2025 Syllabus

Nagasaki Institute of Applied Science
Graduate School

Course Name	Lecture on Applied Mathematics C			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Tanaka		First year or above	common	2 hours

Class Outline	The mathematical models that describe various phenomena in science and engineering are often diff erential equations. In this class, you will learn about Laplace transforms and Fourier analysis, which are powerful methods for solving diff erentialequations, as well as numerical analysis, a practical modern method. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Structural Engineering, Materials Engineering, Marine Fluid Engineering, Mechanical Fluid Engineering. Please also refer to the curriculum map.
Lesson Plan	1st Laplace transform (Laplace transform) (Preparation: None. Review: Organize the contents of the lesson.) 2nd Laplace transform (inverse Laplace transform, diff erential formula and solution of diff erential equations) (Preparation: None. Review: Organize the contents of the lesson.) 3rd Laplace transform (unit step function and delta function) (Preparation: None. Review: Organize the contents of the lesson.) 4th Laplace transform (convolution) (Preparation: None. Review: Organize the contents of the lesson.) 5th Laplace transform (linear systems) (Preparation: None. Review: Organize the contents of the lesson.) 6th Fourier series and Fourier transform (periodic function Fourier series) (Preparation: None. Review: Organize the contents of the lesson.) 7th Fourier series and Fourier transform (Fourier series Partial diff erential equations and Fourier series) (Preparation: None. Review: Organize the contents of the lesson.) 8th Fourier series and Fourier transform (complex Fourier series, Fourier transform and Fourier integral theorem) (Preparation: None. Review: Organize the contents of the lesson.) 9th Fourier series and Fourier transform (Fourier transform and Fourier integral theorem) (Preparation: None. Review: Organize the contents of the lesson.) 10th Fourier series and Fourier transform (discrete Fourier transform) (Preparation: None. Review: Organize the contents of the lesson.) 11th Numerical analysis (What is numerical analysis?) (Preparation: None. Review: Organize the contents of the lesson.) 12th Numerical analysis (diff erential method, diff erential, accuracy, diff erential scheme) (Preparation: None. Review: Organize the contents of the lesson.) 13th Numerical analysis (diff erence scheme stability) (Preparation: None. Review: Organize the contents of the lesson.) 14th Numerical analysis (fi nite volume method, fi nite element method) (Preparation: None. Review: Organize the contents of the lesson.) 15th Numerical analysis (the practice of numerical analysis) (Preparation: None. Review: Organize the contents of the lesson.)
Class Format	Lectures primarily based on fl ipped learning [Active learning] Flipped learning [Use of information devices] None in particular. [Feedback to students regarding submission of work, etc.] Individual questions will be answered regarding reports after they are submitted.

	[Teaching method] Students will develop the ability to apply the theories explained in class through concrete examples and practice problems. [Forms for when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom and classes will be held online.
Achieving Goals	Using the techniques learned in this class, students will be able to solve basic diff erential equations.
Evaluation Method	Students will be evaluated based on the quality of their report and presentation. The ratio of these two will be determined based on the level of participation in the presentation. Students who have poor attitudes towards the class or who are absent without permission will be penalized.
Evaluation criteria	[Students enrolled in 2018 or earlier] Exams and grades will be graded using four levels: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are consideredpassing grades, and Fail are considered failing grades. [Students enrolled in 2019 or later] Exams and grades will be graded using fi ve levels: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points,B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing grades,and D is considered failing grades.
Textbook/ Reference Books	Kenji Ueno Engineering Mathematics Textbook Series "Applied Mathematics (2nd Edition)" Morikita Publishing
Requirements	[Prerequisite Courses] None. However, the lectures will be conducted assuming that students have mastered undergraduate level calculus (partial diff erentials, multiple integrals, etc.).
Notes on course enrollment	Nothing in particular.
Preparation and review	Spend the same amount of time as the class to review the content of each lesson and write a report.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Presentation English			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Dai Hamasaki		Second half of the fi rst academic year	Common to all majors	2 hours

Class Outline	The ability to present in English is now required in international conferences and in everyday corporate work. In this course, you will learn the basics of presentation creation techniques (outlines, visuals, cue cards, etc.) and oral presentations (verbal and nonverbal communication, posture, tone, volume, Q&A, etc.). You will also learn the basics of remote presentations. Students will give approximately four 10-minute presentations on a given topic, repeating the PDCA cycle. Finally, they will create a presentation on their fi eld of expertise or a topic of interest and present it in front of the class.
Lesson Plan	1st What is a Presentation? ・Introduction ・Physical, Oral, Visual, Organizational Aspects ・See how and where we can get good resources. ・Small Presentation 1 Theme presentation 2nd Physical Aspect ・Eye Contact ・Gestures ・Posture 3rd Oral Aspect ・Pronunciation(Word, Phrase, Sentence Level) ・Volume and Tone 4th Small Presentations 1 ・10-minute Presentations ・Exchange of Opinions ・Self-Evaluation (Physical and Oral Aspects) ・Small Presentation 2 Theme Presentation 5th Visual Aspect ・Boards ・Video ・Hypermedia(PowerPoint, Keynote) ・Handout ・Object(Products, Models) ・Understanding Problems, What if... 6th Small Presentation 2 ・10-minute Presentations ・Exchange of Opinions ・Self-Evaluation (Physical, Oral and Visual Aspects) ・Small Presentation 3 Themes 7th Organizational Aspect 1 Formats ・Informative Type(Procedural, Topic-based, Spatial Arrangement Formats) ・Persuasive Type(Problem-solving, Comparative Advantage Formats) 8th Organizational Aspect 2 Structure ・Introduction(Greetings, Opening:Statement of the Purpose, Background, Anecdotes) ・Body ・Conclusion(Summary, Conclusions, Closing) 9th Small Presentation 3 ・10-minute Presentations ・Exchange of Opinions ・Self-Evaluation (Physical, Oral, Visual and Organizational Aspects) ・Small Presentation 4 Themes Professional Research and Management ・ ”good” resources?? ・How to Remote 10th Small Presentation 4

	・10min Presentations ・Exchange Opinions ・Self Evaluation(Physical, Oral, Visual and Organizational Aspects) ・Final Presentation Explanation 11th Final Presentation 1 Preparation ・Theme ・Title ・Hypothesis ・Thesis Statement 12th Final Presentation 2 Check ・Physical, Oral, Visual and Organizational Aspects ・Looking back on the self-evaluations ・Brush Up 13th Presentation 1 ・Presentations ・Exchange Opinions ・Self Evaluation(Physical, Oral, Visual and Organizational Aspects) 14th Presentation 2 ・Presentations ・Exchange Opinions ・Self Evaluation(Physical, Oral, Visual and Organizational Aspects) ・Teacher's Comment 15th Presentation 3 ・Presentations ・Exchange Opinions ・Self Evaluation(Physical, Oral, Visual and Organizational Aspects) ・Teacher's Comment ・Term Evaluation
Class Format	Lectures and practical training [Active learning] Available. Students will repeatedly practice oral presentations to acquire presentation techniques. [Use of information devices] Computers, tablets [Feedback to students regarding submission of work, etc.] Instruction will be given on how to give presentations in English and useful expressions. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Microsoft Teams.
Achieving Goals	・Be able to judge for yourself the skills you will need for everyday and academic English conversation in the future. ・Be able to identify and solve problems by repeating the PDCA (Plan/Do/Check/Act) cycle. ・Be able to acquire eff ective listening and assertiveness. ・Be able to give presentations.
Evaluation Method	Class Assignments 20% Mid-term Examination 40% Final Examination 40%
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.

	Please refer to the rubric for details.
Textbook/ Reference Books	Instructions will be given during the lecture.
Requirements	Students who speak English as a native or common language cannot take this class.
Notes on course enrollment	This class is designed for the students who learn English as a second language. The students who will write or present the thesis in English can not take this class.
Preparation and review	Reviewing lessons and preparing for presentations every hour. Reviewing what was covered in lectures, specifi cally how to create and give presentations, and working on English expressions outside of class.
Office Hours	Give instructions during lectures

Course Name	Internship			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
All year round	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Oyama, Matsui, Choi, Tanaka, Masashi, Kiyoyama, Sato, Kajiwara, Doi, Liu)		First year	All majors	2 hours

Class Outline	To become an independent engineer, students must not only deepen their understanding of basic and specialized subjects, but also take an interest in social trends as engineers and acquire the ability to think and solve problems that need to be overcome theoretically and creatively. This course is based on that purpose and intent, and specifi cally involves training at off -campus companies etc. to learn in detail. 1)Internship hosting location is selected through research and interviews, etc. 2)Preliminary research on the host's work content and its relationship to society, etc. 3)Training at the hosting location (generally for at least two consecutive weeks). The training content is decided in consultation with the internship hosting location. 4)Preparation of a training report 5)Reporting session
Lesson Plan	1st Internship placements will be decided through research and interviews. 2nd Preliminary investigation into the work content and social ties of the host company 3rd Training at the host company (in principle, at least two consecutive weeks) The training content will be decided in consultation with the internship host. 4th Preparation of training report 5th Debriefi ng session
Class Format	As a general rule, interns will undergo practical training at a company or institution for at least two consecutive weeks duringthe summer or spring vacation period. In some cases, it may be possible to undertake two internships of at least one week each. The content of the training will be decided in consultation with the internship host company.
Achieving Goals	1.Accurately understand the work content. 2.Take actions appropriate to the work content and work with enthusiasm and enthusiasm. 3.Report progress and actively seek advice on how to proceed with tasks. 4.Work on tasks proactively with a sense of purpose.
Evaluation Method	Participants will be evaluated on a 100-point scale based on a training period of at least two

	weeks, a training report, and a presentation.
Evaluation criteria	A score of 60 or above is considered a pass. Students enrolled before 2018: 4 levels: A (80-100), B (70-79), C (60-69), D (under 60) Students enrolled after 2019: 5 levels: S (90-100), A (80-89), B (70-79), C (60-69), D (under 60)
Textbook/ Reference Books	None in particular
Requirements	None in particular
Notes on course enrollment	You may be required to take out liability insurance (both Student Education and Research Accident and Personal Accident Insurance and Gakkensai Supplementary Liability Insurance).
Preparation and review	Once you have decided on an internship placement, make sure you understand the nature of the work that will be done there.
Office Hours	at any time

Course Name	Advanced Structural Mechanics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Fujita		First year	Production Technology	2 hours

Class Outline	This course will cover the basic theory and evaluation methods for the dynamic response of structures to dynamic loads such as earthquakes and wind. It will also explain the causes and countermeasures for damage and collapse of structures due tovibration through examples of such damage and collapse. As examples of dynamic response evaluation, it will outline approaches to collisions and explosions, and methods for analyzing the interaction between fl uids and structures and soil and structures as coupled problems.
Lesson Plan	1st Lecture summary Preparation: None. Review: Refer to the lesson plan in the syllabus and read through the textbook regarding the contents of the lecture, and review the relationship between force and displacement acting on a structure using a textbook on structural mechanics or material mechanics. 2nd Dynamic model of structure and load expression Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 3rd free vibration Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 4th Damped Free Vibration Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 5th Forced vibration caused by external disturbances such as wind Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 6th Forced vibration due to earthquake Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 7th Examples of structural collapse due to vibration Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 8th Matrix representation of the vibration equation Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 9th Modal analysis Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 10th Response analysis using modal synthesis Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books.

	11th earthquake response spectrum Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 12th Response spectrum analysis Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 13th Time history response analysis Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 14th Response evaluation against collision and explosion loads Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes on the class content and review using example problems in reference books. 15th Overview of interaction analysis Preparation: Check the relevant areas in reference books, organize any unfamiliar terms or formulas, and preparefor questions. Review: Organize notes from the class content and review the concept of interaction using literature and reference books.
Class Format	[Class method] Lectures will be used. Problem-solving methods will be explained using handouts and blackboard notes. Example problems will also be used to explain specifi c methods. [Active learning] None [Use of information devices] None [Feedback on assignment submissions] Supplementary explanations may be given when returning assignments. [Form of class when face-to-face classes are not possible due to special circumstances] We plan to use the conferencing system software ”meet” based on Google Classroom.
Achieving Goals	Understand the theory of structural response evaluation against dynamic loads such as earthquakes and wind and be able toperform response evaluation.
Evaluation Method	The overall evaluation will be based on the assignment submission (40 points) and the fi nal report (60 points), totaling 100points. Absence from class, failure to submit assignments, and submission after the deadline will result in points being deducted.
Evaluation criteria	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	[Textbook] None in particular. Materials will be distributed as needed. [Reference books] Shibata Akinori: Latest Earthquake-Resistant Structural Analysis, Morikita Publishing. Norio Iegi and Daigi Kikaku (eds.): Earthquake-Resistant Design of Architecture and Civil

	Engineering: Fundamentals - Towards Performance-Based Design, Kanto Gakuin University Press, etc.
Requirements	・Please refer to the table of courses for each department and laboratory. ・As a general rule, students who are absent more than fi ve times (including lateness and leaving early) will not be given credits.
Notes on course enrollment	Nothing in particular.
Preparation and review	[Preparation] Research the content of each lesson using reference books, academic papers, etc., to prepare for class. (2 hours or more) [Review] Review the content learned in class using handouts, class notes, etc., to deepen your understanding. (2 hours or more)
Office Hours	Please refer to the information posted on notice boards and in the AA system whenever you are in the lab.

Course Name	Fluid Machinery			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Yutaka Matsukawa		First year or above	Production Technology	2 hours

Class Outline	canbe classifi ed into various operating methods, but the most well-known are positive displacement and turbo types. Among them, turbo machines, classifi ed as turbo types, are machines that exchange energy with fl uids using multiple rotating blades, and examples include pumps, water wheels, compressors, and turbines. In this lecture, we will learn about related content, focusing on the complex fl ows and fl uid phenomena that occur within turbomachines. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Structural Engineering, Materials Engineering, Marine Fluid Engineering, Mechanical Fluid Engineering . Please also refer to the curriculum map.
Lesson Plan	1st Overview 2nd Classifi cation of fl uid machinery 3rd Fluid Energy and Energy Conversion 4th Working principle and Euler's specifi c work 5th Turbomachinery similarity law 6th specifi c speed 7th Performance curves and operating points 8th Cavitation in pumps 9th windmill 10th Waterwheel 11th turbine 12th pump 13th Blowers and compressors 14th Turbomachinery Fluid Dynamics 15th summary
Class Format	Lectures [Active learning] Discussion of class content and reports. [Use of information devices] None in particular. [Feedback to students regarding submission of work, etc.] Individual questions regarding reports will be answered after submission. [Teaching methods] Students will develop the ability to apply the theories explained in class through concrete examples and practice problems. [Form of instruction when face-to-face classes cannot be held due to special circumstances]

	Instructions will be given via Google Classroom and classes will be held online.
Achieving Goals	Understand turbomachinery performance and fl ow phenomena.
Evaluation Method	The evaluation will be based on the report (100 points). Points will be deducted if the student's attitude is poor.
Evaluation criteria	[Students enrolled in 2018 or earlier] Exams and grades will be graded using four levels: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are consideredpassing grades, and Fail are considered failing grades. [Students enrolled in 2019 or later] Exams and grades will be graded using fi ve levels: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points,B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing grades,and D is considered failing grades.
Textbook/ Reference Books	Nothing in particular.
Requirements	[Prerequisite Courses] None in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	Spend the same amount of time as the class to review the content of each lesson and write a report.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Environment and Energy Engineering			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		First year or above	common	2 hours

Class Outline	Environmental issues such as global warming, ozone layer depletion, and air pollution are among the most important challenges facing humanity in the 21st century. Environmental issues are linked to today's energy-intensive society. In this class, students will learn the basics of environmental science and energy engineering while understanding environmental issues from the perspective of energy use. [Particularly relevant majors, departments, and laboratories as specifi ed in the curriculum map] Department of Production Technology, Department of Environmental Planning, Department of Electronics and Information Science . Please also refer to the curriculum map.
Lesson Plan	1st Environmental issues and energy Check the syllabus and review prerequisite courses. For review, prepare by studying the materials distributed in advance to confi rm your course plan. Also, summarize and reviewthe lecture content yourself. If you have any questions, summarize them and ask your instructor. 2nd Fundamentals of Energy Engineering (What is Energy? Energy Units, Energy Resources) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Fundamentals of Energy Engineering (History of Energy Technology, Global Energy Consumption) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th Fundamentals of energy engineering (Japan's energy consumption, fossil fuels, future energy resources) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th Global warming (changes in global temperature, greenhouse eff ect) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th Global warming (cause of rising temperatures) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor 7th Global warming (impact prediction and countermeasures) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th Ozone depletion Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th Air pollution (environmental standards, automobile exhaust, photochemical smog) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Air pollution (acid rain) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor

	11th CO2 countermeasures (thermal power generation, nuclear power generation) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th CO2 countermeasures (combined cycle cogeneration) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 13th CO2 countermeasures (renewable energy (photovoltaic power generation, solar thermal power generation) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 14th CO2 countermeasures (renewable energy (wind power, hydroelectric power, biomass, geothermal power, tidal power) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th CO2 countermeasures (capture and storage) Future energy society Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Lectures [Active Learning]: Yes. Students may be assigned assignments during class to review the course content, including discussions among themselves. [Use of Information Technology]: None. However, reference materials may be distributed in PDF format. Details will be explained in class. [Feedback to Students Regarding Submission of Work, etc.]: Assignments will be returned in the next class. At that time, additional explanations may be provided, such as points wheremany students struggled. Any mistakes made in exercises will be submitted as a report. [Educational Method]: In addition to explaining theories in a logical and systematic manner, students will learn by actually calculating specifi c examples. [Forms for when face-to-face classes cannot be held due to special circumstances]: Instructions will be given via Google Classroom. [Utilization of Practical Experience]: Yes. The instructor will incorporate his or her experience and knowledge from analyzing hazardous substances and conducting research on hazardous substances into the lectures.
Achieving Goals	Understand environmental issues from the perspective of energy use. Understand global environmental issues and acquire knowledge that can be applied to each specialized fi eld.
Evaluation Method	The evaluation will be based on the report (100 points). Points will be deducted if the student's attitude is poor.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later]

	Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing,and D is considered failing . Please refer to the rubric for details.
Textbook/ Reference Books	Nothing in particular.
Requirements	[Prerequisite Courses] None. Please refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	Read relevant articles in newspapers and other sources as needed to deepen your understanding. Spend the same amount oftime as class time reviewing and reorganizing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class yourself, as well as working on assignments given in class. Also, be sure to ask your teacher any questions that arise during the course of your studies and resolve them in subsequent classes.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Human-Environment Studies			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Shodai Tanaka		First year	Environmental Planning	2 hours

Class Outline	We will consider the relationship between humans and the environment, and consider how to conserve energy and respond toenvironmental concerns.
Lesson Plan	1st Guidance 2nd Environment and Scale 3rd Global environmental issues 4th Regional and urban environmental issues 5th Outdoor Environment 6th Indoor environment 7th Environmental issues and the history of energy 8th Basics for understanding energy issues 9th Japan's Energy Policy 10th How should we position nuclear power 11th How should new energy sources be positioned? 12th Sustainable Buildings and Zero Emission Buildings 13th Measures for achieving carbon neutrality 14th Area-wide use of energy 15th Summary
Class Format	Lectures (seminar format) [Active learning] Yes, students will facilitate among themselves. [Use of information devices] Students will access Google Classroom using their smartphones or laptops to provide materials and write refl ections at the end of class. Please bring an accessible information device. [Feedback to students regarding submission of work , etc.] Responses will be given individually or to the whole class depending on the content. Lectures and exercises [Forms for when face-to-face classes cannot be held due to special circumstances] Google classroom and the conference systems "meet" and "zoom" will be used.
Achieving Goals	Understand the connections between your immediate environment and the global environment.
Evaluation Method	The evaluation will be based on the progress made at each stage and the assignments submitted, with 30 points for the progress made and 70 points for the assignments submitted, for a total of 100 points.
Evaluation criteria	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A

	being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Printed copies will be distributed as needed
Requirements	Nothing in particular
Notes on course enrollment	To deepen your understanding, the necessary themes are set out in order. Therefore, if you are absent and do not understand the previous lecture, it will be diffi cult to understand the subsequent lectures, so please attend all lectures without missinga single one.
Preparation and review	Always keep up with the latest news on the environment. Also, for each weekly class, you will need to spend three hours preparing and three hours reviewing.
Office Hours	In addition to the regular offi ce hours, we are available to assist you at any time by visiting our lab.

