physics Material Characterization Material Processing and Its Integration Device Physics and Performance Reliability Design and ModelingAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Materials focusing on current topics in the field of semiconductor science and technology are selected from academic books and papers written in English.

●Additional Reading

Physics of Semiconductor Devices, 3rd Edition, Eds. by Simon M. Sze and Kwok K. Ng, Willey-Interscience.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 2B (2.0credits) (機能集積デバイスセミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain your knowledge and expertise on semiconductor science and technology, perusing selected publications on semiconductor materials, processing and devices and discussion on their contents are conducted. Goals; 1. To understand a basic of semiconductor engineering and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor engineering.

●Prerequisite Subjects

Semiconductor Materials, Semiconductor Process, Semiconductor Devices and Semiconductor Engineering etc.

●Course Topics

Properties of Semiconductor, and Surface and Interface Physics Material Characterization Material Processing and Its Integration Device Physics and Performance Reliability Design and ModelingAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Materials focusing on current topics in the field of semiconductor science and technology are selected from academic books and papers written in English.

●Additional Reading

Physics of Semiconductor Devices, 3rd Edition, Eds. by Simon M. Sze and Kwok K. Ng, Willey-Interscience.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 2C (2.0credits) (機能集積デバイスセミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain your knowledge and expertise on semiconductor science and technology, perusing selected publications on semiconductor materials, processing and devices and discussion on their contents are conducted. Goals; 1. To understand a basic of semiconductor engineering and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor engineering.

●Prerequisite Subjects

Semiconductor Materials, Semiconductor Process, Semiconductor Devices and Semiconductor Engineering etc.

●Course Topics

Properties of Semiconductor, and Surface and Interface Physics Material Characterization Material Processing and Its Integration Device Physics and Performance Reliability Design and ModelingAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Materials focusing on current topics in the field of semiconductor science and technology are selected from academic books and papers written in English.

●Additional Reading

Physics of Semiconductor Devices, 3rd Edition, Eds. by Simon M. Sze and Kwok K. Ng, Willey-Interscience.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 2D (2.0credits) (機能集積デバイスセミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain your knowledge and expertise on semiconductor science and technology, perusing selected publications on semiconductor materials, processing and devices and discussion on their contents are conducted. Goals; 1. To understand a basic of semiconductor engineering and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor engineering.

●Prerequisite Subjects

Semiconductor Materials, Semiconductor Process, Semiconductor Devices and Semiconductor Engineering etc

●Course Topics

Properties of Semiconductor, and Surface and Interface Physics Material Characterization Material Processing and Its Integration Device Physics and Performance Reliability Design and ModelingAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Materials focusing on current topics in the field of semiconductor science and technology are selected from academic books and papers written in English.

●Additional Reading

Physics of Semiconductor Devices, 3rd Edition, Eds. by Simon M. Sze and Kwok K. Ng, Willey-Interscience.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Semiconductor Engineering and Integration Science 2E (2.0credits) (機能集積デバイスセミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	SeiichiMIYAZAKI Professor	Katsunori MAKIHARA Associate Professor	AkioOTA Assistant Professor

●Course Purpose

To gain your knowledge and expertise on semiconductor science and technology, perusing selected publications on semiconductor materials, processing and devices and discussion on their contents are conducted. Goals; 1. To understand a basic of semiconductor engineering and to cultivate an ability of its application. 2. To understand and explain the content of English publications about the semiconductor engineering.

●Prerequisite Subjects

Semiconductor Materials, Semiconductor Process, Semiconductor Devices and Semiconductor Engineering etc

●Course Topics

Properties of Semiconductor, and Surface and Interface Physics Material Characterization Material Processing and Its Integration Device Physics and Performance Reliability Design and ModelingAs some issues related to the contents in each class will be given, your answer or response should be shown in the next class or by the designated date.

●Textbook

Materials focusing on current topics in the field of semiconductor science and technology are selected from academic books and papers written in English.

●Additional Reading

Physics of Semiconductor Devices, 3rd Edition, Eds. by Simon M. Sze and Kwok K. Ng, Willey-Interscience.

