Advanced Lectures on Materials and Processes (2.0credits) (材料科学・加工学特論)

Course Type	Basic Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Micro-Nano Mechanical Science and Engineering	
Starts 1	1 Spring Semester	
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor

●Course Purpose

The purpose of the lecture is to understand materials processing technologies in relation to material science.
Goal:
1) Basic skills
To understand the rudimentary knowledge and the physical meaning in connection with the intensity of material, the characteristic, and processability.
2) Practical skills
To apply the rudimentary knowledge to understanding the various processing means for manufacturing an industrial commodity.
3)Creativity,Total ability
To understand the rudimentary knowledge and various processing means comprehensively, and can imagine the processing process of industrial commodities

●Prerequisite Subjects

Mechanics of materials, Physics, Chemistry

●Course Topics

1. Properties of Materials
2. Nature of Metals and Alloys
3. Equilibrium Phase Diagrams and the Iron?Carbon System
4. Heat Treatment
5. Nonferrous Metals and Alloys
6. Nonmetallic Materials: Plastics, Elastomers, Ceramics, and Composites
7. Material Selection
8. Casting
9. Metal Forming
10. Additive Processes
11. Nontraditional Manufacturing Processes(ex. EDM)
12. Welding
13. Photolithography
14. Summary
15. Test

Read carefully textbook and handouts before attending each class.

●Textbook

Handouts are available from NUCT web site.

●Additional Reading

The reference book #1 is strongly recommended to get.

1) J. T. Black, Ronald A. Kohser, DeGarmo's Materials and Processes in Manufacturing, 11th Edition(John Wiley & Sons Inc) ISBN : 978-1-118-37941-7 or ISBN : 978-0-470-87375-5, 2012

2) Michael F. Ashby, Materials Selection in Mechanical Design, 4th Edition (Butterworth-

Heinemann)ISBN-10: 1856176630, ISBN-13: 978-1856176637, 2010

●Grade Assessment

No examination (option)
Students must submit a report on every lecture.
Credit is given for the scores of the reports.
The applicant can take a final examination. The examination score is given priority over the above-mentioned score.

Score:100-95:A+, 94-80:A, 79-70:B, 69-65:C, 64-60:C-, Less than 59:F

Qualifying standard
Able to explain the concept of each technology.

●Notes

Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used.
Details will be notified by NUCT.
Contact faculty or via Microsoft Teams.

●Contacting Faculty

Prof. Hata
TEL: 5223
E-mail:seiichi.hata@mae.nagoya-u.ac.jp

Assoc. Prof. Sakurai
TEL5289
E-mailjunpei.sakurai@mae.nagoya-u.ac.jp

Computer Vision and Machine Learning (2.0credits) (コンピュータビジョンと機械学習特論)

Course Type	Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Tadayoshi AOYAMA Associate Professor

●Course Purpose

In recent years, products and applications using computer vision technology have been found in various scenes. The aim of this course is to understand the computer vision and machine learning algorithms through implementation using OpenCV. The goals of this course are to
(1) Understand and implement image feature detection and object detection
(2) Understand and implement Bayesian identification, support vector machines, and neural networks.

●Prerequisite Subjects

linear algebra, Calculus, and Programming language.

●Course Topics

1. Overview of Computer Vision and Machine Learning
 To learn about the trends in computer vision and machine learning.
2. Learning computer vision algorithms
 To learn computer vision theory, focusing on image feature detection, object recognition and tracking, and their implementation.
3. Learning machine learning algorithms
 To learn Bayesian identification, support vector machines, and neural networks and their implementation.

Source code you have learned will be opended, so implement and review the theory you have learned.

●Textbook

●Additional Reading

●Grade Assessment

Assign several exercises to implement computer vision and machine learning algorithms. Grading will be calculated according to the reports of the exercise.

●Notes

●Contacting Faculty

Accepted at any time during the lecture.
If you adjust the date and time in advance by e-mail, questions will be accepted at the office.

Advanced Lectures on Micro-Nano Mechanical Science and Engineering (2.0credits) (マイクロ・ナノ理工学特論

Course Type	Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Shintarou ITOU Associate Professor

●Course Purpose

In order to realize mechanical system design with a view to physical phenomena on the micrometer and nanometer scales, you will study the fundamentals of intermolecular and surface forces and the mechanical phenomena related to them. The aim is to acquire basic knowledge to understand the link between micro / nano mechanical system design and mechanical phenomena in which intermolecular and surface forces work dominantly. The goal of this lecture is to understand the following items.

1. Understand the intermolecular interaction potential and the Boltzmann distribution rule.
2. Understand covalent bonds and Coulomb interactions.
3. Understand van der Waals interactions.
4. Understand the surface tension and its related mechanical phenomena.
5. Understand the mechanical properties of matter from the viewpoint of intermolecular interaction.

●Prerequisite Subjects

Mechanics, Electromagnetics, Material mechanics, Thermodynamics, Material science

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Lectures on Micro Thermo-fluid Engineering (2.0credits) (マイクロ熱流体工学特論)

Course Type	Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this lecture is to promote understanding on the fundamentals and the numerical methods in thermal-fluids engineering from macro- to micro-scale.
Through the course, students will have knowledge of thermal-fluid engineering and have ability to analyze thermal-fluids fields from macro- to micro-scale seamlessly.

●Prerequisite Subjects

Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

1. Outline of Fluid Dynamics and Heat Transfer Engineering
2. Knudsen number
3. High Knudsen number flows and Boltzmann equation
4. Atomic/Molecular motions : Kinetic theory and Molecular Dynamics
5. Fundamentals on Quantum Physics

There will be quizzes, and please carry out a review of each class.

●Textbook

There is no specified text. Related texts will be introduced by the instructor, if needed.

●Additional Reading

Vincenti,W.G., Kruger,C.H., Introduction to Physical Gas Dynamics, Krieger (1975), 0882753096.
Bird,G.A., Molecular Gas Dynamics and the Direct Simulation of Gas flows, Clarendon (1994), 0198561954.
Allen,M.P., Tildesley,D.J., Computer Simulation of Liquids, Oxford University Press (2017), 9780198803195.
Schiff,L.I., Quantum Mechanics, McGraw-Hill (1968), BA10822611.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering.
The grade will be evaluated by quizzes and a written examination or a end-of-semester report.

●Notes

No requirements.
Please register the course at NUCT. Information will be announced via NUCT.

Questions are welcomed by using "messages" in NUCT or e-mail.
Use "messages" in NUCT for discussions among students.

●Contacting Faculty

Questions are welcomed by using "messages" in NUCT or e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp

replace (at) by @

Seminar on Nano Metrology 1A (2.0credits) (ナノ計測工学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods.2.Basic understanding and explanation of micro / nano science and engineering phenomena.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 1B (2.0credits) (ナノ計測工学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods.2.Basic understanding and explanation of micro / nano science and engineering phenomena.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 1C (2.0credits) (ナノ計測工学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods.2.Basic understanding and explanation of micro / nano science and engineering phenomena.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 1D (2.0credits) (ナノ計測工学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods.2.Basic understanding and explanation of micro / nano science and engineering phenomena.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Micro Thermal-Fluids Engineering 1A (2.0credits) (マイクロ熱流体工学セミナー1A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 1C (2.0credits) (マイクロ熱流体工学セミナー1B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 1D (2.0credits) (マイクロ熱流体工学セミナー1C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 1B (2.0credits) (マイクロ熱流体工学セミナー1D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose
The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects
Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics
This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook
Copies of related papers will be distributed at every seminar.

●Additional Reading
Other related materials will be introduced by the instructor.

●Grade Assessment
Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes
No requirements.

●Contacting Faculty
Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Biorobotics and Biomedical Engineering 1A (2.0credits) (バイオロボティクスセミナー1A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.
The purpose of this lecture is for students to acquire basic knowledge of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements

●Course Topics

1. Overview of micro / nano machines
2. Classification of micro / nano machines
3. The fabrication method of micro / nano machines
4. Applications of micro / nano machines
4.1. Application to Robotics
4.2. Application to Biosystems
4.3. Application to biomedical engineering

At the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic knowledge of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.