Course Name	Environmental Planning Fieldwork			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Shinichi Kamohara		Second year	Environmental Planning	2 hours

Class Outline	Students will conduct fi eldwork-based research on a topic presented by their research supervisor or related to their own master's research, and will prepare and present a research report.
Lesson Plan	1st Social issues and fi eldwork 2nd Basic knowledge of fi eldwork (survey planning) 3rd Basic knowledge of fi eldwork (data collection) 4th Basic knowledge of fi eldwork (data analysis) 5th Basic knowledge of fi eldwork (data visualization) 6th Setting and organizing fi eldwork issues 7th Presentation and discussion of fi eldwork issues 8th Fieldwork survey (preliminary survey) 9th Fieldwork survey (main survey) 10th Fieldwork research and data organization 11th Fieldwork material organization and data analysis 12th Fieldwork data analysis and visualization 13th Fieldwork report preparation 14th Presentation and Discussion 15th Revising and summarizing the report
Class Format	Seminars [Active learning] Yes [Use of information devices] Yes [Feedback to students regarding submission of deliverables, etc.] Discussion will be held on the research reports. [Form of instruction when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom.
Achieving Goals	(1)Able to undertake fi eldwork. (2)Able to set fi eldwork topics. (3)Able to plan and carry out fi eldwork. (4)Able to collect and analyze information (data). (5)Able to write a report. (6)Able to give presentations and discuss fi eldwork.
Evaluation Method	The assessment will be 50% based on the research report and 50% on the presentation and discussion
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing.

	[Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	There are no specifi c rules, but materials will be distributed as needed.
Requirements	none.
Notes on course enrollment	Maintain suffi cient communication with your supervisor.
Preparation and review	Fieldwork requires advance preparation (preparation), and suffi cient time must be set aside for this. It is also necessary to set aside time to refl ect on the fi eldwork after the discussion.
Office Hours	Coordinate with your supervisor.

Course Name	Intelligent Machines and Systems			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Masanori Sato		First year	Electronics and Information Science	2 hours

Class Outline	In this course, we will use the Laplace transform to convert mathematical expressions of physical systems into transfer functions, and learn about system response and stability. We will also learn the basics of intelligence, behavior, learning, evolution,etc., as well as the fundamentals of constructive theory of intelligence that emerges and develops through interactions.
Lesson Plan	1st Guidance and Introduction 2nd Laplace transform and inverse Laplace transform 3rd Mathematical models and transfer functions of physical systems 4th Transfer Functions and Block Diagrams 5th Transient Response 6th Frequency response 7th Bode plot 8th Stability of Dynamical Systems 9th Characteristics of feedback control systems 10th PID control system design 11th Information processing by neural networks 12th error backpropagation method 13th Self-Organizing Maps 14th Neural oscillators 15th Genetic Algorithms and Artifi cial Life
Class Format	Lectures [Active learning] Yes [Use of information devices] None in particular , however, reference materials may be distributed in PDF format. Details will be explained in class. [Feedback to students regarding submission of work, etc.] When returning assignments, supplementary explanations may be given. [Teaching method] After explaining the key points, a discussion will be held to check understanding. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	Students will understand the fundamentals of control engineering and be able to explain system response and stability, as well as the fundamentals of intelligence, behavior, learning, and evolutionary methods.
Evaluation Method	Evaluation will be based on 30% of the regular points based on the student's attitude during class, the results of quizzes andreports given as appropriate along the way, and 70% of the fi

	nal exam. Details will be explained in the fi rst class. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on 100% of the regular points based on the student's attitude during class, the results of quizzes and reports given as appropriate along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Handouts will be distributed as appropriate. Reference books: "Control Engineering for Mechatronics" by Shoji Takagi (Corona Publishing) Reference books: "Fundamentals of Neurocomputers" edited by Kaoru Nakano (Corona Publishing)
Requirements	[Prerequisite Courses] None in particular. [Other] Please review the contents of the prerequisite courses before the start of classes. Please carry out the preparation and review items below. Attendance of more than 2/3 of the lecture hours is required.
Notes on course enrollment	none.
Preparation and review	At the end of each lecture, a brief explanation of the content of the next lecture will be given, so please prepare in advance. Spend the same amount of time as the class to reorganize the handouts and your own notes. Also, rework the assignments given during the lecture.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Integrated Circuit Engineering			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Ken Oyama		First year	Electronics and Information Science	2 hours

Class Outline	Bipolar transistors were once the mainstream in analog circuits, but with the advancement of circuit technology, MOSFETs have come to be used in analog circuits. The advantage of using MOSFETs is that they are suitable for developing mixed analog-digital LSIs, and they are currently the mainstream in system LSI development. To master MOSFETs, it is fi rst necessary to thoroughly understand the characteristics of individual elements and the operating principles of basic circuits. In this course, youwill learn about MOSFET operation through practice problems, and then learn about basic circuit confi gurations, in the orderof bias circuits, comparators, and operational amplifi ers, with the help of design examples. [Held every other year, canceled in 2025]
Lesson Plan	1st MOS element structure and MOSFET operation 2nd Exercises on MOSFET operation 3rd Basics of MOS amplifi er circuits 4th Exercises on the basics of MOS amplifi er circuits 5th Amplifi er circuit frequency characteristics 6th Analog circuit noise 7th diff erential amplifi er circuit 8th Current Bias Circuit 9th Reference power circuit 10th Comparator Circuit Basics 11th Comparator Circuit Design 12th OP Amp Basics 1 13th OP Amp Basics 2 14th OP amp circuit design 1 15th OP amp circuit design 2
Class Format	Lectures [Active learning] Yes Exercises and discussions may be assigned in class. [Use of information technology] Yes Details will be explained in class. [Feedback to students regarding submission of work, etc.] Assignments will be explained in the next class. [Educational method] After providing information or lecturing on each topic, the content will be reviewed and discussed. [Form of teaching when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software ”Zoom” based on Google Classroom.

Achieving Goals	To be able to explain the basic operation of MOSFETs at the element level and to be able to build basic circuits such as comparators and operational amplifi ers.
Evaluation Method	Participation in lectures (50 points) and report assignments (50 points) [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on participation in lectures during class and the results of discussions held as appropriate during the class, withthe regular points allocated to 100% of the total.
Evaluation criteria	Of the total possible score of 100, a score of 60 or above is considered a pass. [Students enrolled before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passes, and Fail are considered fails. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passes, and D is considered fails.
Textbook/ Reference Books	The slides and materials used in the lectures will be available online as a reference book: "Introduction to CMOS Analog Circuits for LSI Design" by Kenji Taniguchi (CQ Publishing)
Requirements	None in particular
Notes on course enrollment	Be sure to thoroughly review the knowledge of electronic circuits that you learned in undergraduate school.
Preparation and review	The slides will be made available in advance, so please use them to prepare. Review the points explained in the lecture at home and complete any assignments before the next lecture.
Office Hours	After lectures, etc.

Course Name	Control Engineering for Data Measurement			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Makoto Shimojima, Azumi Sakai, Kazuki Fukae		First year	Electronics and Information Science	2 hours

Class Outline	Recently, computers have become indispensable for processing and analyzing data measured in experiments in any fi eld. In this lecture, students will learn the basic knowledge of collecting and processing measurement data in experiments, and will also be exposed to cutting-edge technology.
Lesson Plan	1st guidance 2nd Physical quantities and digital data 3rd About measurement 4th Various distributions 5th Error analysis 6th statistical processing 7th Controlling Devices 8th mutual exclusion 9th Inter-process communication 10th How network communication works 11th TCP/IP programming 12th Database 13th Hardware techniques for data acquisition systems. 14th Software techniques for data acquisition systems. 15th summary
Class Format	Lectures. [Active learning] Yes. Includes discussion-style as well as computer-based exercises. [Use of information technology] Yes. [Feedback to students regarding submission of work, etc.] Google Classroom will be used. [Teaching method] After the lecture, the content will be reviewed and discussed. [Form of implementation when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, with the conferencing system software ”Zoom/Meet” being used.
Achieving Goals	Able to explain the outline of data collection to others. Understand basic data processing and be able to process data appropriately using a computer.
Evaluation Method	Comprehensive evaluation will be based on lecture reports, discussions, papers, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the regular points from the exercises and assignments completed in lectures, with 100% of thepoints allocated.

Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Will be introduced during the lecture.
Requirements	Nothing in particular.
Notes on course enrollment	There will be some computer-based exercises. Please bring your own laptop. Necessary software will be introduced during the lecture.
Preparation and review	Take suffi cient time to prepare for the discussion and summarize the discussion.
Office Hours	Lunch break and fi fth period on lecture days.

Course Name	Molecular Electronics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Takashi Kato		First year	Electronics and Information Science	2 hours

Class Outline	Knowledge of chemistry is essential for learning and applying molecular electronics. Chemistry, on the other hand, is a science that treats matter as a collection of atoms and molecules, and by its very nature, it is closely connected to society. Regardless of the fi eld of society you pursue in the future, there will undoubtedly be opportunities where chemical knowledge is required. University chemistry is primarily comprised of four fi elds: physical chemistry, analytical chemistry, inorganic chemistry, and organic chemistry. Chemical phenomena, such as chemical reactions, ultimately involve electron transfer within and between atoms. Quantum chemistry governs electron transfer phenomena. With this in mind, knowledge of modern chemistry, including quantum chemistry, is essential when studying these four fi elds. For this reason, this course will primarily focus on modern chemistry, including quantum chemistry, the foundation of chemistry.
Lesson Plan	1st Introduction 2nd Considering atoms from a quantum chemical perspective 3rd Considering molecules from a quantum chemical perspective 4th atomic orbital 5th Orbital interactions and the formation of molecular orbitals 6th sp hybrid orbitals in hydrocarbons 7th sp2 hybrid orbitals in aromatics 8th sp3 hybrid orbitals in hydrocarbons 9th Diamagnetic ring current in benzene 10th Quantum chemical considerations of electrical conductors 11th Quantum chemical considerations of semiconductors 12th Quantum chemical considerations of insulators 13th conductive molecules 14th molecular semiconductors 15th molecular superconductivity
Class Format	lecture
Achieving Goals	The goal is to be able to understand various molecular electronic properties from the perspective of quantum chemistry.
Evaluation Method	Evaluation is based solely on the fi nal exam. However, regardless of the fi nal exam results, attendance of at least two-thirds of lectures is a requirement for obtaining credits (passing).
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later]

	Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Printouts will be distributed at the appropriate time.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Report assignments covering the content of multiple lectures will be distributed in advance, so please do your homework. After each lecture, you will review the content by submitting a report on that content. Also, at the beginning of each lecture, there will be a short quiz on the content of the previous lecture, so you can review it repeatedly. Overall, you will need to prepare and review in order to digest the same amount of content as in class.
Office Hours	Coordinate with the students.

Course Name	Advanced environmental disaster preventionplanning			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Tanaka		First year	Environmental Planning	2 hours

Class Outline	This course focuses on large-scale natural disasters (earthquakes, strong winds, tsunamis, etc.) and provides basic knowledge about disasters and disaster prevention, including the history of disasters, the mechanisms by which disasters occur, the types of damage they cause, and national and local disaster prevention plans for large-scale disasters that are expected to occur in the future.
Lesson Plan	1st Lecture summary Preparation: None. Review: Using the lesson plan in the syllabus as a reference, research materials and literature on large-scale disasters that have occurred in Japan and overseas. 2nd Natural and man-made disasters Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 3rd Earthquake Disasters (1) Earthquake Mechanisms and Disaster History Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 4th Earthquake Disaster (2) Examples of Earthquake Damage Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 5th Strong Wind and Heavy Rain Disasters (1) Mechanisms of Strong Wind and Heavy Rain and History of Disasters Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 6th Strong Wind and Heavy Rain Disaster (2) Examples of damage caused by strong wind and heavy rain Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 7th Tsunami Disaster (1) Mechanism of Tsunami Generation and History of Disasters Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 8th Tsunami Disaster (2) Examples of damage caused by tsunami Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 9th Hard and soft measures against disasters Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions.

	Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 10th Evacuation plans, measures, and their challenges Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 11th Basic Disaster Prevention Plan and related laws and regulations Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 12th Local government disaster prevention plans Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 13th Natural Disaster Risk Assessment (1) Basic Concept Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 14th Natural Disaster Risk Assessment (2) Risk Assessment Methods Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature. 15th Overview of large-scale natural disasters expected to occur in the future Preparation: Check the scope of the materials that will be distributed or posted on Google Classroom in advance,organize any unfamiliar terms, and prepare for questions. Review: Organize your notes on the class content and review ideas related to the distributed materials by researching them in materials and literature.
Class Format	[Class method] The class will be conducted through lectures. Using handouts and blackboard notes, the basic concepts of disaster prevention planning will be explained through past damage patterns and examples. [Active learning] None [Use of information devices] None [Feedback on assignment submissions] Supplementary explanations may be given when returning assignments. [Form of class when face-to-face classes are not possible due to special circumstances] We plan to use the conferencing system software ”Meet” based on Google Classroom.
Achieving Goals	Understand the concepts and issues surrounding disaster prevention planning for large-scale natural disasters, and be able topropose disaster prevention and mitigation plans and measures.
Evaluation Method	The overall evaluation will be based on the assignment submission (40 points) and the fi nal report (60 points), totaling 100points. Absence from class, failure to submit assignments, and submission after the deadline will result in points being deducted.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later]

	Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	[Textbook] None in particular. Printed materials will be distributed or posted on Google Classroom as appropriate.
Requirements	・Please refer to the table of courses for each department and laboratory. ・As a general rule, students who are absent more than fi ve times (including lateness and leaving early) will not be given credits.
Notes on course enrollment	Nothing in particular.
Preparation and review	[Preparation] Research reference books, past disaster cases, disaster prevention plans of local governments, academic papers, etc., in areas relevant to the content of each lesson, in preparation for class. (2 hours or more) [Review] Review the content learned in class using handouts, class notes, etc., to deepen your understanding. (2 hours or more)
Office Hours	Please refer to the information posted on notice boards and in the AA system whenever you are in the lab.

Course Name	Environmental Ecology			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Koji Mochida		First year	Environmental Planning	2 hours

Class Outline	In this course, we will look at the relationship between humans and the environment from an ecological perspective and consider various issues surrounding human society. To do so, we will deepen our knowledge of evolutionary biology, animal ecology, and conservation ecology, and also learn statistical methods required for ecology. [Particularly relevant majors, departments, and laboratories as specifi ed in the curriculum map] Department of Environmental Planning, Department of Environmental Symbiosis Systems Engineering
Lesson Plan	1st Guidance: Humans and Ecosystems 2nd Biodiversity 3rd Mechanism of evolution 4th Evolution of Species, Ecology, and Behavior 5th Customs and Culture 6th Ecosystem services 7th Statistics in Ecology 8th R, a programming language for statistical analysis 9th Simple testing using R 10th General Linear Models Using R 11th General linear model using R 12th General linear mixed models using R 13th Model selection using R 14th Research into natural environmental issues 15th Presentation of natural environmental issues
Class Format	Lectures and exercises [Active learning]: Yes. Reports will be written during class. Field work may also be conducted depending on weather and other conditions. [Use of information devices]: Yes (collecting data from the web and analyzing it on a PC). [Feedback to students regarding the submission of work, etc.]: Reports will be returned. When they are returned, additionalexplanations may be provided. [If face-to-face classes cannot be held due to special circumstances]: Instructions will be given via Google classroom.
Achieving Goals	The goal is to become aware of the ecological issues surrounding humans and to be able to form your own opinions about those issues.
Evaluation Method	The evaluation will be based on assignments such as reports and presentations (60%), and on the student's attitude towardsthe class, such as the amount of speaking in class and the content of that speaking (40%).
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good,

	Pass, and Fail, where Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Passare considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, Ais 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are passing, and D is failing. Please refer to the rubric for details.
Textbook/ Reference Books	none.
Requirements	There are no prerequisite courses, but students must have a basic knowledge of biology and statistics (equivalent to fi rst or second year undergraduates). Students who have not taken biology classes will be allowed to enroll if they meet certain standard
Notes on course enrollment	none.
Preparation and review	Collect information from various media and relate it to the lesson content.
Office Hours	Please also refer to the information posted on the AAA system and on the Tuesdays from 12:00 to 13:00 .