●Grade Assessment

Evaluation based on reports and oral presentation including Q&A will be made for overall rating.Pass criteria is to have a describing ability with knowledge and concepts gaining in this class.

●Notes

There are no limitations for taking this course.The class will be given face-to-face basically, but if necessary both face-to-face and remotely (using MS Teams or Zoom).

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail: miyazaki@nuee.nagoya-u.ac.jp,makihara@nuee.nagoya-u.ac.jp,a_ohta@nuee.nagoya-u.ac.jpIf necessary, a short meeting will be arranged.

Seminar on Advanced Devices 2A (2.0credits) (先端デバイスセミナー2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor power devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students and master-course students.

●Course Topics

Basic of power device structures. Voltage blocking structures including edge termination structures.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 2B (2.0credits) (先端デバイスセミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor power devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students and master-course students.

●Course Topics

Fundamentals of vertical power MOSFETs including opitimization of device structures.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 2C (2.0credits) (先端デバイスセミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Spring Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor power devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students and master-course students.

●Course Topics

Conductivity modulation in power semiconductor devices including detailed analysis of pin diodes.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 2D (2.0credits) (先端デバイスセミナー2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Autumn Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor power devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students and master-course students.

●Course Topics

Discussion on device processes for fabricating power devices. Current status and issues. Impact of theses issues on power device performance.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Advanced Devices 2E (2.0credits) (先端デバイスセミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	3 Spring Semester	
Lecturer	Jun SUDA Professor	Masahiro HORITA Associate Professor

●Course Purpose

Textbooks and papers will be read intensively in turn to understand science and engineering of semiconductor power devices.
After successfully completing this seminar, student will be able to lecture the fundamental properties of semiconductors and the functions of semiconductor devices.

●Prerequisite Subjects

Electromagnetics, Solid State Physics, Semiconductor Physics, Semiconductor Engineering and Semiconductor Devices for undergraduate students and master-course students.

●Course Topics

Discussion on crystal growth methods (bulk and thin-film growth) for fabricating power devices. Current status and issues. Impact of theses issues on power device performance.

●Textbook

B. Jayant Baliga, Fundamentals of Power Semiconductor Devices

●Additional Reading

●Grade Assessment

In addition to attendance rate, evaluations based on reports and oral presentation including Q&A will be made for overall rating.

●Notes

No requirement for attending this course.

●Contacting Faculty

For questions after each seminar, send an outline of your questions by e-mail.
If necessary, a short meeting will be arranged.
E-mail: suda@nuee.nagoya-u.ac.jp

Seminar on Quantum Spin Information 2A (2.0credits) (量子スピン情報セミナー2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Spring Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetization7. Dynamic Magnetization Processes8. Giant magneto-resistnce and Tunnel magneto-resistance9. Magnetic random access memory10. Magnetic SensorsBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 2B (2.0credits) (量子スピン情報セミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetization7. Dynamic Magnetization Processes8. Heat assisted Magnetic recording9. Magneto-optical Recording10. Microwave assisted Magnetic RecordingBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 2C (2.0credits) (量子スピン情報セミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Spring Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetization7. Dynamic Magnetization Processes8. Spin Transfer Torque Switching9. Spin Hall Effect10. Spin Orbit Torque SwitchingBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 2D (2.0credits) (量子スピン情報セミナー2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Autumn Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetization7. Dynamic Magnetization Processes8. Bit Patterned Media9. Heat assisted switching10. Electric field assisted switchingBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Quantum Spin Information 2E (2.0credits) (量子スピン情報セミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	3 Spring Semester	
Lecturer	Takeshi KATO Professor	OSHIMA Daiki Assistant Professor

●Course Purpose

This course is a seminar in magnetic materials and spintronics. The goal of this course is to learn about the fundamental of magnetic materials and spintronics phenomena. Each class, one of the students will give lectures to other students using the textbook or relevant papers. As a lecturer, a student should recite the assigned topics and explain in detail. As a member of audience, students must make questions about the explanation to the lecturer.After successfully completing this seminar, students will be able to:1. Lecture the fundamental properties of magnetic materials.2. Lecture the phenomenological and microscopic theories of magnetic anisotropy and magneto-striction3. Lecture the spin dynamics of magnetic materials.4. Lecture the technical magnetization process of magnetic materials.5. Lecture the various measurement techniques to characterize magnetic materials.6. Lecture the magneto-galvanic effect and spintronics.7. Lecture the application of magnetic materials, such as magnetic recording and sensors.