The classes will be conducted both face-to-face and remotely (interactive communication type).
Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Contact address
Associate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)

*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 1B (2.0credits) (バイオロボティクスセミナー1B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.
The purpose of this lecture is for students to acquire basic knowledge of actuation and regulation mechanism, structure and information transmission mechanism of living body.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements

●Course Topics

1. The actuation mechanism of living organisms
2. Regulation mechanism of organisms and living tissues
3. Biological hierarchical structure, mechanical mechanism and self-healing function
4. Biological sensation and information transmission mechanism

At the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic knowledge of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.

The classes will be conducted both face-to-face and remotely (interactive communication type).
Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Contact address
Associate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)
*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 1C (2.0credits) (バイオロボティクスセミナー1C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.The purpose of this lecture is for students to acquire basic knowledge of micro/nano machine and micro/nano robot related biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements

●Course Topics

1. Overview of medical micro/nano machines2. Micro/nano machine for biological measurement2. Medical micro/nano robot4. Social significance of medical micro/nano machines and robotsAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic knowledge of micro/nano machine and micro/nano robot related biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 1D (2.0credits) (バイオロボティクスセミナー1D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.The purpose of this lecture is for students to acquire basic knowledge of application of actuation and regulation mechanism, structure and information transmission mechanism of living body to micro/nano machines and robots.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements

●Course Topics

1. Micro/nano robots mimicking the actuation mechanism of living organisms2. Micro/nano machines mimicking Regulation mechanism of organisms and living tissues3. Micro/nano robots mimicking Biological hierarchical structure, mechanical mechanism and self-healing function4. Micro/nano machines mimicking Biological sensation and information transmission mechanismAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic knowledge of application of actuation and regulation mechanism, structure and information transmission mechanism of living body to micro/nano machines and robots is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Micro/Nano Processing 1A (2.0credits) (マイクロ・ナノプロセス工学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 1B (2.0credits) (マイクロ・ナノプロセス工学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 1C (2.0credits) (マイクロ・ナノプロセス工学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 1D (2.0credits) (マイクロ・ナノプロセス工学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Material Characterization and Mechanics 1A (2.0credits) (材料強度・評価学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand deformation and fracture of materials based on continuum mechanics. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Strength evaluation of a mechanical component based on elastic-plastic mechanics and fracture mechanics \ 2. Understanding in the several properties of materials with inhomogeneous structure

●Prerequisite Subjects

Strength of Materials Materials Science Solid Mechanics

●Course Topics

1. Elastic-plastic Mechanics 2. Fracture Mechnaics 3. Mechanics of composites 4. Micromechanics
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 1B (2.0credits) (材料強度・評価学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand strength evaluation based on fracture mechanics. By taking turns making oral presentations, students will learn theoretical research method as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in various fracture mechanism and ability to explain the detail \ 2. Understanding in various inspection techniques for damage detection and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Material properties and fracture mechanism 2. Brittle fracture 3. Evaluation of fatigue strength 4. Damage detection and fatigue life assessment
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 1C (2.0credits) (材料強度・評価学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand deformation and fracture of materials based on continuum mechanics. By taking turns making oral presentations, students will learn theoretical research method as well as the trend of the related research. The planned goal of the class is as follows; 1. Ability to design a new mechanical component based on elastic-plastic mechanics and fracture mechanics \ 2. Understanding in new material property with inhomogeneous structure and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Elastic-plastic Mechanics 2. Fracture Mechnaics 3. Mechanics of composites 4. Micromechanics
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 1D (2.0credits) (材料強度・評価学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose
Students are required to read textbooks and papers to understand strength evaluation based on fracture mechanics. By taking turns making oral presentations, students will learn theoretical research method as well as the trend of the related research. The planned goal of the class is as follows; 1. Ability to conduct strength evaluation of a new mechanical component considering various fracture mechanism \ 2. Understanding in various inspection techniques for damage detection and ability to conduct practical fatigue life assessment

●Prerequisite Subjects
Strength of Materials, Materials Science, Solid Mechanics

●Course Topics
1. Material properties and fracture mechanics 2. Brittle fracture 3. Evaluation of fatigue strength 4. Damage detection and fatigue life assessment
Read the textbook and paper in advance.

●Textbook
Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading
Notified during the course, if any.

●Grade Assessment
Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 55 on a scale of 100 will be disqualified.

●Notes
Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty
Inquiries : Inquiries will be accepted during the class

Seminar on Manufacturing Processes Engineering 1A (2.0credits) (生産プロセス工学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To know the basic Knowledge on Tribology and Surface Engineering Goal: \ 1. To understand the research method in Tribology \ 2. To understand the research method on Engineering Surface

●Prerequisite Subjects

Material science, Manufacturing, Ultra presision technology

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 1B (2.0credits) (生産プロセス工学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To understand the basic of Tribology and Surface Engineering and the tendency of the recent research by the presentation

●Prerequisite Subjects

Seminar on manufacturing processes 1A

●Course Topics

Reading of main references

●Textbook

Chosen text book and references will be introduced in the first seminar.

●Additional Reading

●Grade Assessment

Chech by the presentation and discussion

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 1C (2.0credits) (生産プロセス工学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To understand and discuss the new knowledge on the Tribology and Engineering Surface:Goal::1. Proposal of the new method for the research on Tribology :2. Proposal of the new method for the research on Surface Engineering

●Prerequisite Subjects

Seminar on manufacturing processes 1A, 1B

●Course Topics

Reading of main references

●Textbook

Chosen text and references will be introduced inthe first seminar.

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 1D (2.0credits) (生産プロセス工学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To know the strategy of research and advanced way on the Tribology and Surface Engineering:Goal::1. Discussion the new phenomena in Tribology:2. Discussion the new phenomena in Surface Engineering

●Prerequisite Subjects

Seminar on manufacturing processes 1A,1B,1C

●Course Topics

reading of main references

●Textbook

Chosen text and references will be introduced in the first seminar

●Additional Reading

●Grade Assessment

Evalutaion by the presentation oand discussion:

●Notes

●Contacting Faculty

Seminar on Intelligent Robotics 1A (2.0credits) (知能ロボット学セミナー1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to give a seminar on micro-nano mechanical engineering and basics and latest research trend of intelligent robots.

The goals of this course are to
(1) Explain the characteristics, latest research trend, and technical issues on intelligent robots.
(2) Understand and explain elemental technologies used in intelligent robots.

●Prerequisite Subjects

Control engineering, sensing engineering, robotics, mechatronics, programing language

●Course Topics

1. Overview of intelligent robots
2. High precision positioning control
3. Small object manipulation technology
4. High-speed sensing technology
5. Microfabrication technology

Assign preparation tasks and check the preparation status in the class.

●Textbook

Textbooks will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain intelligent robot systems.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 1B (2.0credits) (知能ロボット学セミナー1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to give a seminar on micro-nano mechanical engineering and basics and latest research trend of intelligent robots.

The goals of this course are to
(1) Explain the characteristics, latest research trend, and technical issues on intelligent robots.
(2) Understand and explain elemental technologies used in intelligent robots.

●Prerequisite Subjects

Control engineering, sensing engineering, robotics, mechatronics, programing language

●Course Topics

1. Overview of intelligent robots
2. High precision positioning control
3. Small object manipulation technology
4. High-speed sensing technology
5. Microfabrication technology

Assign preparation tasks and check the preparation status in the class.

●Textbook

Textbooks will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain intelligent robot systems.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 1C (2.0credits) (知能ロボット学セミナー1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to give a seminar on micro-nano mechanical engineering and basics and latest research trend of intelligent robots.

The goals of this course are to
(1) Explain the characteristics, latest research trend, and technical issues on intelligent robots.
(2) Understand and explain elemental technologies used in intelligent robots.

●Prerequisite Subjects

Control engineering, sensing engineering, robotics, mechatronics, programing language

●Course Topics

1. Overview of intelligent robots
2. High precision positioning control
3. Small object manipulation technology
4. High-speed sensing technology
5. Microfabrication technology

Assign preparation tasks and check the preparation status in the class.

●Textbook

Textbooks will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain intelligent robot systems.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 1D (2.0credits) (知能ロボット学セミナー1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to give a seminar on micro-nano mechanical engineering and basics and latest research trend of intelligent robots.