Course Name	Management Information			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Wang Qi		First year	Environmental Planning	2 hours

Class Outline	This class will begin by reviewing the history of business informatics, understanding the current situation, and introducing future challenges. Based on this, students will select recent research papers of their own choosing, introduce their contents, andanswer questions. Through these, students will learn the basics of the fi eld of business informatics and its future developments, and will be able to think independently and acquire hints for research methods. Please also refer to the table of courses to be taken by each major laboratory.
Lesson Plan	1st The relationship and history of management and information Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor. 2nd Fundamentals of Management Information Theory Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Changes in management information systems Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th Introduction to papers on business informatics Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th Advances in information and communications technology Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th Management Information in a Network Society Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th e-business Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th Cloud services Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th Future challenges in management information theory Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Introduction to the paper selected by the students and Q&A session (Theme 1) Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor. 11th Introduction to the paper selected by the students and Q&A session (Theme 2) Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor. 12th Introduction to the paper selected by the students and Q&A session (Theme 3) Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor. 13th Introduction to the paper selected by the students and Q&A session (Theme 4) Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor. 14th Introduction to the paper selected by the students and Q&A session (Theme 5) Summarize and review the lecture content yourself.

	If you have any questions, summarize them and ask your instructor. 15th Submission of fi nal report Summarize and review the lecture content yourself. If you have any questions, summarize them and ask your instructor.
Class Format	Lectures and round-table discussions [Active learning] Yes. Practice problems will be assigned to deepen students' understanding of the class content. Students will also be asked to select a paper in their fi eld and present its contents to the class, answering any questions. [Use of information devices] Yes. Google Classroom will be used to provide materials both in and out of class and to submit assignments. PCs (internet browser, Offi ce tools) will be used for research and presentations, so please make sure they are always ready to use. [Feedback to students regarding the submission of work, etc.] Points to note regarding answers to practice questions and their explanations will be pointed out and supplemented on the spot. In addition, when introducing the contents of the paper, guidance will be given on research perspectives and how to deepen the understanding. [When face-to-face classes cannot be held due to special circumstances] Information and materials will be provided via Google Classroom, and an online conference system will be used.
Achieving Goals	The following items are the achievement goals: ・Be able to explain the fundamentals of management and information and their relationship. ・Be able to explain recent research trends in the fi eld of management information. ・ Be able to introduce the contents of management information papers in detail. ・Be able to summarize one's own opinions about management information in the form of a paper.
Evaluation Method	100% attendance is required, and absences or lateness will result in a signifi cant drop in grade (the maximum grade varies depending on attendance rate). Students who attend a suffi cient number of classes will be graded according to the following guidelines: assignments for each class (20%), paper introduction and Q&A (40%), fi nal report (40%) . However, grades may fl uctuate within a range of ±40 points depending on absences and participation in class.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail is considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. *Please refer to the rubric for details.
Textbook/ Reference Books	This will be introduced at the beginning of the class. If necessary, handouts and past papers will also be used.

Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram.
Notes on course enrollment	Nothing in particular
Preparation and review	I thoroughly reviewed the questions I was unable to answer during class, and tried to fi nd papers in the fi eld of business information and understand their contents. These activities took more than twice the time I spent in class.
Office Hours	Instructions will be given in class.

Course Name	Management science			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Akira Fujihara		First year	Environmental Planning	2 hours

Class Outline	Students will learn the scientifi c and mathematical methods necessary for decision-making, with the aim of supporting companies and public institutions in improving and resolving various management and policy issues that arise.
Lesson Plan	1st Learning from business cases 2nd Business Systems and Invisible Assets 3rd A market where sales are high 4th Creating a market 5th Promoting customer satisfaction 6th Creating a competitive advantage: Proactive strategic development 7th Creating a Competitive Advantage: Challenges in Strategic Markets 8th Active resource accumulation 9th Accumulating technologies in core businesses 10th Strategy technology fi t 11th Expanding technology 12th Strategy Psychological Fit 13th Aggressive capital investment 14th Product Technology and Business Systems 15th The dynamics of invisible asset imbalances
Class Format	Lectures (some classes will incorporate exercises and presentations) [Active learning] None. Students will present (report) materials and literature research in accordance with the seminar progress plan, and also answer questions. [Use of information devices] None in particular . [Feedback to students regarding submission of deliverables, etc.] Students will be instructed on research perspectives and how to deepen their understanding of reports on materials and literature content. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	You will be able to propose solutions to management problems in companies and public institutions. You will also be able to understand the role that information systems play in improving companies and public institutions andput these into practice.
Evaluation Method	The overall evaluation will be based on the following evaluation items: ・Reports, Q&A in class, awareness of issues, etc. ・Content of presentations assigned in class ・Participation in class
Evaluation criteria	[Students entering before 2018]

	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Takayuki Itami and Kazumi Nishino, Casebook: The Logic of Business Strategy, Fully Revised Edition, Nikkei Publishing, 2016
Requirements	Nothing in particular.
Notes on course enrollment	With the goal of cultivating management skills and honing practical skills to refi ne strategies, we expect participants to demonstrate a strong interest in . In addition to theory, research will be based on many case studies.
Preparation and review	Preparation (2 hours): Read the section of the next lesson in the textbook or reference book in advance and organize any questions you may have. Review (2 hours): Using your notes as a reference, carefully read the corresponding section in the textbook or reference book.At the same time, research related knowledge online and write it down in your notebook.
Office Hours	Show the time at the beginning of the lecture.

Course Name	Environmetal Analytical Chemistry			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		First year	Environmental Planning	2 hours

Class Outline	It is necessary to understand the pollution situation. This course will cover the basics of analytical chemistry, which is essential for the analysis and measurement of environmental chemicals, and will provide practical training in water quality, air, soil, odor analysis, and bacterial measurement, as well as cutting-edge new measurement techniques. Please also refer to the system diagram. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Department of Environmental Planning . Please also refer to the curriculum map.
Lesson Plan	1st Measuring the environment Check the syllabus and review prerequisite courses. For review, prepare by studying the materials distributed in advance to confi rm your course plan. Also, summarize and reviewthe lecture content yourself. If you have any questions, summarize them and ask your instructor. 2nd Concentration and units Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Quantitative and qualitative analysis Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th Errors and summary of results Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th Environmental standards and wastewater/emission standards Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th Environmental analysis (BOD/BOD) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th Environmental analysis (TN, TP) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th Environmental analysis (SS, odor) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th Environmental analysis (pH, DO, bacteria) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Environmental analysis (heavy metals) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 11th Environmental analysis (organochlorine compounds) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th Environmental analysis (pesticides) Please prepare by reviewing the materials distributed last time. Also, summarize and

	review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 13th Specialized analytical techniques (toxicity testing) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 14th How analytical equipment works (GC) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th How analytical equipment works (HPLC) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Lectures [Active Learning] None. Students may be assigned assignments during class to review the content, including discussions among themselves. [Use of Information Technology] None. However, reference materials may be distributed in PDF format. Details will be explained in class. [Feedback to Students Regarding Submission of Work, etc.] Assignments will be returned in the next class. At that time, additional explanations may be provided, such as points wheremany students struggled. Any mistakes made in exercises will be submitted as a report. [Educational Method] In addition to explaining theories in a logical and systematic manner, students will learn by actually calculating specifi c examples. [Forms for when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom. [Utilization of Practical Experience] Yes. The instructor will incorporate his or her experience and knowledge from analyzing hazardous substances and conducting research on hazardous substances into the lectures.
Achieving Goals	Acquire the knowledge necessary for environmental analysis and learn how to compile (analyze) data obtained from experiments. Understand the relationship between various environmental standards and analytical data.
Evaluation Method	Assignments related to the lecture content will be given and evaluation will be based on the submitted reports.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing,and D is considered

	failing . Please refer to the rubric for details.
Textbook/ Reference Books	Introduction in lectures
Requirements	Nothing in particular
Notes on course enrollment	Students studying environmental issues, chemistry, and engineering are especially encouraged to take this course.
Preparation and review	You should aim to spend the same amount of time as class time reviewing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during the work by asking the teacher in subsequent classes.
Office Hours	The purpose of this course is for you to actually learn the content of the lecture, so please review it thoroughly and ask questions if you have any questions, even if they are from the past. Similarly, we encourage you to actively ask questions during cl

Course Name	Regional Information			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Manabu Yamaji		First year	Environmental Planning	2 hours

Class Outline	Students will learn how to collect and utilize various information that can be used as evidence for revitalizing and creating a local area. They will visit actual areas, identify problems and issues, and consider ways to solve them. They will hold a policy implementation report meeting (results report meeting) and verify the eff ectiveness. They will also evaluate the reports of others at the results report meeting.
Lesson Plan	1st orientation 2nd Regional revitalization and regional development 3rd ICT/IoT in the region 4th Regional Design 5th Regional problem extraction 6th Identifying local issues 7th problem solving method 8th Regional manufacturing 9th Regional problem solving 10th Regional problem solving 11th Report preparation ①: Organizing the survey content and clarifying the purpose of the report 12th Preparation for the report session ②: Considering the story for the intended audience 13th Preparation for the report session ③: Supplementary research into other cases to reinforce the argument 14th Presentation Method 15th Results report meeting
Class Format	Lectures and seminars (including presentations) [Active learning] Yes, students will facilitate each other. [Use of information devices] Students will access Google Classroom using their smartphones or laptops to provide materials and write refl ections at the end of class. Please bring an accessible information device. [Feedback to students regarding submission of work , etc.] Responses will be given individually or to the whole class depending on the content. Lectures and seminars [Forms when face-to-face classes cannot be held due to special circumstances] Notifi cation will be made via Google Classroom.
Achieving Goals	Clarify local problems and acquire the thinking and methods to solve them.
Evaluation Method	The overall evaluation will be based on the following items: ・Submitted assignments for each class ・Attitude towards participation in class

	・Content of reports at the results presentation and attitude towards evaluating other reports ・Evaluation by others at the results presentation
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Distribute materials as appropriate
Requirements	Nothing in particular
Notes on course enrollment	In addition to studying on campus, on-site research will also be required.
Preparation and review	Conducting online and on-site research and organizing the results requires study time approximately twice as long as class time.
Office Hours	This will be shown in the fi rst lecture.

Course Name	Intellectual Property			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Akira Fujihara		First year	Environmental Planning	2 hours

Class Outline	This course teaches general and basic knowledge about intellectual property rights, which is essential when working in public institutions or private companies, including the defi nition of intellectual property rights, basic legal systems, procedures forintellectual property rights, patent information research, etc. This course also accepts working adults from external organizations.
Lesson Plan	1st Overview Introduction Intellectual Property Overview 2nd Inventions and Patents 1: Creation of Intellectual Property and Its Legal Content 3rd Inventions and Patents 2: Intellectual Property Management (Technical Management and Legal Management) 4th Inventions and Patents 3: Utilization and Issues of Intellectual Property in Business 5th Survey 1: The relationship between intellectual property and information technology 6th Survey 2: The importance of intellectual property in business 7th From application to registration: Overview of utility models and development of legal perspectives 8th Interpretation of Patent Claims: Promoting Legal Understanding 9th Trademark Law Overview: Verifi cation Using Specifi c Cases 10th Overview of the Design Act and Unfair Competition Prevention Act: Business and Legal Perspectives 11th Overview of Copyright Law and Plant Variety Law: Business and Legal Perspectives 12th Foreign Intellectual Property Systems: Case Studies 13th Intellectual property rights and infringement judgments: Case studies using judicial precedents 14th Use and utilization of intellectual property Use of intellectual property in business 15th Summary: Future intellectual property strategies and future direction
Class Format	Lectures and computer exercises [Active learning] Yes Through exercises, students may be assigned assignments to review the content of the class. [Use of information technology] Yes Details will be explained in class. [Feedback to students regarding submission of work, etc.] Assignments will be explained in the next class. [Form of implementation in the event that face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	The goal is to be able to explain the full scope of intellectual property rights, with a focus on patents, and to acquire knowledge equivalent to the Intellectual Property Management Skills Certifi cation Examination Level 3.
Evaluation Method	The evaluation will be based on the progress of classes and seminars, as well as reports, and will be worth a total of 100 points.

	[Evaluation method when face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given in class and the results of reports, with 100% of the points allocated.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Materials will be distributed as appropriate. Reference material: "Introduction to Patent Law" by the National Center for Industrial Property Information and Training
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	The content to be studied will be instructed during the lecture, so be sure to prepare and review in advance.
Office Hours	Break time after class ends.

Course Name	Special Seminar on Production Technology A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Koichi Okada		Second year	Integrated Systems Engineering	2 hours

Class Outline	Students will learn about experimental and analytical techniques related to material strength, particularly fatigue strength and crack propagation. Please refer to the table of courses for each major laboratory.
Lesson Plan	1st Research Ethics 2nd Current status of research into material strength 3rd Overview of various tests related to material strength 4th Tensile test 5th Impact test: Charpy impact test, etc. 6th Hardness Test 7th Creep Test 8th Fracture toughness test 9th Fatigue test (1) Tensile fatigue test 10th Fatigue test (2) Bending fatigue test 11th Fatigue Test (3) Impact Fatigue Test 12th Compilation of various experimental techniques related to material strength 13th Overview of numerical analysis techniques for crack extension 14th Numerical techniques for crack propagation: Formulation and algorithms. 15th Overview of numerical analysis technology for crack propagation: Use of FEM
Class Format	Seminar format [Active learning] Yes. Students will deepen their understanding through presentations and discussions on assigned tasks. [Use of information devices] None in particular. [Feedback to students regarding submission of deliverables, etc.] Submitted reports will be discussed. [Utilization of work experience] Yes. Instruction will be given based on research and development experience in a company.
Achieving Goals	Students will acquire knowledge of analytical and experimental techniques related to material strength, particularly fatigue strength and crack propagation.
Evaluation Method	Seminar presentations, reports, and attitude towards research (planning, problem-solving procedures, etc.) will be evaluatedcomprehensively with a maximum score of 100 points.
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Related books and papers. Materials will be distributed as needed.

Requirements	[Prerequisite Courses] None in particular. Please refer to the table of courses for each major laboratory.
Notes on course enrollment	Nothing in particular.
Preparation and review	Please prepare and review in a planned manner. Instructions regarding essential matters will be given during the seminar.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Welding Engineering for Welded Structure			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kazuhiko Matsuoka		First year	Production Technology	2 hours

Class Outline	Students will understand that in manufacturing sites in all industries, materials fl ow through processes, and added value is added according to the design information by processing them at each process, resulting in the production ofhigh-quality, high-value-added products. Welding and joining techniques are widely used as processing techniques to increase added value at manufacturing sites, butstudents will understand that the welding techniques used at each factory and each process are diff erent. Furthermore, using shipbuilding factories and boiler factories as examples, students will be asked to investigate the fl ow of processes within the factories from materials to products and the welding techniques used at each process , and will present and discuss their fi ndings during class.
Lesson Plan	1st Orientation (The fl ow of materials within a manufacturing factory and the creation of added value through welding technology) 2nd Block fl ow in shipbuilding factories and welding as a value-added process 3rd Block fl ow in boiler factories and welding work as added-value work 4th Characteristics of welding technology in shipbuilding factories 5th Characteristics of welding technology in boiler factories 6th Value-added work, incidental work, and unnecessary work in welding work 7th Large oil tanker manufacturing - Creating a fl ow chart from material delivery to intermediate assembly 8th Large boiler manufacturing - Creating a fl ow chart from material delivery to intermediate assembly 9th LNG ship manufacturing - Creating a fl ow chart from material delivery to intermediate assembly 10th Large oil tanker manufacturing - Creation of a fl ow chart from intermediate assembly to major assembly 11th Large boiler manufacturing - Creating a fl ow chart from intermediate assembly to large assembly 12th LNG ship manufacturing - Creation of a fl ow chart from intermediate assembly to major assembly 13th Flow and welding technology of in-shop blocks for large oil tanker construction; presentation and discussion 14th Flow and welding techniques of in-factory blocks for large boiler manufacturing; presentation and discussion 15th Flow and welding technology of in-shop blocks for LNG ship construction; presentation and discussion
Class Format	Lectures, report presentations and discussions
Achieving Goals	(a)Understand that in manufacturing sites, products are manufactured with added value by transferring design information to components . (b)Understand that welding and joining techniques are one of the processing techniques used to increase added value, and that they diff er depending on the type and process of the manufacturing factory. (c)Understand the importance of welding and joining techniques in manufacturing factories by completing reports on a shipbuilding factory and a boiler factory.