●Prerequisite Subjects

Electromagnetic Theory with Exercises, Quantum Mechanics with Exercises, Solid State Electronics and Tutorial, Magnetic Materials

●Course Topics

1. Fundamentals of magnetic properties2. Induced Magnetic Anisotropy3. Magnetostriction4. Spin distribution and domain walls5. Magnetic domain structure6. Technical magnetization7. Dynamic Magnetization Processes8. Advanced measurement techniques9. Hard Magnetic Materials8. Antiferromagnetic spintronics9. All Optical Switching10. Domain Wall Devices and MemoriesBefore starting the seminar, the lecturer should prepare the lecture notebook of the assigned part of the textbook. The audiences should read the textbook pages corresponding to the topic to prepare the questions in the seminar. The lecture also solve the chapter end problems and describe in the seminar.

●Textbook

Physics of magnetism, S. Chikazumi, Oxford University Press Inc, New YorkModern Magnetic Materials, R. C. O'Handley, John Wiley & Sons Inc., New York

●Additional Reading

The lecturer should introduce the papers to explain the topics.

●Grade Assessment

Individual lecturers will be graded by evaluating the clarity, organization, and preparedness of the lecture. Audiences will be graded by questions, comments, and feedback to the lecturer. To pass the grade, students should explain and lecture the basic concept of magnetic properties. The grade will be affected if the students will lecture the advanced topics, such as spintronics with clear and detailed explanation.

●Notes

No requirements to take this course.

●Contacting Faculty

Questions will be answered during and after the seminar. If necessary, students can book an appointment for your questions in advance via e-mail.

Seminar on Electron Beam Applications 2A (2.0credits) (電子線応用工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Spring Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose

The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects

Electronics, quantum physics, condensed matter physics

●Course Topics

basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook

Instruct during class as needed.

●Additional Reading

Instruct during class as needed.

●Grade Assessment

Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty

questions will be answered during lectures.

Seminar on Electron Beam Applications 2B (2.0credits) (電子線応用工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	1 Autumn Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Electron Beam Applications 2C (2.0credits) (電子線応用工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Spring Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Electron Beam Applications 2D (2.0credits) (電子線応用工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	2 Autumn Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physicsElectronic devicesquantum physics for electron scattering and diffraction.Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Electron Beam Applications 2E (2.0credits) (電子線応用工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Electronics		
Starts 1	3 Spring Semester		
Lecturer	Nobuyuki IKARASHI Professor	Masahiro NAGAO Associate Professor	Emi KANO Assistant Professor

●Course Purpose
The goal is to develop the ability to understand and solve various issues regarding materials science and device physics.
The goal is to acquire the above ability by reading textbooks and academic papers.

●Prerequisite Subjects
Electronics, quantum physics, condensed matter physics

●Course Topics
basics of condensed matter physics
Electronic devices
quantum physics for electron scattering and diffraction.
Review the designated range after the class.

●Textbook
Instruct during class as needed.

●Additional Reading
Instruct during class as needed.

●Grade Assessment
Assess achievement of the goal by oral presentation and Q & A session.

●Notes

●Contacting Faculty
questions will be answered during lectures.

Seminar on Nano-Electronics Devices 2A (2.0credits) (ナノ電子デバイスセミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	1 Spring Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 2B (2.0credits) (ナノ電子デバイスセミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	1 Autumn Semester	1 Autumn Semester
Lecturer	Yutaka ONO Professor	

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 2C (2.0credits) (ナノ電子デバイスセミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	2 Spring Semester	2 Spring Semester
Lecturer	Yutaka ONO Professor	

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 2D (2.0credits) (ナノ電子デバイスセミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Electronics
Starts 1	2 Autumn Semester
Lecturer	Yutaka ONO Professor

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Seminar on Nano-Electronics Devices 2E (2.0credits) (ナノ電子デバイスセミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Electronics	
Starts 1	3 Spring Semester	3 Spring Semester
Lecturer	Yutaka ONO Professor	

●Course Purpose

Seminar on physics and applications of electron devices using textbooks and literatures.The goal is to better understand the materials, properties, and device operation principles of electronic devices.