The goals of this course are to
(1) Explain the characteristics, latest research trend, and technical issues on intelligent robots.
(2) Understand and explain elemental technologies used in intelligent robots.

●Prerequisite Subjects

Control engineering, sensing engineering, robotics, mechatronics, programing language

●Course Topics

1. Overview of intelligent robots
2. High precision positioning control
3. Small object manipulation technology
4. High-speed sensing technology
5. Microfabrication technology

Assign preparation tasks and check the preparation status in the class.

●Textbook

Textbooks will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain intelligent robot systems.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

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 Micro-nano Process (2.0credits) (マイクロ・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	Micro-Nano Mechanical Science and Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor

●Course Purpose

The aim of this lecture is to understand the way of micro-nano devices design based on micro- nano-fabrication process.

Goals and objectives
(1) To understand and explain vasious micro- nano- fabrication processes
(2) To understand and explain micro-nano materials for micro-nano devices and evaluation method for their properties

●Prerequisite Subjects

Physics, Semiconductor technologies, materials

●Course Topics

The contents of this lecture is the followings,
(1) Micro- Nano- fabrication process
Photolithography
Physical Vapor DepositionEvapolation, MBE, Sputtering)
Chemical Vapor Deposition
Electron beam Lithography
Printed electronics technology
Nanoimprinting

(2) Micro-nano materials for micro-nano devices and evaluation method for their properties
Functional thin film materials
Evaluation method of the thier properties

Read carefully handouts before attending each class.

●Textbook

Distribute the handouts at every time from NUCT web site.

●Additional Reading

Specify in the handouts.

●Grade Assessment

Test at every lectures and submit report to confirm the level of understanding for goals and objectives.

Qulifying standard
able to explain the concept of each technology.

Test:70%
Report:30%
You need more than mark of 60 out of 100 points for the pass.
Score:100-95:A+, 94-80:A, 79-70:B, 69-65:C, 64-60:C-, Less than 59:F

●Notes

Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question by E-mail.

●Contacting Faculty

Answer after the lecture.
Prof. Hata
TEL: 5223
E-mail:seiichi.hata@mae.nagoya-u.ac.jp

Assoc. Prof. Sakurai
TEL:5289
E-mail:junpei.sakurai@mae.nagoya-u.ac.jp

Advanced Lectures on Nano Metrology (2.0credits) (ナノ計測工学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Kenji FUKUZAWA Professor

●Course Purpose

Learn the basic knowledge of optical measurement as the main measurement method of nano measurement.Achievement goal1. Understand the principle of measurement using light and learn the fundamental ability to solve problems in actual measurement.2. Learn the fundamental skills necessary for optical measurement of micro / nano scale, such as setting-up of optical systems.

●Prerequisite Subjects

1. Electromagnetics 2. Complex function theory 3. Fourier analysis

●Course Topics

1. Wave equation of light2. Reflection and refraction3. Diffraction and interference4. Polarization5. Basics of geometric engineering6. Fundamentals of wave optics7. Fundamentals of optical measurementRead the relevant sections of the textbooks and reference books before each class, and review the contents of the class after class, such as solving problems in the textbooks and reference books.

●Textbook

Regarding textbooks and references will be selected at the beginning of the class.

●Additional Reading

Instruct during class as needed

●Grade Assessment

Written exam or report

●Notes

- No course requirements are required.-The method of conducting the class (on-site (face-to-face) / online / on-demand, etc.) will be communicated through NUCT.- Questions to the instructor should be sent via NUCT "message" function.- Exchange of opinions among students regarding the class should be done through the NUCT "Message" function.

●Contacting Faculty

Accept after class

Advanced Lectures on Material Characterization (2.0credits) (材料評価学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	Spring Semester ,every other year
Lecturer	Ju Yang Professor

●Course Purpose

The method of interdisciplinary assessment of function and integrity of materials system will be studied. The characteristics of the intrinsic properties of materials, the measurement techniques of minute changes of those properties, and the estimation techniques of changes of structure and geometry of materials system should be understand.

●Prerequisite Subjects

The Principles of Engineering Materials

●Course Topics

1st Electrical characteristics of materials 2nd Magnetic characteristics of materials 3rd Characteristics of materials to elastic wave 4th Characteristics of materials to radioactive rays 5th Nondestructive evaluation (NDE) by means of potential d

●Textbook

Lecture notes

●Additional Reading

To be introduced in the class

●Grade Assessment

Term end examination (80%) and reports (20%)

●Notes

●Contacting Faculty

Any time, Contact address: ju(at)mech.nagoya-u.ac.jp, ex.4672
(at) @

Advanced Lectures on Fracture Mechanics (2.0credits) (破壊強度学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Micro-Nano Mechanical Science and Engineering	
Starts 1	1 Spring Semester	
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer

●Course Purpose

To learn the evaluation method of fracture strength of the structure with cracks, and to understand the concept of material resistance against fracture. The concept of the stress field is applied to the crack problems, and the stress singularity is understood. Fracture mechanics parameters such as the stress intensity factor, energy release rate, J integral and crack opening displacement are understood. The technique of applying them to the fracture analysis is studied. Goals: \ 1. The basic concept of the fracture mechanics should be able to be understood, and to be explained. \ 2. Stress field around cracks can be explained. \ 3. Critical conditions for fracture can be evaluated.

●Prerequisite Subjects

Mechanics of Materials Solid Mechanics

●Course Topics

1. Fractography 2. Stress field near crack 3. Linear elastic fracture mechanics 4. Fracture criteria 5. Energy principle 6. Elastic plastic fracture mechanics 7. Fatigue fracture 8. Life evaluation
Download the lecture materials distributed at NUCT in advance and prepare for each lesson.
In addition, investigate research related to the latest fracture mechanics and materials science will be conducted before the lecture, and the contents of the research will be presented during the lecture in groups.

●Textbook

Printed literature is prepared, and distributed.

●Additional Reading

To be introduced in the class

●Grade Assessment

The weight of the evaluation to the goals is equal. Examination 50%, Exercise 50%More than 60 points are accepted. Contact address: toku@mech.nagoya-u.ac.jp, ext. 4673

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Any time, Contact address: toku@mech.nagoya-u.ac.jp, ext. 4673

Advanced Lectures on Surface Engineering (2.0credits) (機能表面工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Micro-Nano Mechanical Science and Engineering	
Starts 1	1 Spring Semester	
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor

●Course Purpose

To konw the fundamental and application of Tribology to improve machine systems on the basis of Manufacturing and Mateial Science

●Prerequisite Subjects

Material science,

●Course Topics

1. Engineering surface 2. Fundamental of Tribology 3. Fabricationmethod of engineering surface 4. Advanved machine with engineering surface

●Textbook

●Additional Reading

●Grade Assessment

Presentation, Report

●Notes

●Contacting Faculty

Advanced Lectures on Manufacturing Processes Engineering (2.0credits) (生産プロセス工学特論)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Micro-Nano Mechanical Science and Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor

●Course Purpose

Mnufactureing with plasma and ion is useful in nano- and micro-scale manufacturing, and now essential for nano-technology. In this class, we study about the characteristics and latest results of plasma/ion-assisted manufacturing on the basis of fundamental knowledge of Precision Manufacturing, Material Processing, Manufacturing Process Engineering, Electromagnetics, Fluid Dynamics, which you studied in undergradute course.

●Prerequisite Subjects

Precision Manufacturing, Material Processing, Manufacturing Process Engineering, Electromagnetics, Fluid Dynamics

●Course Topics

1. What is plasma and ion beam? 2. Introduction of plasma/ion-assisted manufacturing. 3. Theoretical description of plasma and ion behavior. 4. Measurement of plasma and ion. 5. Analysis methods of surface manufactured with plasma and ion. 6. Ad

●Textbook

●Additional Reading

1. Principles of Plasma discharges and materials processing M. A Lierberman and A. J. Lichtenberg \ Wiley Intyerscience

●Grade Assessment

Presentation, Report and Examination

●Notes

●Contacting Faculty

Advanced Lectures on Biomicro Mechatronics (2.0credits) (バイオマイクロメカトロニクス特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	Spring Semester ,every other year
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.
The purpose of this lecture is for students to acquire basic knowledge of applications, and the latest research on Bio micro-mechatronics and Robotics.