Evaluation Method	Students will be evaluated comprehensively based on their class attitude and reports, with a total score of 100 points.
Evaluation criteria	A score of 60 or above is considered a pass.
Textbook/ Reference Books	Distribute handouts. Reference books: "Introduction to Welding and Joining Technology" edited by the Japan Welding Society (Sanpo Publishing), "Special Topics in Welding and Joining Technology" edited by the Japan Welding Society (Sanpo Publishing)
Requirements	none
Notes on course enrollment	none
Preparation and review	1)Each student will investigate a shipbuilding factory and write a report on the fi ndings to prepare and review the lesson. 2)Students will discuss and evaluate the content of their presentations in class to prepare and review the lesson.
Office Hours	at any time

Course Name	Seminar on Industrial Technology ⅡA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		Second year	Production Technology	2 hours

Class Outline	Decide on the theme and research plan for your master's thesis and conduct your research activities accordingly. Summarizethe results of your research activities as an outline for the interim presentation and give a presentation. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Previous papers and novelty Reorganize the relationship between the results of the literature survey conducted in IA and IB and the proposedresearch plan, and confi rm the novelty of this research. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lecture,and record any points you do not understand or questions you have (at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you have (at least 2 hours). 2nd Research planning Based on the novelty confi rmed in 1), reconfi rm the purpose of this research, the issues to be solved, the measures to be taken, and the goals, and consider the details of the specifi c implementation items and schedule to achieve the purpose. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a summary in your research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you have (for at least 2 hours). 3rd Presentation and discussion of research plans 2)Present the research plan you have drawn up in step 2, discuss its validity with your supervisor, and make anynecessary revisions. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture, and write themdown in your research notebook. If there is anything you do not understand, reread and review your lecture notes, references, etc., and record any questions you have (for at least two hours). 4th Confi rm the appropriateness of measures and action items to solve the issues (policy consideration) 3)You will proceed with your research in detail according to the research plan established in 3), but fi rst you willgive a presentation on how you will proceed (what, by when, how you will study, and how you will evaluate the results) and discuss it with your supervisor. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lecture,and record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture, and write themdown in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you have (for at least two hours). 5th Preparation of a plan to proceed with the implementation item (experiment or calculation) Plan specifi c implementation plans for experiments or calculations (implementation procedures, how to prepare the test equipment or calculation environment,

	experimental or calculation parameters, and how to verify the results). [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review the lecture notes,references, etc., and record any questions you have (for at least two hours).
6th	Preparation for experiments or calculations 5)Prepare for experiments or calculations according to the plan drawn up in step 5. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least 2 hours).
7th	Conducting experiments or calculations 5)Carry out the experiments or calculations prepared in 6) and evaluate the results. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and review, and record any questions you have (for at least 2 hours).
8th	Discussion of experimental or calculation results Present the experimental or calculation results and discuss the validity of the results with your supervisor. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and review, and record any questions you have (for at least 2 hours).
9th	Realignment of research plans Based on the discussion in 8), make any necessary revisions to the content and schedule. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
10th	Preparation of a plan to proceed with the implementation item (experiment or calculation) 9)Based on the results, readjust the specifi c implementation plan for the experiment or calculation (implementation procedure, how to prepare the test equipment or calculation environment, experimental or calculation parameters, and how to verify the results). [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review the lecture notes,references, etc., and record any questions you have (for at least two hours).
11th	Preparation for experiments or calculations 10)Prepare for the experiment or calculation according to the readjusted plan. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review the lecture notes,references, etc. and record any questions you have (for at least 2 hours).

	12th Conducting experiments or calculations 10)Carry out the experiments or calculations prepared in 11) and evaluate the results. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least 2 hours). 13th Discussion of experimental or calculation results Present the experimental or calculation results and discuss the validity of the results with your supervisor. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and review, and record any questions you have (for at least 2 hours). 14th Creating presentation materials [Preparation] Consider the content of your presentation at the symposium based on the research notes you havecompiled in previous lectures (2 hours or more). [Review] Finalize your presentation slides to provide easy-to-understand explanations for participants at the symposium (2 hours or more). 15th Progress presentation (interim presentation) [Preparation] Practice your presentation using the presentation materials you have prepared (for at least 2 hours). [Review] Summarize any points you have noticed in the content of other presentations (for at least 2 hours).
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Use of computers in the lab. [Feedback to students regarding submission of results, etc.] Discussion will be held on the content of submitted research materials. [Class method] Students will carry out actual calculations for specifi c example problems, identify problems, and repeatedly consider solutionsto ensure the content and level of a master's thesis in engineering. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	The goal is to organize the content into a form that can be presented interim by promoting research toward the creation of amaster's thesis.
Evaluation Method	Evaluation will be based on the progress made in the seminar and the content of the summary materials prepared for the interim presentation.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellentbeing 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing.

	[Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points,A being 80 to 89 points, B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribution of materials
Requirements	[Prerequisite Courses] There are no specifi c prerequisites, but to understand the lectures, it is desirable that you have acquired basic knowledge of fl uid mechanics and ships. Please refer to the curriculum map.
Notes on course enrollment	
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	I'm available to answer any questions at any time.

Course Name	Practice in Industrial Technology ⅡB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Kouichi Okada, Kazuhiko Matsuoka, Hiroshi Furuno, Akira Ishikawa, Yutaka Matsukawa, Kenichi Fujita, Satoshi Takagi)		Second year	Production Technology	2 hours

Class Outline	Conduct research on the topic of your master's thesis. Details will be decided according to the status of your master's thesis research. [Particularly relevant majors, departments, and laboratories as specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department . Please also refer to the curriculum map.
Lesson Plan	1st Research Promotion Guidelines Discuss and provide guidance on future research promotion plans regarding research themes. 2nd Research and organization of existing research Research and organize existing research on the research topic. 3rd Comparison with existing research Discuss and provide guidance on comparisons with existing research related to the research topic. 4th Guidance on master's thesis composition Provide guidance on the structure of the master's thesis. 5th Discussion and guidance regarding research status Discuss and provide guidance on the status of numerical and experimental analysis results related to the researchtopic. 6th Interim summary Compile interim results of numerical and experimental analysis related to research themes. 7th Discussion and guidance regarding the interim report Discuss and provide guidance on the interim results of numerical and experimental analysis related to the research topic. 8th Research summary We will provide guidance on how to summarize research on a research topic. 9th Summary of research results Summarize research results related to the research topic. 10th Guidance on the results of thesis compilation Guidance on the results of writing a paper on a research topic 11th Guidance on writing academic papers Provide guidance on writing academic papers on research results. 12th Guidance on materials for thesis presentation Provide guidance on master's thesis presentation materials related to research topics. 13th Guidance on paper presentation Provide guidance on master's thesis presentations related to research topics. 14th Guidance on academic paper presentation materials Provide guidance on academic presentation materials. 15th Guidance on academic presentations Provide guidance on academic presentations.
Class Format	Seminar format [Active learning] Yes, students will deepen their understanding through presentations and discussions on assigned tasks. [Use of information devices] None in particular. [Class method] Not only will the theory be explained in a logical and systematic manner, but students will also

	be given practical examples tolearn by actually calculating them themselves. [Feedback to students regarding the submission of deliverables, etc.] Submitted reports will be discussed. [Utilization of work experience] Yes, instruction will be given based on research and development experience in companies. [Form of class when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	Gain the ability to give presentations at various research meetings and academic conferences.
Evaluation Method	Comprehensive evaluation will be based on seminar presentations, reports, and attitude toward research (planning, problem-solving procedures, etc., including presentations at research meetings and academic conferences).
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Related books and papers. Materials will be distributed as needed.
Requirements	[Prerequisite courses] None. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	Please prepare and review in a planned manner. Instructions regarding essential matters will be given during the seminar.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Seminar on Industrial Technology ⅡB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		Second year	Production Technology	2 hours

Class Outline	Based on the results of the interim presentation, students will revise their research plan as necessary and advance their research. Students will compile the results obtained through their research activities into a master's thesis and give a presentation. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Reorganization of the technical issues targeted in this research [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 2nd Research: Domestic literature survey in the fi eld [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 3rd Research: A detailed review of the contents of domestic literature and an examination of its applicabilityto this research [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 4th Research: Research into overseas literature in the fi eld [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 5th Research: A detailed review of the contents of domestic literature and an examination of its applicabilityto this research [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 6th Research: Consideration of how to proceed with this research based on the contents of domestic and international literature [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in

	the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
7th	Reevaluation of the novelty of this research [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
8th	Consider specifi c measures and implementation items to solve the issues [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or any questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and write them down in your research notebook. If there is anything you do not understand, reread your lecture notes, references,etc., and record any questions you have (for at least two hours).
9th	Presentation and discussion of specifi c measures and implementation items to solve the issues [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
10th	Conducting experiments to solve problems [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
11th	Consider the appropriateness of measures and implementation details [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
12th	Summary of results [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
13th	Organizing future challenges and strategies [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
14th	Creating presentation materials [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).

	15th Progress presentation (master's thesis presentation) [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Use of computers in the lab. [Feedback to students regarding submission of results, etc.] Discussion will be held on the content of submitted research materials. [Class method] Students will carry out actual calculations for specifi c example problems, identify problems, and repeatedly consider solutionsto ensure the content and level of a master's thesis in engineering. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	The goal is to organize the content so that it can pass the fi nal examination by promoting research and providing guidance onpresentations in preparation for the master's thesis.
Evaluation Method	Students will be evaluated based on their regular marks, which will be calculated based on their participation in the seminar and progress in the exercises.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellentbeing 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points,A being 80 to 89 points, B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribution of materials
Requirements	[Prerequisite Courses] There are no specifi c prerequisites, but to understand the lectures, it is desirable that you have acquired basic knowledge of fl uid mechanics and ships. Please refer to the table of courses to be taken for each major laboratory.
Notes on course enrollment	
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours).

	[Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	Second period on Fridays. We are available to answer any questions at any time. Please refer to the information posted on the notice board and in the AAA system.

Course Name	Industrial Technology Experiments			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		Second year	Production Technology	4 hours

Class Outline	Conduct numerical experiments necessary for master's thesis research. Specifi cally, evaluate ship propulsion performance ona computer (using a so-called numerical water tank) and develop a superior hull form or energy-saving device. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory. Please also refer to the curriculum map.
Lesson Plan	1st A review of the latest fl ow fi eld analysis techniques using computational fl uid dynamics (CFD). [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 2nd Object shape modeling method Review how to create hull surface data for CFD analysis using hull 3D CAD data as input data. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a recordof these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least 2 hours). 3rd Creating a spatial grid Studying the effi ciency of methods for effi ciently creating spatial grids around a ship's hull [Preparation/Review] -Before the lecture, read the handouts and references for the relevant part of the lecture and record any points you do not understand or questions you may have. -After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If there is anything you do not understand, reread and review your lecture notes and references, and record any questions you may have. 4th Systematic input data preparation method Establish a system that enables rapid grid generation when systematically changing the shape of the hull or energy-saving devices. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc. and record any questions you may have (for at least 2 hours). 5th Numerical Methods Organize the advantages and disadvantages of various calculation methods and prepare a system to select the optimal solution method for the problem being calculated. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and

	record any questions you have (for at least 2 hours).
6th	How to process the calculation results Developing visualization methods to display the vast amounts of fl ow fi eld data obtained through numerical analysis [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least 2 hours).
7th	Study of analysis methods for fl ow fi eld data Consideration of methods for analyzing fl ow fi eld information [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least 2 hours).
8th	Hull shape planning Plan a series of hull forms that will be the subject of series calculations to solve the problems set in the research plan. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If you do not understand anything, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
9th	Numerical experiments on ship hull shapes Carry out performance calculations for a planned series hull form. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
10th	Analysis of the results of numerical experiments on ship hull shape 9)Organize the calculation results obtained and analyze the relationship between hull form and performance. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and review, and record any questions you have (at least 2 hours).
11th	Plan B hull shape plan Based on the results of 8) to 10), plan the series hull form for Plan B. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least 2 hours).
12th	Numerical experiments on Plan B hull shape Performance improvement devices will be attached to the optimal hull form extracted from the planned series hullforms, and performance calculations will be carried out. [Preparation/Review] -Before the lecture, read the distributed materials and references for the relevant part of the lecture, and recordany points you do not understand or questions you have. -After the lecture, use your lecture notes to confi rm the content discussed in the lecture, and compile and keep aresearch notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any

	questions you have. 13th Analysis of the results of numerical experiments on the Plan B hull shape 12)Organize the calculation results obtained and analyze the relationship between performance-enhancing devices and performance. [Preparation/Review] -Before the lecture, read the distributed materials and references for the relevant part of the lecture and record any points you do not understand or questions you have. -After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc. and record any questions you have. 14th Compilation of calculation results Creating presentation materials [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least 2 hours). 15th Summary of the study results and future issues [Preparation/Review] ・Practice your presentation using the presentation materials you have created. ・Summarize any points you have noticed in the content of other presentations.
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Use of computers in the lab. [Feedback to students regarding submission of results, etc.] Discussion will be held on the content of submitted research materials. [Class method] Students will carry out actual calculations for specifi c example problems, identify problems, and repeatedly consider solutionsto ensure the content and level of a master's thesis in engineering. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	Students will use a numerical water tank to develop a high-performance ship model or an energy-saving device, and learn how to analyze and summarize numerical experiments.
Evaluation Method	Students will be evaluated based on their regular marks, which will be calculated based on their participation in the seminar and progress in the experiment.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellentbeing 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points,A being 80 to 89 points, B being 70 to 79 points, C being 60 to

	69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribution of materials
Requirements	[Prerequisite Courses] There are no specifi c prerequisites, but to understand the lectures, it is desirable that you have acquired basic knowledge of fl uid mechanics and ships. Please refer to the table of courses to be taken for each major laboratory.
Notes on course enrollment	
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	Second period on Fridays. We are available to answer any questions at any time. Please refer to the information posted on the notice board and in the AAA system.

Course Name	Seminar on Industrial Technology I Ab			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Hitoshi Furuno		First year	Production Technology	2 hours

Class Outline	In this course, students will decide on the outline of their master's thesis and research plan through 15 seminars, and will receive guidance on their research activities and a summary of their research results. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Furuno Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Lecture Deciding on the outline theme and research plan for the master's thesis, and examining the plate width that contributes to the bending stiff ness of double constant longitudinal and transverse beams in SSEM.Beam . [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 2nd Lecture Study on the approximate formula for the plate width that contributes to the bending stiff ness of double constantlongitudinal and cross beams in SSEM.Beam [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 3rd Lecture Study on the approximate formula for the plate width that contributes to the bending stiff ness of double constantlongitudinal and cross beams in SSEM.Beam [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 4th Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ects of adjacent double bottom structures Modeling of double bottom structure and defl ection assumptions [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour). 5th Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ectof adjacent double bottom structures Derivation of the strain energy of double bottom side girders [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour). 6th Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ectof adjacent double bottom structures Derivation of strain energy of double bottom fl oors [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).

	7th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method that takes into account the deformation effects of adjacent double bottom structures Derivation of the continuity conditions on the connection line of adjacent double bottom structures [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).
	8th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ects of adjacent double bottom structures Introduction of Lagrange's undetermined multiplier method and the energy equation for the system [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).
	9th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ects of adjacent double bottom structures Stationary problems for the energy equation [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).
	10th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3 Derivation of a simple double bottom strength evaluation method using the energy method 2.3.1 Derivation of a simple double bottom strength evaluation method taking into account the deformation eff ects of adjacent double bottom structures Determination of the undetermined defl ection coeffi cient [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).
	11th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 2: Development of a simple double bottom strength method 2.3: Derivation of a simple double bottom strength evaluation method using the energy method 2.3.2: Defl ection curve of a beam made of a lattice structure Drawing of a defl ection curve for a double bottom structure [Preparation]: To be instructed separately (more than 1 hour). [Review]: To be instructed separately (more than 1 hour).
	12th	Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 3: Confi rmation of estimation accuracy of simple double bottom strength evaluation method using fi nite element analysis and setting of allowable shear stress3.4 Setting of allowable shear stress related to shear strength3.4.2 Calculation of shear force using simple double bottom structure and setting of allowable shear stressDerivation of shear force generated in stringers and fl oors of double bottom structure [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour).

	13th Lecture Reading: "Establishment of an initial structural planning system for box-shaped bulk carriers (optimization of hull structure using genetic algorithms)" Chapter 3: Confi rmation of estimation accuracy of simple double bottom strength evaluation method using fi nite element analysis and setting of allowable shear stress3.4 Setting of allowable shear stress related to shear strength3.4.2 Calculation of shear force using simple double bottom structure and setting of allowable shear stressDrawing of shear force distribution occurring in stringers and fl oors of double bottom structure [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour). 14th Lecture Summarize research results to date and create a poster for presentation. [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour). 15th Lecture Presentation skills instruction [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more).
Class Format	Seminar format [Active learning] Research reports, discussions, readings, etc. will be conducted on the topic of the master's thesis. [Use of information devices] None in particular [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed together with thesupervising professor. [Education method] Education and guidance will be provided with the aim of cultivating basic skills for research and development. [Form when face-to-face classes cannot be held due to special circumstances] Communication will be via Google Classroom,and lectures will be conducted via two-way remote classes using Zoom meetings.
Achieving Goals	Students will decide on the outline of their master's thesis and research plan, and will then carry out their research activitiesaccordingly. The results of their research activities will be compiled into a report.
Evaluation Method	Evaluation will be based on the status of seminar participation and research progress. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] None in particular.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Materials will be distributed as needed.
Requirements	none
Notes on course enrollment	Do not be late or absent.
Preparation and review	[Preparation] Deeply consider the problems given in the lectures and readings, and clarify their meaning and essence. [Review] Be sure to record the knowledge gained through research activities as research materials.
Office Hours	Please visit the lab. We will assist you if we have time.

	Please also refer to the notices and information in the AAA system.

Course Name	Seminar on Industrial Technology I Bb			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Hitoshi Furuno		First year	Production Technology	2 hours

Class Outline	This course will review past research activities and provide guidance on research activities, summarizing research results, andpresentation techniques through 15 seminars. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] Furuno Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Lecture Review of research activities to date and revision of research plans [Preparation] To be instructed separately (at least 1 hour). [Review] To be instructed separately (at least 1 hour). 2nd Lecture FEM analysis of double bottom structure (creating the geometric shape of the double bottom structure) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 3rd Lecture FEM analysis of double bottom structure (creating a mesh for a double bottom structure) [Preparation] Instructions will be given separately (1 hour or more). [Review] Instructions will be given separately (1 hour or more). 4th Lecture FEM analysis of double bottom structure (setting element properties, material properties, boundary conditions) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 5th Lecture FEM analysis of double bottom structure (analysis of loading condition CASE-1) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 6th Lecture FEM analysis of double bottom structure (analysis of loading condition CASE-2) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 7th Lecture FEM analysis of double bottom structure (analysis of loading condition CASE-3) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 8th Lecture FEM analysis of double bottom structure (analysis of loading condition CASE-4) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 9th Lecture FEM analysis of double bottom structure (analysis of loading condition CASE-5) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 10th Lecture FEM analysis of double bottom structure (summarizing analysis results) [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 11th Lecture Review the classifi cation rules formulas used in the initial structural planning system. [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 12th Lecture Modifi cation of classifi cation rules formulas used in the initial structural planning system [Preparation] To be instructed separately (1 hour or more).