●Prerequisite Subjects

Solid-state electronics, semiconductor engineering

●Course Topics

1. Electron transport in solid state materials2. Semiconductor devices3. Nanomaterial science4. ElectrochemistryBe sure to prepare enough.

●Textbook

A textbook will be selected in the first seminar.

●Additional Reading

S. M. Sze, "Physics of Semiconductor Devices" 3rd. Ed.

●Grade Assessment

Presentations and/or report.It is required that fundamental operation mechanism and the physics behind the operation of electron devices can be explained.

●Notes

Students are required to review the contents covered in the previous lecture before each class.

●Contacting Faculty

Any question is welcome anytime.

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by studying in an abroad laboratory and learn different methods and ways of thinking, as well as communicate on a daily base with foreign researchers.

By completing the course, the students are expected to acquire various research methods and ways of thinking, gain the ability to tackle research problems from multiple angles, and acquire a broad international perspective.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject, English, Advanced Lectures on Scientific English

●Course Topics

Students will stay in an abroad laboratory that will be chosen based on the participant’s research field and interest. The course consists of the following contents.

1. Theme setting and literature review
2. Formulating a research plan
3. Analyzing the results and discussion
4. Presentation of the results

After the class, students should review the analyzing processes of the research results and investigate related literatures.

●Textbook
Will be introduced at the host laboratory depending on the research subject

●Additional Reading
Will be introduced at the host laboratory if necessary

●Grade Assessment
Conducting research in an abroad laboratory for one semester and submitting a report is a prerequisite. Evaluation will be based on the student's report (50%) and oral presentation (50%). To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results.

●Notes

●Contacting Faculty
Questions will be answered by the supervisors at the host laboratory during the course.

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by studying in an abroad laboratory and learn different methods and ways of thinking, as well as communicate on a daily base with foreign researchers.

By completing the course, the students are expected to acquire various research methods and ways of thinking, gain the ability to tackle research problems from multiple angles, and acquire a broad international perspective.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject, English, Advanced Lectures on Scientific English

●Course Topics

Students will stay in an abroad laboratory that will be chosen based on the participant’s research field and interest. The course consists of the following contents.

1. Theme setting and literature review
2. Formulating a research plan
3. Analyzing the results and discussion
4. Presentation of the results

After the class, students should review the analyzing processes of the research results and investigate related literatures.

●Textbook
Will be introduced at the host laboratory depending on the research subject

●Additional Reading
Will be introduced at the host laboratory if necessary

●Grade Assessment
Conducting research in an abroad laboratory for two semesters and submitting a report is a prerequisite. Evaluation will be based on the student's report (50%) and oral presentation (50%). To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results.

●Notes

●Contacting Faculty
Questions will be answered by the supervisors at the host laboratory during the course.

Teaching and Instruction Exercise 1 (1.0credits) (実験指導体験実習1)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

While attendance is raw, in "the innovation experience project," I stand with a company engineer (DP, Directing Professor) and carry an assistance, DP of the attendance straight instruction by the DP and the role of the interface of the attendance student. In this way, it is intended to let you do experience of the project management.

I aim for planning a researcher, improvement of the nature as the leader, the expansion of the field of vision by a simulated experience of instruction of the attendance life and the business management in the real world.

●Prerequisite Subjects

"Innovation Practice Course" 75 hours(Principle one day a week)

●Course Topics

In "the innovation experience project," I assist the project promotion by the DP.

Help of the understanding of a project theme and contents for the attendance life of various specialisms

I compile an opinion of the attendance life and let you make a purpose, the method of the project clear

Exchange of opinions between the attendance life, instruction, report of the discussion

Communication adjustment that DP and attendance are raw

I assume this a main component.

In addition, correspondence out of the lecture time is necessary when preparations, an investigation to affect project accomplishment are necessary.

●Textbook

Papers, books and/or documents that the lecturer (DP) will introduce.