●Prerequisite Subjects

Mechatronics Engineering, Control Engineering, Robotics engineering, Basic Course on Biomedical Engineering

●Course Topics

1. Current Trends of Robotics & Mechatronics,
2. Basics of Micro-nano Mechatronics,
3. Physical Phenomenon in Micro-nano World,
4. Miniature Robots,
5. Basics of Robotics,
6. Mico-nano Manipulation,
7. Biomedical Applications

At the end of each lecture, a report related to the lecture is imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic knowledge of applications, and the latest research on Bio micro-mechatronics and Robotics is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.

The classes will be conducted both face-to-face and remotely (interactive communication type).
Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Contact address
Associate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)

*Please replace to @ in the e-mail address.

Advanced Lectures on Intelligent Motion Control (2.0credits) (知的制御特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	Autumn Semester ,every other year
Lecturer	Yasuhisa Hasegawa Professor

●Course Purpose

This course introduces controller design and stability analysis methods for nonlinear dynamical system. feedback control for rapid and precise robot motion and iterative learning for a robot with unknown dynamics. By the end of the course, student should be able to design an appropriate controller for1. Rapid and precise motion of a robot,2. A robot with unknown parameters of its dynamics.

●Prerequisite Subjects

Robotics, control theory, linear algebra, and analytical dynamics

●Course Topics

Contents: 1. Evaluation of the internal stability using the Lyapunov function 2. Evaluation of internal stability using small gain theorem and the passivity 3. Learnability, and output dissipativity and strictly positive real 4. Iterative learning control 5. Adaptive Control

●Textbook

Control theory of non-linear mechanical systems : a passivity-based and circuit-theoretic approachSuguru ArimotoThe Oxford engineering science series, 49Oxford University Press, 1996

●Additional Reading

Some references are introduced in class.

●Grade Assessment

Each student taking the course will be evaluated by reports and score of final examination.

●Notes

●Contacting Faculty

Please contact to hasegawa@mein.nagoya-u.ac.jp or directly at class room, if you have any question.

Advanced Lectures on Biomechanism and Bioengineering (2.0credits) (生体機能工学特論)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.
The purpose of this lecture is for students to acquire basic knowledge of bioengineering from macro-scale (organ and tissue) to micro, nano-scale (cell and bio-molecule) are studied. Moreover, Artificial organ, Treatment technilogy, measurement technology cell engineering and tissue engineering are studied.

Targets
Understand the fundamental of bioengineering
Understand and explain the concrete examples of artificiala organ and tissue engineering

●Prerequisite Subjects

Basic Course on Biomedical Engineering, Mechatronics Engineering

●Course Topics

1. Fundamentals of Biomechanical Engineering
2. Overview of Artificial Organs
3. Skeleton
4. Respiratory Apparatus
5. Circulatory Organ
6. Digestive Organ
7. Red blood cell
8. Bio-material
9. Cell engineering
10. Regenerative medicine
11. Treatment engineering
12. Meawsurement engineering
13. Diagnosis engineering
14. Brain-machine interface
15. Prospect of bio-enginnering

At the end of each lecture, a report related to the lecture is imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

“Bioengineering for tissue engineering”,Toshihiro Akaike, Corona publishing

●Grade Assessment

The degree of acquisition of basic knowledge of bioengineering is evaluated by reports in each class and is reflected on grades.

●Notes

No registration requirements required.

The classes will be conducted both face-to-face and remotely (interactive communication type).
Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Contact address
Associate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)
*Please replace to @ in the e-mail address.

al Lectures on Micro-Nano Mechanical Science and Engineering 1 (1.0credits) (マイクロ・ナノ機械理工学特別講

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Part-time Faculty

●Course Purpose
The aim is to gain a wide range of insights into micro / nano mechanical science and engineering.

Achievement goals
1. Students can take lectures by instructors who are close to their own specialty, and deepen their specialty.
2. A wide range of knowledge on micro / nano can be obtained from lectures that differ from their own specialties.

●Prerequisite Subjects
Confirm the specialty of the facilitator lab

●Course Topics
A relay lecture will be given by external lecturers (multiple) in the field of micro / nano mechanical science and engineering. The contents of each lecture will be announced in advance by posting.

Before the class, confirm each instructor's specialty and their papers.

●Textbook
Distribute handouts.

●Additional Reading
Refer to handouts

●Grade Assessment
Attend a lecture hosted by the two facilitator laboratories.
Credits are awarded for meeting the specified criteria (attendance, report).

●Notes

●Contacting Faculty
After class

al Lectures on Micro-Nano Mechanical Science and Engineering 2 (1.0credits) (マイクロ・ナノ機械理工学特別講

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Part-time Faculty

●Course Purpose

The aim is to gain a wide range of insights into micro / nano mechanical science and engineering.
Achievement goals
1. Take lectures by instructors who are close to their own specialty, and deepen your specialty.
2. A wide range of knowledge on micro / nano can be obtained from lectures that differ from their own specialties.

●Prerequisite Subjects

Confirm the specialty of the facilitator lab

●Course Topics

A relay lecture will be given by external lecturers (multiple) in the field of micro / nano mechanical science and engineering. The contents of each lecture will be announced in advance by posting.

Before the class, confirm each instructor's specialty and their papers.

●Textbook

Distribute handouts.

●Additional Reading

Refer to handouts

●Grade Assessment

Attend a lecture hosted by the two facilitator laboratories.
Credits are awarded for meeting the specified criteria (attendance, report).

●Notes

●Contacting Faculty

After class

al Lectures on Micro-Nano Mechanical Science and Engineering 3 (1.0credits) (マイクロ・ナノ機械理工学特別講

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Part-time Faculty

●Course Purpose

The aim is to gain a wide range of insights into micro / nano mechanical science and engineering.
Achievement goals
1. Students can take lectures by instructors who are close to their own specialty, and deepen their specialty.]
2. A wide range of knowledge on micro / nano can be obtained from lectures that differ from their own specialties.

●Prerequisite Subjects

Confirm the specialty of the facilitator lab

●Course Topics

A relay lecture will be given by external lecturers (multiple) in the field of micro / nano mechanical science and engineering. The contents of each lecture will be announced in advance by posting.
Before the class, examine the instructor's specialty and their papers.

●Textbook

Distribute handouts.

●Additional Reading

Refer to handouts

●Grade Assessment

Attend a lecture hosted by the two facilitator laboratories.Credits are awarded for meeting the specified criteria (attendance, report).

●Notes

●Contacting Faculty

After class

Exercises in Material Characterization and Mechanics A (1.0credits) (材料強度・評価学特別実験及び演習A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to apply the fundamentals of the strength of materials to engineering design. The planned goal of the class is as follows; 1.Understanding in the fundamentals of fracture mechanics and ability to apply them to the practical design. \ 2. Mastering the prediction methods of life prediction and ability to apply them to the practical design.

●Prerequisite Subjects

Mechanics of Meterials, Materials Science

●Course Topics

1. Fracture mechanics design 2. Fatigue life prediction 3. Damage evaluation 4. Reliablity analysis
Read the textbook and paper in advance.

●Textbook

The subjects of exercise are selected at the beginning of the semester, and the copies of the related publications will be handed out.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Exercises in Material Characterization and Mechanics B (1.0credits) (材料強度・評価学特別実験及び演習B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to apply the fundamentals of the strength of materials to engineering design. The planned goal of the class is as follows; 1. Understanding the methods of fracture control design and ability to apply them to practical design. \ 2. Mastering the prediction methods of life prediction through simulation techniques.

●Prerequisite Subjects

Mechanics of Materials Materials Science

●Course Topics

1. Evaluation of the strength of materials 2. Simulation of fracture process 3. Analysis of fracture accident
Read the textbook and paper in advance.