	[Review] To be instructed separately (1 hour or more). 13th Lecture Trial calculations using the initial structural planning system [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 14th Lecture Create an outline for the midterm presentation. [Preparation] Separate instructions will be given (at least 1 hour). [Review] Separate instructions will be given (at least 1 hour). 15th Lecture Presentation skills instruction [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more).
Class Format	Seminar format [Active learning] Research reports, discussions, readings, etc. will be conducted on the topic of the master's thesis. [Use of information devices] None in particular [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed together with thesupervising professor. [Education method] Education and guidance will be provided with the aim of cultivating basic skills for research and development. [Form when face-to-face classes cannot be held due to special circumstances] Communication will be via Google Classroom,and lectures will be conducted via two-way remote classes using Zoom meetings.
Achieving Goals	Students will review their research activities to date, revise their research plans as necessary, and continue their research activities. They will also aim to improve their presentation skills by summarizing the results of their research activities in an interim presentation.
Evaluation Method	Evaluation will be based on the status of seminar participation and research progress. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] None in particular.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Materials will be distributed as needed.
Requirements	[Prerequisite course] Students must have taken Production Technology Seminar IA.
Notes on course enrollment	Do not be late or absent.
Preparation and review	[Preparation] Deeply consider the problems given in the lectures and readings, and clarify their meaning and essence. [Review] Be sure to record the knowledge gained through research activities as research materials.
Office Hours	Please visit the lab. We will assist you if we have time. Please also refer to the notices and information in the AAA system.

Course Name	Medical Ultrasound			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	Students will learn about the principles, structure, and maintenance management of ultrasound engineering equipment used in diagnostic imaging and treatment, and the course will enable them to comprehensively manage the many diagnostic and treatment machines used in hospitals. In Japan, there is a system of ultrasound technicians, and technicians use diagnostic equipment to perform examinations and work as highly specialized medical professionals. In addition, in the fi eld of surgery and treatment, ultrasound is an indispensable medical device for stone crushing and other surgery-related equipment, and requires specialized maintenance management, so a deep engineering knowledge is required.
Lesson Plan	1st Introduction to Ultrasonic Engineering 2nd Diseases and diagnostic equipment 3rd Diseases and treatment devices 4th Piezoelectric ceramic materials and their characteristics 5th Structure and principles of diagnostic equipment 6th Structure and principles of treatment devices 7th Structure and principles of surgical equipment 8th Structure and principles of peripheral devices 9th Ultrasound examination in practice 10th The reality of ultrasound treatment 11th Intravascular ultrasound 12th acoustic physics 13th Ultrasound Technician Exam and Engineering 14th Ultrasound examinations of the abdomen, circulation, body surface, urinary system, and gynecology 15th Depiction using an ultrasound device 16th Breast ultrasound examination
Class Format	Lectures [Active learning] None [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational method] Exercises and assignments (reports) will be given in a lecture format. [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software ”Zoom” or ”Meet” will be used.

Achieving Goals	Ability to properly perform professional maintenance and operation of medical equipment
Evaluation Method	The evaluation will be made on a 100-point scale, with 80 points for reports and assignments submitted and 20 points for theamount of speaking in class and the content of that speaking. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] The evaluation will be made on the basis of the student's attitude in class and regular marks based on reports submitted as appropriate during the class, with 100% of the total points allocated
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Handouts distributed during class
Requirements	Must have suffi cient basic medical knowledge and must complete the self-study prescribed by the doctor.
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions given during lectures

Course Name	Biomedical Optics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	There are many types of optical equipment used in medical facilities depending on the application, and they have become indispensable medical equipment in modern medicine. In addition, there are a great many peripheral devices used in examinations and treatments, and their use requires a wide range of specialized knowledge. Therefore, those who pass the gastrointestinal endoscopy technician examination under the gastrointestinal endoscopy technician system of the Japan Gastrointestinal Endoscopy Society are granted a gastrointestinal endoscopy technician license, and clinical engineers are also expected to contribute in this fi eld. In this class, students will learn the medical and engineering knowledge and skills required for the gastrointestinal endoscopy technician examination.
Lesson Plan	1st Engineer system and related regulations 2nd Each disease and optical equipment 3rd Structure and Principles of Fiberscopes 4th Structure and principles of electronic endoscopes 5th Structure and principle of light source device 6th Structure and Principles of Capsule Endoscopy 7th Arthroscopes, laparoscopes, and other scopes 8th Structure and principles of peripheral devices 9th Actual treatment (upper gastrointestinal tract) 10th Actual treatment (lower gastrointestinal tract) 11th Principles and structure of ultrasound endoscopes 12th Magnifying endoscopy and chromoendoscopy 13th Preparation for the Gastrointestinal Endoscopy Technician Examination 14th Preparation for the Gastrointestinal Endoscopy Technician Examination 15th Endoscopy service hospital tour 16th Summary of endoscopic work Comprehensive written exam
Class Format	Lectures [Active learning] available. In addition to classes, practical training and exercises will be conducted. [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational methods] In addition to exercises and assignments (reports), experiments and practical training will be conducted to deepen understanding. [Form of classes when face-to-face classes cannot be held due to special circumstances]

	Google Classroom will be used as the base, and the conference system software "Zoom" or "Meet" will be used.
Achieving Goals	In addition to understanding the peripheral equipment used in endoscopic examinations and treatments, students will also acquire knowledge of operation and infection control.
Evaluation Method	The evaluation will be made on a 100-point scale, with 80 points for submitted reports and assignments and 20 points for theresults of exercises. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] The evaluation will be made on the basis of the student's attitude in class and regular marks based on reports submitted as appropriate along the way, with 100% of the total points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Handouts: Explanation of Gastrointestinal Endoscopy Technician Exam Questions (3); Gastrointestinal Endoscopy Technician System Council of the Japan Gastrointestinal Endoscopy Society (ed.); Handbook for Gastrointestinal Endoscopy Technicians (revised 6th edition); Japan Gastrointestinal Endoscopy Society; Gastrointestinal Endoscopy Technician System Committee; Gastrointestinal Endoscopy Guidelines, supervised by the Japan Gastrointestinal Endoscopy Society, edited by the PostgraduateEducation Committee of the Japan Gastrointestinal Endoscopy Society
Requirements	Those who have basic knowledge of medical engineering and clinical engineering
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions will be given during the lecture.

Course Name	Experiment of Electrical and Information Technology			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Oyama, Matsui, Choi, Tanaka, Masashi, Seiyama, Sato, Kajiwara, Doi, Liu)		First year	Electronics and Information Science	2 hours

Class Outline	Students will acquire knowledge and basic skills related to experiments (including program development and simulation analysis) that are essential in the fi elds of electricity, electronics, medicine, and information, develop analytical and thinking abilities that are essential for conducting master's theses and research activities in specialized fi elds, and acquire experiment-relatedskills such as report writing and presentations.
Lesson Plan	1st Guidance on how to take classes, topics, and experiments The theme will be one of the following four fi elds: Electronic Devices , Medical Engineering , Measurement and Control , Information Systems. Preparation: Instructions will be given in advance. Review: To be presented at the end of the lecture. 2nd Submission of experimental plan and explanation of experimental method Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 3rd Experimental preparation and setup Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 4th Conducting the experiment (preliminary experiment) Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 5th Conducting experiments (acquiring data) Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 6th Organize results Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 7th Analysis of results and interview with supervisor Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 8th Additional Experiments Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 9th Analysis of additional experiments Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 10th Briefi ng and interview with supervisor Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 11th Discussion of the experimental results Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 12th Creating presentation materials Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 13th presentation Present the principles, objectives, and considerations of the experiment, and then answer questions.Preparation : Prepare in advance for the presentation.Review: Review the presentation plan. 14th Report preparation Preparation: Instructions will be given in advance. Review: Instructions will be provided at the end of the lecture. 15th Supervisor checks, corrects, and completes the report Preparation: Instructions will be given in advance. Review: None.

Class Format	Experiments [Active learning] Yes, including discussions and presentations between students. [Use of information technology] Yes, computers will be used for programming and simulations. Supplementary materials will be distributed in PDF format. [Feedback to students regarding submission of work, etc.] Additional explanations will be provided when returning assignments. [Educational method] Presentations and discussions will be held regarding theories and the analysis and consideration of the data obtained to increase understanding. [Form of class when face-to-face classes cannot be held due to special circumstances] We plan to use the Zoom conferencing system based on Google Classroom.
Achieving Goals	The main goals of this class are to acquire the following abilities: ・Understand the fundamentals of electrical engineering, electronics engineering, medical engineering, and information engineering ・Understand the principles of experimental equipment and measuring instruments and learn how to use them ・Improve logical expression skills through report writing ・Improve oral presentation skills and communication skills through presentations
Evaluation Method	Evaluation will be based on the progress of the experiment and the content of the report.
Evaluation criteria	[Students entering in 2019 or later] Grades will be expressed in fi ve levels: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Materials will be distributed as needed.
Requirements	Nothing in particular.
Notes on course enrollment	Use a computer.
Preparation and review	[Preparation] Research and examine the given topic and summarize its meaning and essence. [Review] Compile the obtained results, data, and knowledge into a report.
Office Hours	Applications are accepted at any time. Please also refer to the information posted on bulletin boards and in the AA system.

Course Name	Electronic Engineering in Clinical Engineering			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	In today's medical fi eld, advanced electronic devices are widely used not only for diagnosis but also for treatment. In addition, team medical care is becoming more common, and support from paramedical staff is becoming increasingly important. The purpose of this course is to provide a systematic study of electronic engineering in general in order to acquire the advanced electronic engineering knowledge required in the medical fi eld.
Lesson Plan	1st Clinical Engineering and Electronics 2nd Principles of Electrical Conduction 3rd What is a semiconductor? 4th Phenomena in pn junctions 5th Transistor structure and principles 6th Integrated circuits and other devices 7th Structures and principles of optical devices and circuits 8th Battery structure and principles 9th Amplifi cation and Noise 10th Information transmission, signal processing, medical information 11th Overview of biosignal sensing devices 12th Overview of wearable medical devices 13th Overview of implantable medical devices 14th Overview of assistive devices 15th Comprehensive Exam
Class Format	Lectures [Active learning] None [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational method] Lecture format based on the theme. [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software "Zoom" or "Meet" will be used.
Achieving Goals	Acquire general knowledge of medical electronics engineering
Evaluation Method	20 points for class attitude + 80 points for fi nal exam = 100 points in total (20 points based on overall evaluation of attitude during lectures, questions, opinions, etc.) [Evaluation method when face-to-face regular exams cannot be held due to special circumstances]

	Evaluation will be changed to 100% based on attitude during lectures and regular marks based on reports submitted as appropriate along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Materials will be distributed during the lecture. Reference book: Clinical Engineering Series, Medical Electronics, by Masayuki Matsuo, Corona Publishing
Requirements	Nothing in particular.
Notes on course enrollment	Using a scientifi c calculator
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions will be given during the lecture.

Course Name	Advanced Practicum in the Electronics Devices I			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising professors (Fujio Kurokawa, Yoshito Tanaka, Takashi Kato, Haruo Hito, Ken Oyama, Nobumasa Matsui)		First year	Electronics and Information Science	2 hours

Class Outline	Deepen your understanding of electronic devices used in the engineering fi eld and master cutting-edge technology.
Lesson Plan	1st Survey of cutting-edge technology trends in electronic devices used in the domestic engineering fi eld 2nd Organizing the trends of cutting-edge electronic device technology used in the domestic engineering fi eld 3rd Commentary on the latest trends in electronic devices used in the domestic engineering fi elds 4th Discussion on the trend of advanced technology in electronic devices used in domestic engineering fi elds 5th Summary of cutting-edge technology trends in electronic devices used in the domestic engineering fi elds 6th Research into the latest technological trends in electronic devices used in overseas engineering fi elds 7th Summary of cutting-edge technology trends in electronic devices used in overseas engineering fi elds 8th Commentary on the latest trends in electronic devices used in overseas engineering fi elds 9th Discussion on the trend of cutting-edge technology in electronic devices used in overseas engineering fi elds 10th Summary of cutting-edge technology trends in electronic devices used in overseas engineering fi elds 11th Explanation of technical issues surrounding electronic devices used in engineering fi elds both in Japan and overseas 12th Discussion of technical issues of electronic devices used in domestic and international engineering fi elds 13th Overview of the outlook for electronic devices used in engineering fi elds both domestically and internationally 14th Discussion of the outlook for electronic devices used in domestic and international engineering fi elds 15th Summary of technical issues and prospects for electronic devices used in engineering fi elds both in Japan and overseas
Class Format	Lectures and seminars. [Educational method] Theories will be explained in a logical and systematic manner, and students will acquire skills through seminars. [In cases where face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59

	points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	In preparation, students should summarize theories related to the lecture topic and trends in cutting-edge technology. In review, students should organize the discussions held during the lecture and conduct literature research to deepen their understanding.
Office Hours	at any time.

Course Name	Advanced Practicum in the Electronics Devices Ⅱ			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising professors (Fujio Kurokawa, Yoshito Tanaka, Takashi Kato, Haruo Hito, Ken Oyama, Nobumasa Matsui)		First year	Integrated Systems Engineering	2 hours

Class Outline	Deepen your understanding of electronic devices used in the engineering fi eld and master cutting-edge technology.
Lesson Plan	1st Survey of cutting-edge technology trends in electronic devices used in the domestic engineering fields 2nd Organizing the trends of cutting-edge electronic device technology used in the domestic engineering fi elds 3rd Commentary on the latest trends in electronic devices used in the domestic engineering fi elds 4th Discussion on the trend of advanced technology in electronic devices used in domestic engineering fi elds 5th Summary of cutting-edge technology trends in electronic devices used in the domestic engineering fi elds 6th Research into the latest technological trends in electronic devices used in overseas engineering fi elds 7th Summary of cutting-edge technology trends in electronic devices used in overseas engineering fi elds 8th Commentary on the latest trends in electronic devices used in overseas engineering fi elds 9th Discussion on the trend of cutting-edge technology in electronic devices used in overseas engineering fi elds 10th Summary of cutting-edge technology trends in electronic devices used in overseas engineering fi elds 11th Explanation of technical issues surrounding electronic devices used in engineering fi elds both in Japan and overseas 12th Discussion of technical issues of electronic devices used in domestic and international engineering fi elds 13th Overview of the outlook for electronic devices used in engineering fi elds both domestically and internationally 14th Discussion of the outlook for electronic devices used in domestic and international engineering fi elds 15th Summary of technical issues and prospects for electronic devices used in engineering fi elds both in Japan and overseas
Class Format	Lectures and seminars. [Educational method] Theories will be explained in a logical and systematic manner, and students will acquire skills through seminars. [In cases where face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59

	points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	In preparation, students should summarize theories related to the lecture topic and trends in cutting-edge technology. In review, students should organize the discussions held during the lecture and conduct literature research to deepen their understanding.
Office Hours	at any time.

Course Name	Seminar of Electronic and Information Tech. II A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Masanori Sato		Second year	Electronics and Information Science	2 hours

Class Outline	Students will conduct technical research and discussions using papers related to robotics, acquire the knowledge necessary for master's thesis research, and discuss research topics for completing the master's thesis.
Lesson Plan	1st Lectures and practical training are provided to acquire the basic knowledge necessary for master's thesisresearch and the skills required for carrying out experiments. Organizing research and experiment plans for master's thesis writing 2nd Organizing simulation or experimental results and investigating previous research 3rd Simulation or experimental results and discussion of previous research 4th Additional simulations or experiments 5th Interim summary of research results 6th Interim summary and discussion of research results 7th Guidance on the composition and writing of master's thesis 8th Master's thesis writing and supervision 9th Guidance on master's thesis mid-term examination 10th Guidance on mid-term presentations 11th Interim presentation of master's thesis 12th Discussion on the results of the master's thesis and interim presentation 13th Master's thesis revision and guidance 14th Guidance on master's thesis summaries and journals 15th Interim guidance on master's thesis
Class Format	Group reading and practical training. [Active learning] Available. Literature research and assignments to reconfi rm the content of the class may be assigned. [Use of information devices] Available. [Feedback to students regarding the submission of work, etc.] Provided when returning assignments and papers. [Educational method] Research previous research and discuss the results of the research to position the research and promote it. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	The goal is to acquire knowledge about the research topic and related technologies.
Evaluation Method	Comprehensive evaluation will be based on the attitude towards seminar presentations, reports, and research. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation

	will be based on the attitude towards lectures in class, quizzes given as appropriate during the class, and the results of reports, with 100% of the points allocated to the regular grades.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	[Prerequisite Courses] ”Electronic and Information Science Seminar IA” and ”Electronic and Information Science Seminar IB” [Other] Please review the contents of the prerequisite courses before classes begin. Please also complete the preparation and review
Notes on course enrollment	Lectures and practical training are conducted on the assumption that students have knowledge of robotics, control engineering, measurement engineering, and programming.
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Present during lectures

Course Name	Environmental plan studies practice Ⅰ A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		First year	Environmental Planning	2 hours

Class Outline	This involves guidance on experimental techniques to determine the research topic for the master's thesis, as well as literature research on related papers. [Particularly relevant departments, affi liated groups, and laboratories as specifi ed in the curriculum map] Department of Environmental Planning . Please also refer to the curriculum map.
Lesson Plan	1st Deciding on a research topic Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 2nd Prior literature search and investigation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Research plan creation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th First fi eld survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th 2nd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th 3rd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th Data analysis and interim summary Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th 4th Field Survey, 5th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th 6th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Data analysis Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 11th Report preparation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th Report creation (graphs and tables) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.