●Additional Reading

Papers, books and/or documents that the lecturer (DP) will introduce.

●Grade Assessment

I evaluate it through accomplishment, the discussion of the project. If display of leadership, report ability and the leadership is accepted, it is said that I pass.

●Notes

No specific requirements.

●Contacting Faculty

The lecturer (DP) and the project staff of the university accept questions at any time.

Teaching and Instruction Exercise 2 (1.0credits) (実験指導体験実習2)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Manato DEKI Associate Professor		

●Course Purpose

The purpose of this course is to provide guidance to semester students for advanced science and engineering experiments at the Venture Business Laboratory. Through this research guidance, students will be able to play a comprehensive role as a researcher / educator and instructor in the field in charge of device process system and device simulation, and will be able to provide research guidance. Useful for practical training as a research leader.

●Prerequisite Subjects

Knowledge of the field in charge selected from the fields of electronic device process system and device simulation.

●Course Topics

In the student experiment, the instructor students provide guidance to attendant students on subject research and original research from the field of electronic device process system and device simulation with the professional teacher. Together with the attendant students, they perform practical use these equipment and software and get the results. They experience the leadership of the research, providing research guidance, report preparation guidance, and presentation guidance.

●Textbook

Required documents is distributed.

●Additional Reading

Required documents is distributed.

●Grade Assessment

Evaluate by compiling experiments / exercises, teaching (70%), and interviewing (30%). Students who understand each device and software and give appropriate guidance are accepted, and their research results and new approaches are highly evaluated. A score of 60 or more out of 100 is a passing score.

●Notes

To have a deep understandinginonefieldfromelectronic device process and device simulation.

●Contacting Faculty

Arranging the schedules by e-mail and etc.

Research Internship2 U2 (2.0credits) (研究インターンシップ２ U2)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days less than or equal to 20 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U3 (3.0credits) (研究インターンシップ２ U3)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 21 and 40 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U4 (4.0credits) (研究インターンシップ２ U4)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 41 and 60 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U6 (6.0credits) (研究インターンシップ２ U6)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days between 61 and 80 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U8 (8.0credits) (研究インターンシップ２ U8)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Materials Design Innovation Engineering
	Materials Process Engineering	Chemical Systems Engineering	Electrical Engineering
	Electronics	Information and Communication Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	Department of Energy Engineering
	Department of Applied Energy	Civil and Environmental Engineering	
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	
Lecturer	Shinji DOKI Professor		

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

Students attending Research Internship are strongly recommended to take short-term Patent Laws and Focus on Venture Business I or II before the attendance.

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Additional Reading

Papers, books and/or documents that the staff instructing the training in the company will introduce.

●Grade Assessment

The credits will be given to the students who have had the working days more than or equal to 81 daysin the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Laboratory Visit 2 U2 (2.0credits) (研究室ローテーション２ U2)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

Will be introduced at the host laboratory depending on the research subject

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

Up to 20 days research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

Questions will be answered by the supervisors at the host laboratory during the course.

Laboratory Visit 1 U3 (3.0credits) (研究室ローテーション２ U3)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

Will be introduced at the host laboratory depending on the research subject

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

21 days or more and 40 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

Questions will be answered by the supervisors at the host laboratory during the course.

Laboratory Visit 1 U4 (4.0credits) (研究室ローテーション２ U4)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

Will be introduced at the host laboratory depending on the research subject

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

41 days or more and 60 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

Questions will be answered by the supervisors at the host laboratory during the course.

Laboratory Visit 1 U6 (6.0credits) (研究室ローテーション２ U6)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

Will be introduced at the host laboratory depending on the research subject

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

61 days or more and 80 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

Questions will be answered by the supervisors at the host laboratory during the course.

Laboratory Visit 1 U8 (8.0credits) (研究室ローテーション２ U8)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Practice		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Applied Physics	Materials Physics	Chemical Systems Engineering
	Electrical Engineering	Electronics	Information and Communication Engineering
	Mechanical Systems Engineering	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

Will be introduced at the host laboratory depending on the research subject

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

81 days or more research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

Questions will be answered by the supervisors at the host laboratory during the course.