●Textbook

The subjects of exercise are selected at the beginning of the semester, and the copies of the related publications will be handed out.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Exercises in Manufacturing Processes Engineering A (1.0credits) (生産プロセス工学特別実験及び演習A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To learn the knowledge on Tribology, surface engineering and manufacturing process engineering with fundamental experiments

●Prerequisite Subjects

Material science, Precison engineering, Ultra presicion technology

●Course Topics

Fundamental experiment on Tribology, Engineering surface and process engineering

●Textbook

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion

●Notes

●Contacting Faculty

Exercises in Manufacturing Processes Engineering B (1.0credits) (生産プロセス工学特別実験及び演習B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To learn the knowledge on Tribology, surface engineering and manufacturing process engineering with fundamental experiments

●Prerequisite Subjects

Exercises in Manufacturing Processes Engineering A

●Course Topics

Advanced experimets on Trobology and manufacturing process engineering for obtaining fundamental knowledge

●Textbook

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion

●Notes

●Contacting Faculty

Exercises in Nano Metrology A (1.0credits) (ナノ計測工学特別実験及び演習A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The purpose is to conduct experiments and exercises on issues and to understand the fundamentals and applications of micro / nano measurement technology.Achievements:1. Understand the principle, configuration, and features of micro / nano measurement technology.2. The acquired micro / nano measurement technology can be applied to solving problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Understanding measurement principles2. Design and production of measurement system3. Processing and understanding of measurement informationAccording to weekly guidance, data collection, experiment preparation, data reduction, and data analysis should be performed.

●Textbook

Instruct during class as needed

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated based on the process and progress of the problem solving in experiments and exercises.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Exercises in Nano Metrology B (1.0credits) (ナノ計測工学特別実験及び演習B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The purpose is to conduct experiments and exercises on issues and to understand the fundamentals and applications of micro / nano measurement technology.Achievements:1. Understand the principle, configuration, and features of micro / nano measurement technology.2. The acquired micro / nano measurement technology can be applied to solving problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Understanding measurement principles2. Design and production of measurement system3. Processing and understanding of measurement informationAfter class, follow the instruction during class to collect materials, prepare for experiments, organize data, analyze data, and make presentation materials.

●Textbook

Instruct during class as needed

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated based on the process and progress of the problem solving in experiments and exercises.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Exercises in Micro Thermal-Fluids Engineering A (1.0credits) (マイクロ熱流体工学特別実験及び演習A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose
The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects
Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics
This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook
Copies of related papers will be distributed at every seminar.

●Additional Reading
Other related materials will be introduced by the instructor.

●Grade Assessment
Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes
No requirements.

●Contacting Faculty
Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Exercises in Micro Thermal-Fluids Engineering B (1.0credits) (マイクロ熱流体工学特別実験及び演習B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose
The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects
Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics
This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook
Copies of related papers will be distributed at every seminar.

●Additional Reading
Other related materials will be introduced by the instructor.

●Grade Assessment
Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes
No requirements.

●Contacting Faculty
Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Exercises in Biorobotics and Biomedical Engineering A (1.0credits) (バイオロボティクス特別実験及び演習A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.The purpose of this exercise is for students to acquire basic technique of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of MeasurementsExp. and Workshop Practice in Mech. and Aerospace Eng. 1Exp. and Workshop Practice in Mech. and Aerospace Eng. 2

●Course Topics

1. Micro-fabrication technologies for micro/nano machine fabrication2. Fabrication of micro/nano machines using micro-fabrication3. Micro manipulation and measurement using micro/nano machinesAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic technique of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Exercises in Biorobotics and Biomedical Engineering B (1.0credits) (バイオロボティクス特別実験及び演習B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, improvement of ability on autonomous analysis and resolution of engineering issues, and the ability to develop into new areas are promoted.The purpose of this exercise is to acquire basic technique of fabrication of micro/nano machines and robots mimicking the actuation mechanism and structure of living body.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of MeasurementsExp. and Workshop Practice in Mech. and Aerospace Eng. 1Exp. and Workshop Practice in Mech. and Aerospace Eng. 2

●Course Topics

1. Design of The actuation mechanism of living organisms2. Fabrication of the actuation mechanism mimicking living organisms using micro- fabrication technique.3. Fabrication of the actuation mechanism mimicking living organisms using 3D printer.2. Evaluation of the actuation mechanism mimicking living organisms.At the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of basic technique of fabrication of micro/nano machines and robots mimicking the actuation mechanism and structure of living body is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No requirement for this lecture.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Execises in Intelligent Robotics A (1.0credits) (知能ロボット学特別実験及び演習A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to learn basic knowledge and practical techniques of intelligent robots through the design and manufacture of robotic systems.

The goals of this course are to
(1) Design and development intelligent robot systems
(2) Control intelligent robot systems

●Prerequisite Subjects

Design drawing, control engineering, robotics, mechatronics, system engineering

●Course Topics

1. Design and development of robot systems
2. Control of robot systems

Assign preparation tasks and check the preparation status in the class.

●Textbook

Text books will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Grading will be calculated according to the performance of the developed robot system.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Execises in Intelligent Robotics B (1.0credits) (知能ロボット学特別実験及び演習B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to learn basic knowledge and practical techniques of intelligent robots through the design and manufacture of robotic systems.

The goals of this course are to
(1) Design and development intelligent robot systems
(2) Control intelligent robot systems

●Prerequisite Subjects

Design drawing, control engineering, robotics, mechatronics, system engineering

●Course Topics

1. Design and development of robot systems
2. Control of robot systems

Assign preparation tasks and check the preparation status in the class.

●Textbook

Text books will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Grading will be calculated according to the performance of the developed robot system.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Exercises in Micro/Nano Processing　A (1.0credits) (マイクロ・ナノプロセス工学特別実験及び演習A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose

The aim is to understand design, fabrication, actuation, and control techniques of microsensors and microactuators.
You will become able to
1. Explain design and fabrication of microdevices.
2. Explain scale effects in microsystems.
3. Explain principle of microsensors and microactuators.

●Prerequisite Subjects

Material Science, Mechanical Engineering, Electrical and Electronics Engineering, Physics, Semiconductor technologies

●Course Topics

Reading books and papers about microdevices, and giving a presentation. Discussing contents of the literature to achieve the above aim.

●Textbook

The literature is selected at the first class.
For examples, papers in Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems.

●Additional Reading

Microsystem Design: Stephen D. Senturia (Springer US)

●Grade Assessment

Score is evaluated by equally each learning item described in Purpose. In particular, it is marked by the reports, presentation, and discussion. You need more than mark of 60 out of 100 points for the pass.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes

Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty

Contact faculty verbally or via Microsoft Teams.

Exercises in Micro/Nano Processing　B (1.0credits) (マイクロ・ナノプロセス工学特別実験及び演習B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose

The aim is to understand design, fabrication, actuation, and control techniques of microsensors and microactuators.
You will become able to
1. Explain design and fabrication of microdevices.
2. Explain scale effects in microsystems.
3. Explain principle of microsensors and microactuators.

●Prerequisite Subjects

Material Science, Mechanical Engineering, Electrical and Electronics Engineering, Physics, Semiconductor technologies

●Course Topics

Reading books and papers about microdevices, and giving a presentation. Discussing contents of the literature to achieve the above aim.

●Textbook

The literature is selected at the first class.
For examples, papers in Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems.

●Additional Reading

Microsystem Design: Stephen D. Senturia (Springer US)

●Grade Assessment

Score is evaluated by equally each learning item described in Purpose. In particular, it is marked by the reports, presentation, and discussion. You need more than mark of 60 out of 100 points for the pass.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes

Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty

Contact faculty verbally or via Microsoft Teams.

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

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	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose
Experience practical engineering in the real world by conducting practical training at private companies and research institutes outside the university for a certain period of time. Learn the relationship between engineering and society in an environment different from the university environment, and reaffirm the importance of basic science.

Achivement goals
1. Experience engineering practice at companies and laboratories.
2. Through the training, able to confirm the required knowledge and skill for your future.

●Prerequisite Subjects
Fundamentals of engineering and your specialty

●Course Topics
Assignments are set as appropriate in consultation with the training destination.

●Textbook
confirm to training destination

●Additional Reading
confirm to training destination

●Grade Assessment
Submit report and presentation.
You need more than mark of 60 out of 100 points. If the fundamental topics are successfully understood, credit will be awarded. Higher grade will be provided depending on the level of understood topics.