	13th Report writing (results and discussion) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 14th Report creation (completed) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th discussion Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Seminar format [Active learning] None Students will present (report) materials and literature research in accordance with the seminar progress plan, and will also answer questions. [Use of information devices] None. [Feedback to students regarding submission of deliverables, etc.] Students will be given guidance on research perspectives and how to deepen their understanding of reports on materials and literaturecontent. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	Acquire the basic skills needed to write a master's thesis.
Evaluation Method	Evaluation will be based on the report and presentation at the results presentation meeting.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Instructions given during lectures
Requirements	none
Notes on course enrollment	none
Preparation and review	You should aim to spend the same amount of time as class time reviewing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during the work by asking the teacher in subsequent classes.
Office Hours	Instructions given during lectures

Course Name	Environmental plan studies practice Ⅰ B			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		First year	Environmental Planning	2 hours

Class Outline	This involves guidance on experimental techniques to determine the research topic for the master's thesis, as well as literature research on related papers. [Particularly relevant departments, affi liated groups, and laboratories as specifi ed in the curriculum map] Department of Environmental Planning . Please also refer to the curriculum map.
Lesson Plan	1st Deciding on a research topic Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 2nd Prior literature search and investigation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Research plan creation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th First fi eld survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th 2nd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th 3rd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th Data analysis and interim summary Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th 4th Field Survey, 5th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th 6th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Data analysis Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 11th Report preparation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th Report creation (graphs and tables) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 13th Report writing (results and discussion) Please prepare by reviewing the materials distributed last time. Also, summarize and

	review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 14th Report creation (completed) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th discussion Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Seminar format [Active learning] None Students will present (report) materials and literature research in accordance with the seminar progress plan, and will also answer questions. [Use of information devices] None. [Feedback to students regarding submission of deliverables, etc.] Students will be given guidance on research perspectives and how to deepen their understanding of reports on materials and literaturecontent. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	Acquire the basic skills needed to write a master's thesis.
Evaluation Method	Evaluation will be based on the report and presentation at the results presentation meeting.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Instructions given during lectures
Requirements	none
Notes on course enrollment	none
Preparation and review	You should aim to spend the same amount of time as class time reviewing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during the work by asking the teacher in subsequent classes.
Office Hours	Instructions given during lectures

Course Name	Practice in Industrial Technology ⅡA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Kouichi Okada, Kazuhiko Matsuoka, Hiroshi Furuno, Akira Ishikawa, Yutaka Matsukawa, Kenichi Fujita, Satoshi Takagi)		Second year	Production Technology	2 hours

Class Outline	Conduct research on your master's thesis topic. Deepen your understanding of your position through discussions at interim presentations. Decide on details based on the progress of your master's thesis research.
Lesson Plan	1st Research Ethics 2nd Current status of research fi eld 3rd Background of the research topic 4th Current status of research on the research topic 5th Master's thesis structure 6th Guidelines for writing a paper 7th Survey of existing research in related fi elds 8th Review of existing research in related fi elds 9th Discussion and guidance on research status (1) 10th Future research plans 11th Discussion and guidance on research status (2) 12th About submitting to academic conferences 13th Discussion and guidance on research status (3) 14th Summary of interim research report 15th Guidance on interim research reports
Class Format	Seminar format [Active learning] Yes: Deepen understanding through presentations and discussions on assigned tasks. [Use of information devices] Use the lab's PCs and other devices as needed. [Feedback to students regarding submission of deliverables, etc.] Discuss submitted reports. [Utilization of work experience] Yes: Instruction will be based on experience in corporate product development, vibration andacoustic analysis technology related to reliability improvement, countermeasure technology, and applied technology development.
Achieving Goals	Acquire the academic skills necessary to write a master's thesis.
Evaluation Method	Students will be evaluated based on their attitude towards seminar presentations, reports, and research (planning, problem-solving procedures, etc.).
Evaluation criteria	Students will be evaluated based on their level of understanding during seminar presentations and reports, and a score of 60or above will be considered a pass. There are fi ve levels: S (90-100), A (80-89), B (70-79), C (60-69), and D (less than 60).
Textbook/ Reference Books	Related books and papers. Materials will be distributed as needed.
Requirements	none

Notes on course enrollment	none
Preparation and review	Please plan your preparation and review accordingly. Instructions regarding essential points will be given during the seminar.
Office Hours	at any time

Course Name	Industrial Technology Experiments			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising teacher		Second year	Production Technology	2 hours

Class Outline	Students will be required to carry out the numerical and model experiments necessary to carry out the research planned in Production Technology Seminars IA and IB. The plan will be adjusted and details will be decided according to the progress of the master's thesis research. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department . Please also refer to the curriculum map.
Lesson Plan	1st Experimental and analytical techniques for structural and material strength 2nd Numerical experiments on structural strength: How to create a calculation model 3rd Numerical experiment on structural strength Setting calculation conditions 4th Numerical experiments on structural strength: Calculation and evaluation 5th Model experiments on structural strength 6th Comparison and evaluation of numerical and model experiments on structural strength 7th Numerical experiments on fatigue strength: How to create a calculation model 8th Numerical experiment on fatigue strength Setting of calculation conditions 9th Numerical experiments on fatigue strength: Calculation and evaluation 10th Model experiment on fatigue strength Experimental condition setting 11th Model experiment on fatigue strength 12th Comparison and evaluation of numerical and model experiments on fatigue strength 13th Model experiment on fracture toughness Experimental implementation 14th Model experiment evaluation of fracture toughness 15th collect
Class Format	Exercises and experiments [Active learning] Yes: Deepen understanding through presentations and discussions on assigned tasks. [Use of information devices] Use the lab's computers and other devices as needed. [Feedback to students regarding submission of deliverables, etc.] Discussions will be held on submitted reports, etc. [Utilization of work experience] Yes: Instruction will be given based on actual research and development experience at a company. [Form of instruction when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom.
Achieving Goals	Students will acquire the numerical analysis and experimental techniques necessary to carry out their research.

Evaluation Method	Evaluation will be based on a report of numerical analysis and experimental results.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four types: excellent, good, pass, and fail, with excellent being 80 to 100 points, good being 70 to79 points, pass being 60 to 69 points, and fail being 59 points or less. Excellent, good, and pass are considered passing, andfail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve types: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70 to79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is consideredfailing.
Textbook/ Reference Books	Related materials and literature will be distributed as necessary.
Requirements	[Prerequisite Courses] Students must have taken Production Technology Seminar IA and IB. Please refer to the course list for each major laboratory.
Notes on course enrollment	Nothing in particular.
Preparation and review	Plan ahead and review your lessons.
Office Hours	at any time

Course Name	Exam of Electrical and Information Technology IIA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Koji Kiyoyama		Second year	Electronics and Information Science	2 hours

Class Outline	Students will conduct technical research and discussions using the latest papers related to semiconductor integrated circuits,and acquire the knowledge necessary for master's thesis research. This seminar will also cover three-dimensional integration technology and medical application technology of semiconductors. Lectures and practical training are provided to acquire the basic knowledge necessary for master's thesisresearch and the skills required for carrying out experiments.
Lesson Plan	1st Survey of previous research in the research fi eld 2nd Current status of research 3rd Background of the research topic 4th Creating a research plan and examining the content 5th Research and experimental planning 6th Preparing the research environment 7th circuit desktop design 8th circuit CAD design 9th Simulation or Experiment: Static Characteristics 10th Simulation or experiment: dynamic characteristics 11th Simulation or experimental results 12th Discussion of simulation or experimental results 13th Guidance on interim research reports 14th Interim research status presentation
Class Format	Group reading and practical training. [Active learning] Yes. Presentations and discussions will be held as appropriate depending on the progress of literature research and research. [Use of information devices] None in particular , but supplementary materials will be distributed in PDF format. [Feedback to students regarding the submission of deliverables, etc.] Will be given when returning reports and papers. [Educational method] Students will research previous research themselves and discuss the results of the research to position the research and promote it.

	[Form of class when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "Zoom" based on Google Classroom.
Achieving Goals	The goal is to acquire the knowledge and skills necessary for the research topic.
Evaluation Method	Evaluation will be based on the progress of the assignments (40% preparation and review, 60% discussion and refl ection). [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on the student's attitude towards the lectures during class and the results of discussions held duringthe class, with 100% of the points allocated to the regular grades.
Evaluation criteria	preparationand review, and 60 points for discussion and refl ection, for a total of 100 points. [Students enrolled before 2018] Grades will be given in fi ve categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points,Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail is considered failing. [Students enrolled after 2019] Grades will be given in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribute handouts and papers.
Requirements	[Prerequisite Courses] "Electronic and Information Science Seminar IA" and "Electronic and Information Science Seminar IB"
Notes on course enrollment	The practical training will be conducted on the assumption that students can use electronic circuit design CAD and circuit simulators.
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Will be presented during the lecture.

Course Name	Exam of Electrical and Information Technology ⅡB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Koji Kiyoyama		Second year	Electronics and Information Science	2 hours

Class Outline	Students will conduct technical research and discussions using papers related to semiconductor integrated circuits, primarily from IEEE JSSC and ISSCC, and acquire the knowledge necessary for master's thesis research. This seminar will also cover packaging technology and reliability technology. Lectures and practical training are provided to acquire the basic knowledge necessary for master's thesisresearch and the skills required for carrying out experiments.
Lesson Plan	1st Organizing research and experiment plans for master's thesis writing 2nd Organizing simulation or experimental results and investigating previous research 3rd Simulation or experimental results and discussion of previous research 4th Additional simulations or experiments 5th Interim summary of research results 6th Interim summary and discussion of research results 7th Guidance on the composition and writing of master's thesis 8th Master's thesis writing and supervision 9th Guidance on master's thesis examination 10th Guidance on paper presentation 11th Master's thesis presentation 12th Discussion on the results of the master's thesis and presentation 13th Master's thesis revision and guidance 14th Guidance on master's thesis summaries and journals 15th Final guidance on master's thesis
Class Format	Group reading and practical training. [Active learning] Yes. Presentations and discussions will be held as appropriate depending on the progress of literature research and research. [Use of information devices] None in particular (however, supplementary materials will be distributed in PDF format). [Feedback to students regarding the submission of deliverables, etc.] Provided when returning assignments and papers. [Educational method] Students will research previous research themselves and discuss the results of the research to position the research and promote it. [Form of class when face-to-face classes cannot be held due to special circumstances]

	We plan to use the conference system software ”Zoom” based on Google Classroom.
Achieving Goals	The goal is to acquire knowledge about the research topic and related technologies.
Evaluation Method	Evaluation will be based on the progress of the assignments (40% preparation and review, 60% discussion and refl ection). [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on the student’s attitude towards the lectures in class and the results of discussions during the class,with 100% of the points allocated to the regular grades.
Evaluation criteria	Students will be graded according to the above method and their progress will be assessed. 40 points will be for preparationand review, and 60 points for discussion and refl ection, for a total of 100 points. [Students enrolled before 2018] Grades will be given in fi ve categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points,Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail is considered failing. [Students enrolled after 2019] Grades will be given in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribute handouts and papers.
Requirements	[Prerequisite Courses] ”Electronic and Information Science Seminar IA,” ”Electronic and Information Science Seminar IB,” and ”Electronic and Information Science Seminar IIA”
Notes on course enrollment	Lectures and practical training will be conducted on the assumption that students have knowledge of semiconductor integrated circuits and devices.
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Will be presented during the lecture.

Course Name	Special exercise in human information processing II			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Liu Zhen, Shimojima Makoto, Tanaka Kenichi, Sato Masaki, Tanaka Masaharu)		First year	Integrated Systems Engineering	2 hours

Class Outline	1.Research the technologies and methods related to human interfaces required for the design and development of robots, or 2.Research technologies related to information security [Educational objectives (year of enrollment) corresponding to the Degree Awarding Policy and Curriculum Implementation Policy] For other years, students enrolled in 2009 or earlier should refer to the content posted in 2019, and students enrolled in 2020 or later should refer to the course guide for their year of enrollment. Also, refer to the system diagram.
Lesson Plan	Consult and decide on the relevant techniques and methods to learn for the content of your doctoral thesis.
Class Format	Practical training. [Active learning] Yes. Each student will conduct experiments etc. related to the assignment. [Use of information devices] None in particular. [Feedback to students regarding the submission of work etc.] As needed. [Educational method] After providing information or a lecture, a discussion will be held. [Form when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software "meet" and "zoom" will be used.
Achieving Goals	1.Acquire basic knowledge for doctoral dissertation research, research human interface design methods for robots, and propose new methods.

	Or, 2.Acquire information security-related technologies, research related technologies and methods, and propose new methods.
Evaluation Method	Evaluation will be based on 30% of the regular points based on the student's attitude during class, the results of quizzes andreports given as appropriate along the way, and 70% of the fi nal exam. Details will be explained in the fi rst class. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on 100% of the regular points based on the student's attitude during class, the results of quizzes and reports given as appropriate along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Specified during class
Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram. [Other] Review the contents of prerequisite courses before the start of class. Carry out the contents of the preparation and review items below.
Notes on course enrollment	None in particular
Preparation and review	Preparation: Prepare papers and materials that will be used in each seminar. Review: Think carefully about how to solve the problems and issues discussed in the seminar.
Office Hours	Please refer to the bulletin board and the AA system for information.

Course Name	System Theory II			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	choice	
Faculty		Year of Lecture	Major	Class Hours
Kazuhiro Kajiwara and Kenichi Morimoto		First year	Electronics and Information Science	2 hours

Class Outline	To design a "system" so that it operates as desired, a model of that system is required, and mathematics is an important toolfor creating that model. Furthermore, knowledge of control engineering is required to manipulate and adjust that model to the desired state. In this class, students will build on the mathematical knowledge acquired in Special Topics in Systems Mathematics I and learn system control theory, which is a good example of mathematical science in practice and is one of the important theories for studying electronics and information science. Furthermore, we will cover trends in international standards for system development such as industrial equipment, as well as functional safety.
Lesson Plan	1st International standards required for system development(Morimoto) 2nd functional safety(Morimoto) 3rd Cybersecurity(Morimoto) 4th System modeling (Laplace transform to transfer function)(Kajiwara) 5th Time response (transient response and steady-state response)(Kajiwara) 6th Time response (type of input signal and response)(Kajiwara) 7th Time response (fi rst-order delay system)(Kajiwara) 8th Time response (second-order delay system)(Kajiwara) 9th Time response (delay, poles and zeros, and stability)(Kajiwara) 10th Frequency response (gain and phase)(Kajiwara) 11th Frequency response (frequency transfer function) 12th Frequency response (Bode plot, vector locus)(Kajiwara) 13th Feedback control (structure and stability of feedback control systems)(Kajiwara) 14th Feedback control (root locus, Nyquist stability criterion) (Kajiwara) 15th Feedback control (stability margin, PID control)
Class Format	Lectures [Active learning] Yes Lectures and exercises will be mixed in, and presentations by attending students will also be incorporated. [Use of information devices] None in particular [Feedback to students regarding submission of work, etc.] When returning assignments, supplementary explanations may be provided. [Educational method] In addition to explaining theories in a logical and systematic manner, students will be encouraged to learn by actually calculating specifi c examples themselves. [Form of class when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Zoom" based on Google Classroom.
Achieving Goals	Students will understand the theory of system control and learn mathematics as a necessary

	tool for understanding it.
Evaluation Method	Comprehensive evaluation will be based on presentations, report assignments, etc. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	To be contacted at the fi rst lecture.
Requirements	Understanding of the basics of diff erentiation and integration.
Notes on course enrollment	Nothing in particular
Preparation and review	Please prepare thoroughly before attending the lecture, including deriving the formulas that appear in the textbook.
Office Hours	Nothing in particular

Course Name	Advanced Studies in Information Technologies I			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Fujio Kurokawa, Makoto Shimojima, Yoshito Tanaka, Masakatsu Motomura, Liu Zhen , Takashi Kato, Kenichi Tanaka, Kaoru Kawazoe, Nobumasa Matsui, Ken Oyama, Haruo Hinata, Koji Kiyoyama, Masanori Sato, Masaharu Tanaka)		First year	Integrated Systems Engineering	2 hours

Class Outline	In the special research on information technology, students will learn the basic elemental technologies of integrated systemsengineering and will be given comprehensive study of the research fi eld necessary for writing a doctoral dissertation. In addition, in order to enrich the content of their research, they will be given guidance on how to present at academic conferences and submit papers.
Lesson Plan	1st Regarding the structure of the paper 2nd About writing a thesis 3rd Research Ethics 4th Current status of research fi eld 5th Guidance on academic presentations and paper submissions (1) 6th Survey of previous research on the research topic (1) 7th Summary of major research on research topic (1) 8th Guidance on research themes (1) 9th Guidance on academic presentations and paper submissions (2) 10th Survey of previous research on the research topic (2) 11th Summary of major research on research topic (2) 12th Guidance on research themes (2) 13th Guidance on academic presentations and paper submissions (3) 14th Guidance on academic presentations and paper submissions (4) 15th Guidance on academic presentations and paper submissions (5)
Class Format	Lectures and seminars. [Active learning] Yes. Students may be assigned assignments to review the content of the class through literature research. [Use of information technology] Yes. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] Assignments will be explained in the next class. [Teaching method] Research content will be thoroughly discussed to enhance it. [Form in case face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.

Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time

Course Name	Advanced Studies in Information Technologies II			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Fujio Kurokawa, Makoto Shimojima, Yoshito Tanaka, Masakatsu Motomura, Liu Zhen, Takashi Kato, Kenichi Tanaka, Kaoru Kawazoe, No bumasa Matsui, Ken Oyama, Haruo Hinata, Koji Kiyoyama, Masanori Sato, Masaharu Tanaka)		Late 1st year to late 2nd year	Integrated Systems Engineering	2 hours

Class Outline	In the special research on information technology, students will learn the basic elemental technologies of integrated systemsengineering and will be given comprehensive study of the research fi eld necessary for writing a doctoral dissertation. In addition, in order to enrich the content of their research, they will be given guidance on how to present at academic conferences and submit papers.
Lesson Plan	1st Regarding the structure of the paper 2nd About writing a thesis 3rd Research Ethics 4th Current status of research fi eld 5th Guidance on academic presentations and paper submissions (1) 6th Survey of previous research on the research topic (1) 7th Summary of major research on research topic (1) 8th Guidance on research themes (1) 9th Guidance on academic presentations and paper submissions (2) 10th Survey of previous research on the research topic (2) 11th Summary of major research on research topic (2) 12th Guidance on research themes (2) 13th Guidance on academic presentations and paper submissions (3) 14th Guidance on academic presentations and paper submissions (4) 15th Guidance on academic presentations and paper submissions (5)
Class Format	Lectures and seminars. [Active learning] Yes. Students may be assigned assignments to review the content of the class through literature research. [Use of information technology] Yes. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] Assignments will be explained in the next class. [Teaching method] Research content will be thoroughly discussed to enhance it. [Form in case face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.

Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time

Course Name	Information Technology Special Research III			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Tanaka		Second year	Integrated Systems Engineering	2 hours

Class Outline	In the special research on information technology, students will learn the basic elemental technologies of integrated systemsengineering and will be given comprehensive study of the research fi eld necessary for writing a doctoral dissertation. In addition, in order to enrich the content of their research, they will be given guidance on how to present at academic conferences and submit papers.
Lesson Plan	1st Regarding the structure of the paper 2nd About writing a thesis 3rd Research Ethics 4th Current status of research fi eld 5th Guidance on academic presentations and paper submissions (1) 6th Survey of previous research on the research topic (1) 7th Summary of major research on research topic (1) 8th Guidance on research themes (1) 9th Guidance on academic presentations and paper submissions (2) 10th Survey of previous research on the research topic (2) 11th Summary of major research on research topic (2) 12th Guidance on research themes (2) 13th Guidance on academic presentations and paper submissions (3) 14th Guidance on academic presentations and paper submissions (4) 15th Guidance on academic presentations and paper submissions (5)
Class Format	Lectures [Active learning] Presentations, discussions [Use of information devices] Used for presentations [Feedback to students regarding submission of deliverables, etc.] To be implemented as necessary
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the student's attitude towards the lectures during class, quizzes given as appropriate during the class, and the results of reports, with 100% of the points allocated to the regular grades.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing.

	[Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time

Course Name	Special research on environmental technologyIII			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising teachers (Huan Li, Koji Mochida)		second year to third year	Integrated Systems Engineering	2 hours

Class Outline	The so-called environmental problems of today are global in scale, but this special research will focus on three areas: humanliving and residential environments, environmental symbiotic engineering centered on environmental energy and physical environments, and historical and social environments, and will conduct surveys and analyses, experimental development research, scientifi c investigations, and conservation and utilization plans. Students will study and research the research fi elds necessary for writing their doctoral thesis under the supervision of a doctoral thesis advisor.
Lesson Plan	1st Regarding the structure of the paper 2nd About writing a thesis 3rd Research Ethics 4th Current status of research fi eld 5th Guidance on academic presentations and paper submissions (1) 6th Survey of previous research on the research topic (1) 7th Summary of major research on research topic (1) 8th Guidance on research themes (1) 9th Guidance on academic presentations and paper submissions (2) 10th Survey of previous research on the research topic (2) 11th Summary of major research on research topic (2) 12th Guidance on research themes (2) 13th Guidance on academic presentations and paper submissions (3) 14th Guidance on academic presentations and paper submissions (4) 15th Guidance on academic presentations and paper submissions (5)
Class Format	Lectures and seminars. [Active learning] Yes. Students may be assigned assignments to review the content of the class through literature research. [Use of information technology] Yes. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] Assignments will be explained in the next class. [Teaching method] Research content will be thoroughly discussed to enhance it. [Form in case face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special

	circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time

Course Name	Exam of Electrical and Information Technology I A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	In order to acquire the ability to conceive, design and develop new medical equipment, students will study fi elds such as information engineering, systems engineering and control engineering, which are necessary for the development of medical equipment, and will also engage in practical engineering simulations and the production of equipment required for the development theme.
Lesson Plan	1st guidance 2nd Special Lecture on Medical Devices 3rd Medical Device Design and Safety 4th Research and study required for each development theme 5th Research into previous papers and understanding the current situation 6th Medical Engineering Equipment Research and Practice 7th Survey and practice of measurement engineering equipment 8th Understanding and practicing sensor equipment 9th Current status survey and training of ergonomic operating units 10th Understanding and practicing waveform amplifi cation circuits 11th Equipment safety management and training 12th Leakage current safety management and training 13th Performance and design review of developed equipment 14th Verifi cation of developed equipment and data analysis 15th Papers and Presentations 16th Social contribution of developed equipment
Class Format	Practical training [Active learning] None [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational method] Exercises and assignments (reports) will be given in a lecture format. [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software ”Zoom” or ”Meet” will be used.
Achieving Goals	To enable the research and study required for the design and development of medical devices that meet each medical purpose.
Evaluation Method	Evaluation will be based on the production of equipment required for the development theme, the evaluation of engineering simulations, the submission of reports and assignments, and the completion of exercises. The evaluation of production and engineering simulations will be 30

	points, and the evaluation of reports, assignment submissions, and the completion of exercises will be 70 points. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on the attitude towards lectures during class and regular points based on reports submitted as appropriate along the way, with 100% of the total weighting.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous papers and literature
Requirements	Those who have suffi cient medical and medical engineering knowledge
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions given during lectures

Course Name	Exam of Electrical and Information Technology ⅠB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	In order to acquire the ability to conceive, design and develop new medical equipment, students will study fi elds such as information engineering, systems engineering and control engineering, which are necessary for the development of medical equipment, and will also engage in practical engineering simulations and the production of equipment required for the development theme.
Lesson Plan	1st Electronics and Information Science Seminar IB Guidance 2nd Research content required for the development equipment theme 3rd Experimental methods and safety 4th How to use a 3D printer 5th 3D printer exercise 6th Equipment Design and Safety 7th Development environment and safety 8th Operational experiments and exercises 9th Verifi cation of developed equipment 10th Key points of patent application 11th Overseas patent applications 12th Post-patent application procedures 13th Regarding additional patent applications 14th Intellectual Property Rights 15th Highly unique development and social contribution 16th Current status of domestic enterprise development and presentation exam
Class Format	Lectures [Active learning] None [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational method] Exercises and practical assignments will be given in a lecture format. [Form when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software ”Zoom” or ”Meet” will be used.
Achieving Goals	Ability to carry out research required for medical device development and to work towards highly original development
Evaluation Method	The evaluation will be based on 50 points for reports and assignments submitted, and 50 points for presentations. [Evaluation method when face-to-face regular exams cannot be held due to special

	circumstances] Evaluation will be based on the student's attitude in class and regular marks based on reports submitted as appropriate during the class, with 100% of the total points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Academic journals, papers, etc.
Requirements	Have medical and engineering knowledge
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions will be given during the lecture.

Course Name	Environmental Technology Special Seminar E			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Shinichi Kamohara		First year	Integrated Systems Engineering	2 hours

Class Outline	The business environment surrounding local residents and local industries is becoming increasingly severe, and while it is clear that economic and management perspectives are necessary to maintain and develop the local economy and businesses,gaining solid knowledge from accounting and management information is also essential for formulating eff ective policies. Therefore, the main purpose of this seminar is to consider measures for regional and business development while utilizing datamining methods.
Lesson Plan	
Class Format	
Achieving Goals	
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given in class, with 100% of the points allocated.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Nothing in particular.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.

Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time.

Course Name	Seminar of Electronics and Information Tech.IB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Masanori Sato		First year	Electronics and Information Science	2 hours

Class Outline	for master's thesis research, and discuss research topics for completing the master's thesis.
Lesson Plan	1st Organizing research topics 2nd Searching for a master's thesis topic 3rd Survey of the current state of previous research related to the master's thesis 4th Collection of previous research papers related to the master's thesis 5th Identifying issues in previous research related to the master's thesis 6th Discussing specifi c measures to resolve issues 7th Implementing concrete measures to solve problems 8th Review of specifi c measures to resolve issues 9th Preliminary experiment planning 10th Conducting preliminary experiments 11th Discussion of the results of the preliminary experiment 12th Deciding on a research topic for your master's thesis 13th Planning a research topic for your master's thesis 14th Preliminary experiment on the research topic of the master's thesis 15th Discussion of the results of preliminary experiments related to the research topic of the master's thesis
Class Format	Group reading and practical training. [Active learning] Available. Literature research and assignments to reconfi rm the content of the class may be assigned. [Use of information devices] Available. [Feedback to students regarding the submission of work, etc.] Provided when returning assignments and papers. [Educational method] Research previous research and discuss the results of the research to position the research and promote it. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	The goal is to acquire knowledge about the research topic and related technologies.
Evaluation Method	Comprehensive evaluation will be based on the attitude towards seminar presentations, reports, and research. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the attitude towards lectures in class, quizzes given as appropriate during the class, and the results of reports, with 100% of the points allocated to the regular grades.

Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	[Prerequisite Courses] None in particular. [Other] Please review the contents of the prerequisite courses before the start of classes. Please carry out the preparation and review items below. Attendance of more than 2/3 of the lecture hours is required.
Notes on course enrollment	Lectures and practical training are conducted on the assumption that students have knowledge of robotics, control engineering, measurement engineering, and programming.
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Present during lectures

Course Name	Practice in Industrial Technology Ⅰ A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Katsuhiko Kuroda		First year	Production Technology	2 hours

Class Outline	Consider and decide on a topic for writing your master's thesis.
Lesson Plan	Summarize research progress and report at least once a week.
Class Format	Seminar format [Active learning] Students will give a research report on the topic of their master's thesis. [Use of information devices] None in particular. [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed with the supervising professor.
Achieving Goals	Students will research materials and literature to determine the topic of their master's thesis and acquire basic knowledge about the subject.
Evaluation Method	Evaluation will be based on the content of seminar reports and seminar presentations.
Evaluation criteria	Evaluation will be based on the content of the report and the level of understanding at the time of the seminar presentation. [Students enrolled in 2019 or later] Grades will be expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is a failing grade.
Textbook/ Reference Books	Related books and papers. Materials will be provided as needed.
Requirements	Nothing in particular
Notes on course enrollment	Nothing in particular
Preparation and review	[Preparation] Deeply consider the problems given in the study and reading sessions and unravel their meaning and essence. [Review] Organize the knowledge gained through research activities as research materials.
Office Hours	Nothing in particular

Course Name	Practice in Industrial Technology Ⅰ B			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Katsuhiko Kuroda		First year	Production Technology	2 hours

Class Outline	Consider and decide on a topic for writing your master's thesis.
Lesson Plan	The progress of the research will be summarized and reported at least once a week. Finally, a presentation will be made at a conference.
Class Format	Seminar format [Active learning] Research reports, discussions, readings, etc. will be conducted on the topic of the master's thesis. [Use of information devices] None in particular. [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed with the supervising professor.
Achieving Goals	Prepare an abstract for presentation at a conference in the following year and summarize the relevant results. Present at least one domestic conference between October and March of the following year.
Evaluation Method	Evaluation will be based on the content of seminar reports, seminar presentations and research attitude, and academic presentations.
Evaluation criteria	Evaluation is based on the content of the report, level of understanding during seminar presentations, and content of academic conference presentations. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Related books and papers. Materials will be provided as needed.
Requirements	Nothing in particular
Notes on course enrollment	Nothing in particular

Preparation and review	[Preparation] Deeply consider the problems given in the study and reading sessions and unravel their meaning and essence. [Review] Organize the knowledge gained through research activities as research materials.
Office Hours	Nothing in particular

Course Name	Environmental plan studies practice ⅡA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		First year	Environmental Planning	2 hours

Class Outline	This involves guidance on experimental techniques to determine the research topic for the master's thesis, as well as literature research on related papers. [Particularly relevant departments, affi liated groups, and laboratories as specifi ed in the curriculum map] Department of Environmental Planning . Please also refer to the curriculum map.
Lesson Plan	1st Deciding on a research topic Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 2nd Prior literature search and investigation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Research plan creation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th First fi eld survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th 2nd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th 3rd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th Data analysis and interim summary Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th 4th Field Survey, 5th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th 6th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Data analysis Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 11th Report preparation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th Report creation (graphs and tables) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 13th Report writing (results and discussion) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself.

	If you have any questions, please summarize them and ask the instructor. 14th Report creation (completed) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th discussion Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Seminar format [Active learning] None Students will present (report) materials and literature research in accordance with the seminar progress plan, and will also answer questions. [Use of information devices] None. [Feedback to students regarding submission of deliverables, etc.] Students will be given guidance on research perspectives and how to deepen their understanding of reports on materials and literaturecontent. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	Acquire the basic skills needed to write a master's thesis.
Evaluation Method	Evaluation will be based on the report and presentation at the results presentation meeting.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Instructions given during lectures
Requirements	none
Notes on course enrollment	none
Preparation and review	You should aim to spend the same amount of time as class time reviewing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during the work by asking the teacher in subsequent classes.
Office Hours	Instructions given during lectures

Course Name	Environmental plan studies practice IIB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Takahiro Nakamichi		Second year	Environmental Planning	2 hours

Class Outline	This involves guidance on experimental techniques to determine the research topic for the master's thesis, as well as literature research on related papers. [Particularly relevant departments, affi liated groups, and laboratories as specifi ed in the curriculum map] Department of Environmental Planning . Please also refer to the curriculum map.
Lesson Plan	1st Deciding on a research topic Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 2nd Prior literature search and investigation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 3rd Research plan creation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 4th First fi eld survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 5th 2nd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 6th 3rd Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 7th Data analysis and interim summary Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 8th 4th Field Survey, 5th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 9th 6th Field Survey Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 10th Data analysis Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 11th Report preparation Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 12th Report creation (graphs and tables) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 13th Report writing (results and discussion) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself.

	If you have any questions, please summarize them and ask the instructor. 14th Report creation (completed) Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor. 15th discussion Please prepare by reviewing the materials distributed last time. Also, summarize and review the lecture content yourself. If you have any questions, please summarize them and ask the instructor.
Class Format	Seminar format [Active learning] None Students will present (report) materials and literature research in accordance with the seminar progress plan, and will also answer questions. [Use of information devices] None. [Feedback to students regarding submission of deliverables, etc.] Students will be given guidance on research perspectives and how to deepen their understanding of reports on materials and literaturecontent. [Form when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	Acquire the basic skills needed to write a master's thesis.
Evaluation Method	Evaluation will be based on the report and presentation at the results presentation meeting.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Instructions given during lectures
Requirements	none
Notes on course enrollment	none
Preparation and review	You should aim to spend the same amount of time as class time reviewing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during the work by asking the teacher in subsequent classes.
Office Hours	Instructions given during lectures

Course Name	Exam of Electrical and Information Technology ⅡA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		Second year	Electronics and Information Science	2 hours

Class Outline	In order to acquire the ability to conceive, design and develop new medical equipment, students will study fi elds such as information engineering, systems engineering and control engineering, which are necessary for the development of medical equipment, and will also engage in practical engineering simulations and the production of equipment required for the development theme.
Lesson Plan	1st Guidance for Electronic and Information Science Seminar IIA 2nd Research required for the theme of the developed equipment 3rd Previous papers and novelty 4th Signifi cance of academic journal articles and research themes 5th Materials required for research topic 6th Manufacturing equipment for research themes 7th Research Theme Equipment Verifi cation 8th Electrical Safety in the Research Environment 9th Research Ethics 10th Confl ict of interest 11th Conferences and Abstract Submissions 12th Presentation slides and presentation 13th Research presentations and seminars 14th Principles for submitting to academic journals 15th Comprehensive evaluation of developed equipment 16th Improvements to development equipment and addition of functions
Class Format	Lectures and seminars [Active learning] Yes. Includes seminars and practical training. [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational methods] Lectures and seminars/practical training will be conducted to deepen understanding. [Form when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software ”Zoom” or ”Meet” will be used.
Achieving Goals	To be able to manufacture the equipment and perform engineering simulations required for the development theme
Evaluation Method	The evaluation will be made on a 100-point scale: 20 points for research report, 20 points for

	research presentation, and 60points for essay . [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be made on the basis of the student's attitude towards lectures and regular marks based on reports submittedalong the way, with 100% of the total points allocated.
Evaluation criteria	[Students enrolled before 2018] Excellent: 80-100 points, Good: 70-79 points, Pass: 60-69 points, Fail: 59 points or less. Excellent, Good, and Pass are considered passing grades, and Fail is considered failing grades. [Students enrolled in 2019 or later] S: 90-100 points, A: 80-89 points, B: 70-79 points, C: 60-69 points, D: 59 points or less. S, A, B, and C are considered passing grades, and D is considered failing grades.
Textbook/ Reference Books	Academic journals, papers, etc.
Requirements	Have studied basic medical engineering and clinical engineering
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions will be given during the lesson.