●Notes

●Contacting Faculty
Appropriately

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	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose

Experience practical engineering in the real world by conducting practical training at private companies and research institutes outside the university for a certain period of time.
Learn the relationship between engineering and society in an environment different from the university environment, and reaffirm the importance of basic science.

Achivement goals
1. Experience engineering practice at companies and laboratories.
2. Through the training, able to confirm the required knowledge and skill for your future.

●Prerequisite Subjects

Fundamentals of engineering and your specialty

●Course Topics

Assignments are set as appropriate in consultation with the training destination.

●Textbook

confirm to training destination

●Additional Reading

confirm to training destination

●Grade Assessment

Submit report and presentation.
You need more than mark of 60 out of 100 points. If the fundamental topics are successfully understood, credit will be awarded. Higher grade will be provided depending on the level of understood topics.

●Notes

●Contacting Faculty

Appropriately

Seminar on medical engineering (2.0credits) (医工連携セミナー)

Course Type	Comprehensive engineering courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Materials Process Engineering	Chemical Systems Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace 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	
Lecturer	Associated Faculty		

●Course Purpose

In the coming decades with growing overage population, novel technologies and outstanding ideas for the new breakthrough strategy of tailor-made medical therapy is strongly required. For the establishment of such strategy, basic technologies that enable the detection and diagnosis of molecular dynamics should be investigated. In this class, we try to educate young researchers to step out to this new frontier by setting various types of classes held by very advanced researchers in medical engineering field in Nagoya University. The lecturers are invited from engineering faculty and medical faculty, and introduce the expected ideas and the most recent achievements in the aspect of medical engineering.

1. Explain the importance of medical engineering research
2. Explain the outline of medical engineering research in Nagoya University
3. Explain the potential engineering ability needed for committing in medical engineering field

●Prerequisite Subjects

Clinical medicine, Molecular biology, Biological engineering, Biomechanics, Robotics, Medical engineering, Bioinformatics

●Course Topics

In every lecture, different lectures invited from different fields (engineer, doctors, etc.) teach the most recent advances in the field of medical engineering.

The following viewpoint will be focused

1. Propose the engineering techniques needed in clinical research or treatment
2. Propose the analytical methods for clinical research or treatment
3. Introduce the engineering techniques with high potency for clinical research

The lecture is mostly presented by power point, and for some classes, handouts are provided.

●Textbook

Not specified, but distributed handouts if necessary.

●Additional Reading

It will be appointed if necessary.

●Grade Assessment

Reports (80%) and interview (20%)

●Notes

Not needed

●Contacting Faculty

At lecture time

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.

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.

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)

Seminar on Nano Metrology 2A (2.0credits) (ナノ計測工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods and almost solve related new problems.2.Basic understanding and explanation of micro / nano science and engineering phenomena and almost solve related new problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 2B (2.0credits) (ナノ計測工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods and almost solve related new problems.2.Basic understanding and explanation of micro / nano science and engineering phenomena and almost solve related new problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 2C (2.0credits) (ナノ計測工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods and almost solve related new problems.2.Basic understanding and explanation of micro / nano science and engineering phenomena and almost solve related new problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 2D (2.0credits) (ナノ計測工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods and almost solve related new problems.2.Basic understanding and explanation of micro / nano science and engineering phenomena and almost solve related new problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

Instruct during class as needed

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

NUCT

●Contacting Faculty

Accept after class

Seminar on Nano Metrology 2E (2.0credits) (ナノ計測工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	3 Spring Semester		
Lecturer	Kenji FUKUZAWA Professor	Shintarou ITOU Associate Professor	Naoki AZUMA Assistant Professor

●Course Purpose

The aim is to learn the basics of micro / nano measurement technology for analyzing shapes, movements, characteristics, etc. with high resolution for micro / nano mechatronics, biomanipulation, and micro / nano machining, and to learn basic knowledge of related micro / nano science and engineering phenomena, by reading and presenting textbooks and documents.Achievements:1.Understand and explain the principles, specific configurations, and features of micro / nano measurement methods and almost solve related new problems.2.Basic understanding and explanation of micro / nano science and engineering phenomena and almost solve related new problems.

●Prerequisite Subjects

Material engineering, vibration engineering, signal processing, sensing engineering

●Course Topics

1. Basics of micro / nano measurement2. Basics of micro / nano science and engineering3. Basics of micro / nano mechatronicsRead relevant textbooks and reference books before each class and prepare presentation materials. After the class, review the contents of the class by using textbooks and reference books to clarify questions during the class.

●Textbook

Select textbooks / literatures to be read at the beginning of the year.

●Additional Reading

No course requirements

●Grade Assessment

The goal achievement is evaluated by oral presentation at the seminar and Q & A session.

●Notes

- No course requirements are required.- The class will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be instructed by NUCT.

●Contacting Faculty

Accept after class

Seminar on Micro Thermal-Fluids Engineering 2A (2.0credits) (マイクロ熱流体工学セミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 2B (2.0credits) (マイクロ熱流体工学セミナー2B)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 2C (2.0credits) (マイクロ熱流体工学セミナー2C)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose
The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects
Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics
This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook
Copies of related papers will be distributed at every seminar.

●Additional Reading
Other related materials will be introduced by the instructor.

●Grade Assessment
Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes
No requirements.

●Contacting Faculty
Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 2D (2.0credits) (マイクロ熱流体工学セミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Autumn Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose

The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects

Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics

This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook

Copies of related papers will be distributed at every seminar.

●Additional Reading

Other related materials will be introduced by the instructor.

●Grade Assessment

Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes

No requirements.

●Contacting Faculty

Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Micro Thermal-Fluids Engineering 2E (2.0credits) (マイクロ熱流体工学セミナー2E)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	3 Spring Semester
Lecturer	Hiroki YAMAGUCHI Associate Professor

●Course Purpose
The purpose of this seminar is to have better understanding on specific phenomena appear in the nano- and micro-scale thermal-fluids engineering by reading texts and research papers.
Through the course, students will be able to have basic and latest knowledge of nano- and micro-scale thermal-fluids engineering.

●Prerequisite Subjects
Basic mathematics and physics, Physics I, Fundamentals of Fluid Mechanics with Exercises, Viscous Fluid Dynamics with Exercises, Heat Transfer Engineering with Exercises

●Course Topics
This seminar is based on the reading of texts and research papers related to the nano- and micro-scale thermal-fluids phenomena.
Please read specified parts before every seminar.

●Textbook
Copies of related papers will be distributed at every seminar.

●Additional Reading
Other related materials will be introduced by the instructor.

●Grade Assessment
Students are required to be able to properly explain about the micro- and nano-scale thermal-fluids engineering. The grade will be determined according to contributions during the seminar and reports.

●Notes
No requirements.

●Contacting Faculty
Please contact the instructor by e-mail.

Contacts
Hiroki YAMAGUCHI hiroki(at)nagoya-u.jp
replace (at) by @

Seminar on Biorobotics and Biomedical Engineering 2A (2.0credits) (バイオロボティクスセミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, researchers and engineers who can create new academic fields and new industrial areas in fields such as devices and systems are promoted.
The purpose of this lecture is for students to acquire application knowledge and technique of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements, Advanced Lectures on Biomicro Mechatronics, Advanced Lectures on Biomechanism and Bioengineering

●Course Topics

1. Overview of micro / nano machines
2. Classification of micro / nano machines
3. The fabrication method of micro / nano machines
4. Applications of micro / nano machines
4.1. Application to Robotics
4.2. Application to Biosystems
4.3. Application to biomedical engineering

At the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of application knowledge and technique of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.

The classes will be conducted both face-to-face and remotely (interactive communication type).
Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.

Contact address
Associate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)
*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 2B (2.0credits) (バイオロボティクスセミナー2B)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	1 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, researchers and engineers who can create new academic fields and new industrial areas in fields such as devices and systems are promoted.The purpose of this lecture is for studentsto acquire application knowledge and technique of actuation and regulation mechanism, structure and information transmission mechanism of living body.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements, Advanced Lectures on Biomicro Mechatronics, Advanced Lectures on Biomechanism and Bioengineering

●Course Topics

1. The actuation mechanism of living organisms2. Regulation mechanism of organisms and living tissues3. Biological hierarchical structure, mechanical mechanism and self-healing function4. Biological sensation and information transmission mechanismAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of application knowledge and technique of actuation and regulation mechanism, structure and information transmission mechanism of living body is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 2C (2.0credits) (バイオロボティクスセミナー2C)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, researchers and engineers who can create new academic fields and new industrial areas in fields such as devices and systems are promoted.The purpose of this lecture is for students to acquire application knowledge and technique of micro/nano machine and micro/nano robot related biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements, Advanced Lectures on Biomicro Mechatronics, Advanced Lectures on Biomechanism and Bioengineering

●Course Topics

1. Overview of medical micro/nano machines2. Micro/nano machine for biological measurement2. Medical micro/nano robot4. Social significance of medical micro/nano machines and robotsAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of application knowledge and technique of micro/nano mechanical engineering related to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 2D (2.0credits) (バイオロボティクスセミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	2 Autumn Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, researchers and engineers who can create new academic fields and new industrial areas in fields such as devices and systems are promoted.The purpose of this lecture is for students to acquire application knowledge and techniqu of application of actuation and regulation mechanism, structure and information transmission mechanism of living body to micro/nano machines and robots.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements, Advanced Lectures on Biomicro Mechatronics, Advanced Lectures on Biomechanism and Bioengineering

●Course Topics

1. Micro/nano robots mimicking the actuation mechanism of living organisms2. Micro/nano machines mimicking Regulation mechanism of organisms and living tissues3. Micro/nano robots mimicking Biological hierarchical structure, mechanical mechanism and self-healing function4. Micro/nano machines mimicking Biological sensation and information transmission mechanismAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of application knowledge and technique of application of actuation and regulation mechanism, structure and information transmission mechanism of living body to micro/nano machines and robots is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Biorobotics and Biomedical Engineering 2E (2.0credits) (バイオロボティクスセミナー2E)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Micro-Nano Mechanical Science and Engineering
Starts 1	3 Spring Semester
Lecturer	Hisataka MARUYAMA Associate Professor

●Course Purpose

Interdisciplinary education and research centered on mechanical science and engineering in the micro/nano-scale area, researchers and engineers who can create new academic fields and new industrial areas in fields such as devices and systems are promoted.The purpose of this lecture is for students to acquire application skills of micro/nano machines and robots to robotics, biosystems, and biomedical engineering.

●Prerequisite Subjects

Actuator Engineering, Sensing Engineering, Mechatronics Engineering, Basic Course on Biomedical Engineering, Fundamentals of Measurements, Advanced Lectures on Biomicro Mechatronics, Advanced Lectures on Biomechanism and Bioengineering

●Course Topics

1. Application of micro/nano machines and robots to robotics2. Application of micro/nano machines and robots to biosystems3. Application of micro/nano machines and robots to biomedical engineeringAt the end of each lecture, presentation theme and report for the next lecture will be imposed.

●Textbook

Although there is no specific textbook or reference book to be specified individually, necessary materials and prints are distributed and specified as appropriate according to the progress of the class and the students' understanding.

●Additional Reading

I will introduce appropriate references as the lecture progresses.

●Grade Assessment

The degree of acquisition of application skills of micro/nano machines and robots to robotics, biosystems, and biomedical engineering is evaluated by reports and presenttions in each class and is reflected on grades.

●Notes

No registration requirements required.The classes will be conducted both face-to-face and remotely (interactive communication type). Remote classes will be conducted using Teams.

●Contacting Faculty

I will respond to questions during breaks after lectures or at office hours.Contact addressAssociate Prof. Maruyama (ext: 5026, e-mail: hisataka.maruyamamae.nagoya-u.ac.jp)*Please replace to @ in the e-mail address.

Seminar on Micro/Nano Processing 2A (2.0credits) (マイクロ・ナノプロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 2B (2.0credits) (マイクロ・ナノプロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams. Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 2C (2.0credits) (マイクロ・ナノプロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 2D (2.0credits) (マイクロ・ナノプロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Micro/Nano Processing 2E (2.0credits) (マイクロ・ナノプロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	3 Spring Semester		
Lecturer	Seiichi HATA Professor	Junpei SAKURAI Associate Professor	Chiemi OKA Assistant Professor

●Course Purpose
Learning basic knowledge on MEMS (Micro-Electro-Mechanical Systems) materials and their processing techniques. Obtaining presentation and discussion skills.

●Prerequisite Subjects
Material Science, Mechanical Engineering, Electrical and Electronics Engineering

●Course Topics
Discussing results and future plan of research projects of each student through oral presentation.

●Textbook
Textbooks will be assigned as appropriate.

●Additional Reading
International journals: Journal of Micromechanics and Microengineering, Sensors and Actuators:A, Journal of Microelectromechanical Systems

●Grade Assessment
Oral presentation and discussions are evaluated. Credit is provided for 60% achievement of the full score.
Score: 100-95: A+, 94-80: A, 79-70: B, 69-65: C, 64-60: C-, Less than 59: F

●Notes
Anyone can take this class.
Classes will be conducted in combination with face-to-face and remote (two-way communication type).
Remote learning is conducted by Teams, Details will be notified by NUCT.
Ask question verbally or via Microsoft Teams.

●Contacting Faculty
Contact faculty verbally or via Microsoft Teams.

Seminar on Material Characterization and Mechanics 2A (2.0credits) (材料強度・評価学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand strength evaluation of materials based on the motion of the atoms. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in the essence of deformation and fracture from a viewpoint of atomic motion and ability to explain the mechanics \ 2. Understanding in the unique properties of micro materials under deformation and fracture and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Atomic system model continuum mechanics 2. Microscopic deformation and fracture 3. Strength evaluation of micro materials 4. Deformation and fracture of carbon nanotubes and nanoscopic structure Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 2B (2.0credits) (材料強度・評価学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand evaluation methods of deformation and damage based on the crystal structure. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in the deformation and fracture behavior based on the crystal structure and ability to explain the mechanism \ 2. Understanding in damage evaluation methods of crystalline materials and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Mechanics of monocrystals and polycrystals 2. Crystal structure and mechanism of deformation and fracture 3. Damage detection
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 2C (2.0credits) (材料強度・評価学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand deformation mechanism and strength evaluation of nano-crystalline materials. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in the relation between microstructure and mechanical properties of materials and ability to explain the theory \ 2. Understanding in the strengthening mechanism of nano-crystalline materials and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Microstructure and mechanical 2. Deformation of nano-crystalline materials 3. Fracture strength of nano-crystalline materials
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified. Conditions for Application : None Inquiries : Inquiries will be accepted during the class

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 2D (2.0credits) (材料強度・評価学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand the mechanical properties and strength of functional materials. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in deformation behavior and strength properties of functional materials and ability to explain the detail \ 2. Understanding in the design methods for optimum construction of intelligent materials and structures and ability to explain the detail

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Mechanical properties of functional materials 2. Strength evaluation of functional materials 3. Intelligent materials and structures
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Material Characterization and Mechanics 2E (2.0credits) (材料強度・評価学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	3 Spring Semester		
Lecturer	Ju Yang Professor	Yuki TOKU Lecturer	Yasuhiro KIMURA Assistant Professor

●Course Purpose

Students are required to read textbooks and papers to understand the deformation and fracture mechanism of ductile and brittle thin films. By taking turns making oral presentations, students will learn theoretical research methods as well as the trend of the related research. The planned goal of the class is as follows; 1. Understanding in mechanical properties of thin films and ability to explain the detail \ 2. Understanding in the design methods for optimization of thin film structures and ability to explain the theory

●Prerequisite Subjects

Strength of Materials, Materials Science, Solid Mechanics

●Course Topics

1. Mechanics of thin films 2. Evaluation of mechanical properties in thin films 3. Optimum thin film structure
Read the textbook and paper in advance.

●Textbook

Textbook to read by turns will be notified at the beginning of the semester. Papers will be selected in the course of the class.

●Additional Reading

Notified during the course, if any.

●Grade Assessment

Achievement will be evaluated by oral presentation and the questions and answers. Those with the score of less than 60 on a scale of 100 will be disqualified.

●Notes

Classes will be conducted in combination with face-to-face and remote (two-way communication type). Remote learning is conducted by Teams or Zoom, but live distribution to YouTube may also be used. Details will be notified by NUCT.

●Contacting Faculty

Inquiries : Inquiries will be accepted during the class

Seminar on Manufacturing Processes Engineering 2A (2.0credits) (生産プロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To know the basic and advanced Knowledge on Tribology and Surface Engineering:Goal::1. To understand the research method in Tribology:2. To understand the research method on Engineering Surface

●Prerequisite Subjects

Material Scinece, Precison Engineering, Ultra presiciao engineering

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 2B (2.0credits) (生産プロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To understand the basic and advanced of Tribology and Surface Engineering and the tendency of the recent research by the presentation

●Prerequisite Subjects

Seminar on Manufacturing Processes Engineering 2 A

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 2C (2.0credits) (生産プロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To understand and discuss the new knowledge on the advanced Tribology and advaced Engineering Surface:Goal::1. Proposal of the new method for the research on Tribology :2. Proposal of the new method for the research on Surface Engineering

●Prerequisite Subjects

Seminar on Manufacturing Processes Engineering 2 A, 2B

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 2D (2.0credits) (生産プロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To know the strategy of research and advanced way on the advanced Tribology and advaced Surface Engineering:Goal::1. Discussion the new phenomena in Tribology:2. Discussion the new phenomena in Surface Engineering

●Prerequisite Subjects

Seminar on Manufacturing Processes Engineering 2 A, 2B and 2C

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Manufacturing Processes Engineering 2E (2.0credits) (生産プロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	3 Spring Semester		
Lecturer	Noritsugu UMEHARA Professor	Takayuki TOKOROYAMA Associate Professor	Motoyuki MURASHIMA Assistant Professor

●Course Purpose

To know the strategy of research and advanced way on the Tribology and Surface Engineering:Goal::1. Discussion the new phenomena in Tribology and show the strategy for some issues:2. Discussion the new phenomena in Surface Engineering and show the strategy for some issues

●Prerequisite Subjects

Seminar on Manufacturing Processes Engineering 2 A, 2B, 2C and 2D

●Course Topics

Reading of main references

●Textbook

Chosen references will be introduced in the first seminar in this Semester

●Additional Reading

●Grade Assessment

Evaluation by the presentation and discussion:

●Notes

●Contacting Faculty

Seminar on Intelligent Robotics 2A (2.0credits) (知能ロボット学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to present the contents of papers with respect to precision machinery and intelligent control, and to understand the latest knowledge/research trend of precision machinery and intelligent control.

The goals of this course are to
(1) Understand and explain the latest technology of precision machinery and intelligent control.
(2) Understand and explain latest research trend on precision machinery and intelligent control.

●Prerequisite Subjects

Robotics, mechatronics, human engineering, control engineering, system engineering

●Course Topics

Understanding precision machinery and intelligent control using latest research papers.
1. Overview of intelligent robots
2. Precision machinery
3. Intelligent control

Assign preparation tasks and check the preparation status in the class.

●Textbook

Research papers will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain precision machinery and intelligent control.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 2B (2.0credits) (知能ロボット学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to present the contents of papers with respect to precision machinery and intelligent control, and to understand the latest knowledge/research trend of precision machinery and intelligent control.

The goals of this course are to
(1) Understand and explain the latest technology of precision machinery and intelligent control.
(2) Understand and explain latest research trend on precision machinery and intelligent control.

●Prerequisite Subjects

Robotics, mechatronics, human engineering, control engineering, system engineering

●Course Topics

Understanding precision machinery and intelligent control using latest research papers.
1. Overview of intelligent robots
2. Precision machinery
3. Intelligent control

Assign preparation tasks and check the preparation status in the class.

●Textbook

Research papers will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain precision machinery and intelligent control.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 2C (2.0credits) (知能ロボット学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to present the contents of papers with respect to precision machinery and intelligent control, and to understand the latest knowledge/research trend of precision machinery and intelligent control.

The goals of this course are to
(1) Understand and explain the latest technology of precision machinery and intelligent control.
(2) Understand and explain latest research trend on precision machinery and intelligent control.

●Prerequisite Subjects

Robotics, mechatronics, human engineering, control engineering, system engineering

●Course Topics

Understanding precision machinery and intelligent control using latest research papers.
1. Overview of intelligent robots
2. Precision machinery
3. Intelligent control

Assign preparation tasks and check the preparation status in the class.

●Textbook

Research papers will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain precision machinery and intelligent control.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 2D (2.0credits) (知能ロボット学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to present the contents of papers with respect to precision machinery and intelligent control, and to understand the latest knowledge/research trend of precision machinery and intelligent control.

The goals of this course are to
(1) Understand and explain the latest technology of precision machinery and intelligent control.
(2) Understand and explain latest research trend on precision machinery and intelligent control.

●Prerequisite Subjects

Robotics, mechatronics, human engineering, control engineering, system engineering

●Course Topics

Understanding precision machinery and intelligent control using latest research papers.
1. Overview of intelligent robots
2. Precision machinery
3. Intelligent control

Assign preparation tasks and check the preparation status in the class.

●Textbook

Research papers will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain precision machinery and intelligent control.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

Seminar on Intelligent Robotics 2E (2.0credits) (知能ロボット学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Micro-Nano Mechanical Science and Engineering		
Starts 1	3 Spring Semester		
Lecturer	Yasuhisa Hasegawa Professor	Tadayoshi AOYAMA Associate Professor	Masaru TAKEUCHI Assistant Professor

●Course Purpose

The aim of this course is to present the contents of papers with respect to precision machinery and intelligent control, and to understand the latest knowledge/research trend of precision machinery and intelligent control.

The goals of this course are to
(1) Understand and explain the latest technology of precision machinery and intelligent control.
(2) Understand and explain latest research trend on precision machinery and intelligent control.

●Prerequisite Subjects

Robotics, mechatronics, human engineering, control engineering, system engineering

●Course Topics

Understanding precision machinery and intelligent control using latest research papers.
1. Overview of intelligent robots
2. Precision machinery
3. Intelligent control

Assign preparation tasks and check the preparation status in the class.

●Textbook

Research papers will be introduced as appropriate as the lecture progresses.

●Additional Reading

Reference books will be introduced as appropriate as the lecture progresses.

●Grade Assessment

Assign several exercises to explain precision machinery and intelligent control.
Grading will be calculated according to the reports.

●Notes

●Contacting Faculty

Questions will be accepted during breaks after the class or office hours.

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 1 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.

Seminar on medical engineering (2.0credits) (医工連携セミナー)

Course Type	Comprehensive engineering courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
	Materials Process Engineering	Chemical Systems Engineering	Mechanical Systems Engineering
	Micro-Nano Mechanical Science and Engineering	Aerospace Engineering	
Starts 1	Spring Semester	Spring Semester	Spring Semester
	Spring Semester	Spring Semester	Spring Semester
	Spring Semester	Spring Semester	
Lecturer	Associated Faculty		

●Course Purpose

In the coming decades with growing overage population, novel technologies and outstanding ideas for the new breakthrough strategy of tailor-made medical therapy is strongly required. For the establishment of such strategy, basic technologies that enable the detection and diagnosis of molecular dynamics should be investigated. In this class, we try to educate young researchers to step out to this new frontier by setting various types of classes held by very advanced researchers in medical engineering field in Nagoya University. The lecturers are invited from engineering faculty and medical faculty, and introduce the expected ideas and the most recent achievements in the aspect of medical engineering.

●Prerequisite Subjects

Clinical medicine, Molecular biology, Biological engineering, Biomechanics, Robotics, Medical engineering, Bioinformatics

●Course Topics

In every lecture, different lectures invited from different fields (engineer, doctors, etc.) teach the most recent advances in the field of medical engineering. The lecture is mostly presented by power point, and for some classes, handouts are provided.

●Textbook

Not specified, but distributed handouts if necessary.

●Additional Reading

It will be appointed if necessary.

●Grade Assessment

Reports (80%) and interview (20%)

●Notes

Not needed

●Contacting Faculty

At lecture time