Course Name	Exam of Electrical and Information Technology IIB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Oyama, Matsui, Choi, Masaharu Tanaka, Kiyoyama, Sato, Kajiwara, Doi, Liu)		Second year	Electronics and Information Science	2 hours

Class Outline	This course provides lectures necessary for students to acquire academic writing and presentation skills and to summarize their research results so that they can compile their research results into a paper and present it at various academic conferences.
Lesson Plan	1st Thesis Studies-1 (What is a thesis?) 2nd Thesis Studies-2 (Substantial Requirements for Thesis Writing) 3rd Thesis Studies-3 (Formal Requirements for Thesis Writing) 4th Thesis writing - 4 (specifi c steps for writing a thesis) 5th Exercises on each individual's research topic (research background) 6th Exercises on each individual's research topic (research purpose) 7th Exercises on each individual's research topic (experimental methods) 8th Exercises on each student's research topic (production of experimental equipment) 9th Exercises on each individual's research topic (verifi cation experiments) 10th Practice on each individual's research topic (adjustment of developed equipment) 11th Exercises on each individual's research topic (verifi cation experiments) 12th Exercises on each individual's research topic (data collection) 13th Exercises on each individual's research topic (ensuring safety) 14th Preparation for academic presentations and research presentations (paper outlines) 15th Creating documents and slides required for academic presentations Presentation and overall review
Class Format	Experiments and practical training [Active learning] Available. Includes exercises, practical training, and presentations. [Use of information devices] None in particular (however, supplementary materials will be distributed). [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments. [Educational methods] After lectures and exercises/practical training, presentations will be given to deepen understanding. [Form of instruction when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software "Zoom" or "Meet" will be used.
Achieving Goals	Acquire the ability to write papers and give presentations so that you can present your research at various academic conferences.
Evaluation Method	The evaluation will be made on a 100-point scale, with 50 points based on the results of the exercises and 50 points based on the presentation. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances]

	The evaluation will be made on the basis of the student's attitude towards lectures and regular marks based on reports submitted along the way, with 100% of the total points allocated to the class.
Evaluation criteria	[Students enrolled before 2018] Excellent: 80-100 points, Good: 70-79 points, Pass: 60-69 points, Fail: 59 points or less. Excellent, Good, and Pass are considered passing grades, and Fail is considered failing grades. [Students enrolled in 2019 or later] S: 90-100 points, A: 80-89 points, B: 70-79 points, C: 60-69 points, D: 59 points or less. S, A, B, and C are considered passing grades, and D is considered failing grades.
Textbook/ Reference Books	Academic journals and papers
Requirements	Those who have acquired basic medical engineering and clinical engineering knowledge
Notes on course enrollment	None in particular
Preparation and review	Preparation: Based on the preparation items presented for each lecture, read the relevant sections of textbooks and reference books related to each lecture theme and handouts, and summarize your own thoughts. (2 hours) Review: Based on the notes taken during the lecture, organize the lecture content and your own thoughts, and strive to deepen your understanding by reading related literature, etc. (2 hours)
Office Hours	As needed, we will coordinate with the students.

Course Name	Seminar of Electronics and Information Tech.IA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Oyama, Matsui, Choi, Masaharu Tanaka, Kiyoyama, Sato, Kajiwara, Doi, Liu)		Second year	Electronics and Information Science	2 hours

Class Outline	The master's thesis will be structured, research methods will be determined, and experimental data will be prepared.
Lesson Plan	1st Organizing research topics 2nd Searching for a master's thesis topic 3rd Survey of the current state of previous research related to the master's thesis 4th Collection of previous research papers related to the master's thesis 5th Identifying issues in previous research related to the master's thesis 6th Discussing specifi c measures to resolve issues 7th Implementing concrete measures to solve problems 8th Review of specifi c measures to resolve issues 9th Preliminary experiment planning 10th Conducting preliminary experiments 11th Discussion of the results of the preliminary experiment 12th Deciding on a research topic for your master's thesis 13th Planning a research topic for your master's thesis 14th Preliminary experiment on the research topic of the master's thesis 15th Discussion of the results of preliminary experiments related to the research topic of the master's thesis
Class Format	Group reading and practical training. [Active learning] Available. Literature research and assignments to reconfi rm the content of the class may be assigned. [Use of information devices] Available. [Feedback to students regarding the submission of work, etc.] Provided when returning assignments and papers. [Educational method] Research previous research and discuss the results of the research to position the research and promote it. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	The goal is to acquire knowledge about the research topic and related technologies.
Evaluation Method	Comprehensive evaluation will be based on the attitude towards seminar presentations, reports, and research. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the attitude towards lectures in class, quizzes given as appropriate during the class, and the results of reports, with 100% of the points allocated to the regular grades.

Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	[Prerequisite Courses] None in particular. [Other] Please review the contents of the prerequisite courses before the start of classes. Please carry out the preparation and review items below. Attendance of more than 2/3 of the lecture hours is required.
Notes on course enrollment	Nothing in particular
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Present during lectures

Course Name	Seminar of Electronics and Information Tech.IB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Oyama, Matsui, Choi, Masaharu Tanaka, Kiyoyama, Sato, Kajiwara, Doi, Liu)		First year	Electronics and Information Science	2 hours

Class Outline	The master's thesis will be structured, research methods will be determined, and experimental data will be prepared.
Lesson Plan	1st Guidance and assignment review 2nd Literature survey (latest domestic literature) 3rd Review of literature survey results (latest domestic literature) 4th Summary of report materials after reviewing literature survey results (latest domestic literature) 5th Literature survey (International Nuclear Physics related) 6th Literature survey review (International Nuclear Physics related) 7th Summary of report materials after reviewing literature survey results (IEEE literature) 8th Organizing the researched literature 9th Organizing the literature surveyed and considering its relevance 10th Discussion about research objectives, signifi cance, etc. 11th Comparison and consideration of previous research and research content 12th Consideration of research plans 13th Reporting 14th Review the report you created 15th Report revision and summary of this lecture
Class Format	Seminars [Active learning]: Students will be asked to make presentations as appropriate depending on the progress of their research. [Use of information technology]: Available [Educational method]: Students will investigate the issue and discuss the results of the investigation to position the researchand promote it. [Form of implementation when face-to-face classes cannot be held due to special circumstances]: We plan to use the conference system software "Zoom" based on Google Classroom.
Achieving Goals	Students will be able to research related technologies and papers in line with their research topic and acquire relevant skills.
Evaluation Method	Evaluation will be based on discussions during lectures, reports, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the student's attitude during lectures and the results of discussions held during the class, with 100% of the points allocated to the regular grades.

Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Proceedings of academic conferences and journals related to the research, books related to the research, etc.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Take suffi cient time to prepare your presentation and summarize the discussion.
Office Hours	at any time

Course Name	Seminar on Industrial Technology I Aa			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Hitoshi Furuno		First year	Production Technology	2 hours

Class Outline	In this course, students will decide on the outline of their master's thesis and research plan through 15 seminars, and will receive guidance on their research activities and a summary of their research results. [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] Furuno Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Lecture Deciding on the outline theme and research plan for the master's thesis [Preparation] To be instructed separately (at least 1 hour). [Review] To be instructed separately (at least 1 hour). 2nd Lecture Vehicle control system component selection [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 3rd Lecture Vehicle control system update [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 4th Lecture Speed controller update [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 5th Lecture Making the front cowl of the vehicle [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 6th Lecture Finishing the front cowl of the vehicle [Preparation] Will be instructed separately (1 hour or more). [Review] Will be instructed separately (1 hour or more). 7th Lecture Consideration of specifi cations for the mating device [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 8th Lecture Design and drawing of fi tting devices [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 9th Lecture Checking the drawings of the mating device [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 10th Lecture Correcting drawings of fi tting devices [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 11th Lecture Consideration of system requirements for mating systems [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 12th Lecture Research into elemental technology for system development of mating systems [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more).

	13th Lecture System development for mating systems [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 14th Lecture Summarize research results to date and create a poster for presentation. [Preparation] To be instructed separately (more than 1 hour). [Review] To be instructed separately (more than 1 hour). 15th Lecture Presentation skills instruction [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more).
Class Format	Seminar format [Active learning] Research reports, discussions, readings, etc. will be conducted on the topic of the master's thesis. [Use of information devices] None in particular [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed together with thesupervising professor. [Education method] Education and guidance will be provided with the aim of cultivating basic skills for research and development. [Form when face-to-face classes cannot be held due to special circumstances] Communication will be via Google Classroom,and lectures will be conducted via two-way remote classes using Zoom meetings.
Achieving Goals	Students will decide on the outline of their master's thesis and research plan, and will then carry out their research activitiesaccordingly. The results of their research activities will be compiled into a report.
Evaluation Method	Evaluation will be based on the status of seminar participation and research progress. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] None in particular.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Materials will be distributed as needed.
Requirements	None in particular.
Notes on course enrollment	Do not be late or absent.
Preparation and review	[Preparation] Deeply consider the problems given in the lectures and readings, and clarify their meaning and essence. [Review] Be sure to record the knowledge gained through research activities as research materials.
Office Hours	Please visit the lab. We will assist you if we have free time. Please also refer to the notices and information in the AAA system.

Course Name	Seminar on Industrial Technology I Ba			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Hitoshi Furuno		First year	Production Technology	2 hours

Class Outline	This course will review past research activities and provide guidance on research activities, summarizing research results, andpresentation techniques through 15 seminars. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] Furuno Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Lecture Review of research activities to date and revision of research plans [Preparation] To be instructed separately (at least 1 hour). [Review] To be instructed separately (at least 1 hour). 2nd Lecture Outsourcing production of fi tting device (meeting) [Preparation] Instructions will be given separately (1 hour or more). [Review] Instructions will be given separately (1 hour or more). 3rd Lecture Outsourcing production of fi tting devices [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 4th Lecture Attaching the mating device to the vehicle [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 5th Lecture Preparation of a vehicle operation experiment plan [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 6th Lecture Preparation for the vehicle operation experiment [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 7th Lecture Vehicle operation experiment [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 8th Lecture Summary of the results of the vehicle operation experiment [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more). 9th Lecture Study the specifi cations of the horizontal stabilizer control device for the intermediate launcher [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 10th Lecture Creation of a working drawing for the horizontal stabilizer control device of the intermediate launcher [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 11th Lecture Preparation of a parts list for the horizontal stabilizer control unit of the intermediate launcher [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 12th Lecture Manufacture of horizontal stabilizer control device for intermediate launcher [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 13th Lecture

	Installation of the horizontal stabilizer control unit of the intermediate launcher [Preparation] To be instructed separately (1 hour or more). [Review] To be instructed separately (1 hour or more). 14th Lecture Create an outline for the midterm presentation. [Preparation] Separate instructions will be given (at least 1 hour). [Review] Separate instructions will be given (at least 1 hour). 15th Lecture Presentation skills instruction [Preparation] Separate instructions will be given (1 hour or more). [Review] Separate instructions will be given (1 hour or more).
Class Format	Seminar format [Active learning] Research reports, discussions, readings, etc. will be conducted on the topic of the master's thesis. [Use of information devices] None in particular [Feedback to students regarding submission of results, etc.] Submitted research materials will be discussed together with thesupervising professor. [Education method] Education and guidance will be provided with the aim of cultivating basic skills for research and development. [Form when face-to-face classes cannot be held due to special circumstances] Communication will be via Google Classroom,and lectures will be conducted via two-way remote classes using Zoom meetings.
Achieving Goals	Students will review their research activities to date, revise their research plans as necessary, and continue their research activities. They will also aim to improve their presentation skills by summarizing the results of their research activities in an interim presentation.
Evaluation Method	Evaluation will be based on the status of seminar participation and research progress. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] None in particular.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Materials will be distributed as needed.
Requirements	Students must have taken Production Technology Seminar IA.
Notes on course enrollment	Do not be late or absent.
Preparation and review	[Preparation] Deeply consider the problems given in the lectures and readings, and clarify their meaning and essence. [Review] Be sure to record the knowledge gained through research activities as research materials.
Office Hours	Please visit the lab. We will assist you if we have free time. Please also refer to the notices and information in the AAA system.

Course Name	Seminar of Electronics and Information Tech.IA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		First year	Electronics and Information Science	2 hours

Class Outline	The master's thesis will be structured, research methods will be determined, and experimental data will be prepared.
Lesson Plan	1st Guidance for conducting lectures and practical training to acquire the basic knowledge necessary for master's thesis research and the skills required for carrying out experiments 2nd Literature survey on power electronics (domestic) 3rd Literature survey on power electronics (USA) 4th Literature survey on power electronics (Europe and other countries) 5th Literature survey on electrical energy (domestic) 6th Literature survey on electrical energy (USA) 7th Literature survey on electrical energy (Europe and other countries) 8th Summary of the literature investigated so far 9th Relevance discussion and commentary 10th Summary of research plan documents 11th Discussion of the purpose, signifi cance, and plan of the research project 12th Review of research plan materials 13th Compiling a research plan into a report 14th Comparison with previous studies 15th Review of research plan reports
Class Format	Seminars. [Active learning] Yes. Students will be asked to make presentations as appropriate depending on the progress of their research. [Use of information devices] Yes. [Educational method] Students will research previous research themselves and discuss the results of their research to position their research and promote it. [Form of study when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Students will be able to research related technologies and papers in line with their research topic and acquire relevant skills.
Evaluation Method	Evaluation will be based on discussions during lectures, reports, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given during class, with 100% of the marks allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59

	points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Proceedings of academic conferences and journals related to the research, books related to the research, etc.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Take suffi cient time to prepare for presentations and summarize discussions. At the same time, try to spend the same amount of time as the class itself reorganizing your notes, including the notes on the board and oral explanations given in class, reviewing by solving the examples introduced in class, and working on assignments given in class. Also, be sure to ask your teacher in subsequent classes for any questions that arise during the work you do and resolve them. If you are absent for any reason, ask to see the teacher's notes from that class and complete your own notes.
Office Hours	at any time

Course Name	Seminar of Electronic and Information Tech. IB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		First year	Electronics and Information Science	2 hours

Class Outline	The master's thesis will be structured, research methods will be determined, and experimental data will be prepared.
Lesson Plan	1st Guidance for conducting lectures and practical training to acquire the basic knowledge necessary for master's thesis research and the skills required for carrying out experiments 2nd Introduction and explanation of closely related literature on power electronics (domestic) 3rd Introduction and explanation of closely related literature on power electronics (USA) 4th Introduction and explanation of closely related literature on power electronics (Europe and other countries) 5th Introduction and explanation of closely related literature on electrical energy (domestic) 6th Introduction and explanation of closely related literature on electrical energy (USA) 7th Introduction and explanation of closely related literature on electrical energy (Europe and other countries) 8th Introduction and explanation of related literature on electrical and electronic devices (domestic) 9th Introduction and explanation of related literature on electrical and electronic devices (USA) 10th Introduction and explanation of related literature on electrical and electronic devices (Europe and othercountries) 11th Discussion of the purpose, signifi cance, and plan of the research project 12th Review of research plan materials 13th Compiling a research plan into a report 14th Review of previous research and the signifi cance of the research objectives 15th Review of research plan reports
Class Format	Seminars. [Active learning] Yes. Students will be asked to make presentations as appropriate depending on the progress of their research. [Use of information devices] Yes. [Educational method] Students will research previous research themselves and discuss the results of their research to position their research and promote it. [Form of study when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Students will be able to research related technologies and papers in line with their research topic and acquire relevant skills.
Evaluation Method	Evaluation will be based on discussions during lectures, reports, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given during class, with 100% of the marks allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier]

	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Proceedings of academic conferences and journals related to the research, books related to the research, etc.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Take suffi cient time to prepare for presentations and summarize discussions. At the same time, try to spend the same amount of time as the class itself reorganizing your notes, including the notes on the board and oral explanations given in class, reviewing by solving the examples introduced in class, and working on assignments given in class. Also, be sure to ask your teacher in subsequent classes for any questions that arise during the work you do and resolve them. If you are absent for any reason, ask to see the teacher's notes from that class and complete your own notes.
Office Hours	at any time

Course Name	Living Environment Design			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Hiroko Hashimoto		First year	Environmental Planning	2 hours

Class Outline	Based on the fundamental premise that homes and buildings are privately owned and owned assets, but are also part of society's stock, the course aims to acquire design methods for desirable residential environments that can accept people's diversity in terms of gender, race, age, personality, educational background, values, etc. Residential design is conceived as a method for making places for people's lives and social activities more compatible with diverse natural and social environments.
Lesson Plan	1st Guidance - Living independently in the community 2nd Seven principles of universal design 3rd Normalization 4th Home welfare and social welfare 5th Community welfare and social welfare 6th Barrier-free and universal design 7th Improving living environments 8th About disabilities 9th Japan's and the world's progress 10th Overseas cases 11th Japanese cases 12th Current issues 13th Welfare in Nagasaki 14th Urban development 15th Summary
Class Format	Lectures [Active Learning] None. Students will present (report) materials and literature research in accordance with the seminar progress plan, and also answer questions. [Use of Information Devices] None. [Feedback to Students Regarding Submission of Deliverables, etc.] Students will be instructed on research perspectives and how to deepen their understanding of reports on materials and literature content. [Forms for when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom.
Achieving Goals	Understand the residential environment and acquire the knowledge necessary for urban development and building design andplanning.
Evaluation Method	The evaluation will be based on the progress made at each stage and the assignments submitted, with 30 points for the progress made and 70 points for the assignments submitted, for a total of 100 points.
Evaluation criteria	[Students entering before 2018]

	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Printed copies will be distributed as needed
Requirements	Be sure to refer to the curriculum map
Notes on course enrollment	To deepen your understanding, the necessary themes are set out in order. Therefore, if you are absent and do not understand the previous lecture, it will be diffi cult to understand the subsequent lectures, so please attend all lectures without missinga single one.
Preparation and review	For each weekly lesson, 3 hours of preparation and 3 hours of review
Office Hours	In addition to the regular offi ce hours, we are available to assist you at any time if you come to the lab.

Course Name	Advanced Studies in Information Technologies Ⅲ			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Fujio Kurokawa, Makoto Shimojima, Yoshito Tanaka, Masakatsu Motomura, Liu Zhen, Takashi Kato, Kenichi Tanaka, Kaoru Kawazoe, Nobumasa Matsui, Ken Oyama, Haruo Hinata, Koji Kiyoyama, Masanori Sato, Masaharu Tanaka)		First half of 2nd year to fi rst half of 3rd year	Integrated Systems Engineering	2 hours

Class Outline	In the special research on information technology, students will learn the basic elemental technologies of integrated systemsengineering and will be given comprehensive study of the research fi eld necessary for writing a doctoral dissertation. In addition, in order to enrich the content of their research, they will be given guidance on how to present at academic conferences and submit papers.
Lesson Plan	1st Regarding the structure of the paper 2nd About writing a thesis 3rd Research Ethics 4th Current status of research fi eld 5th Guidance on academic presentations and paper submissions (1) 6th Survey of previous research on the research topic (1) 7th Summary of major research on research topic (1) 8th Guidance on research themes (1) 9th Guidance on academic presentations and paper submissions (2) 10th Survey of previous research on the research topic (2) 11th Summary of major research on research topic (2) 12th Guidance on research themes (2) 13th Guidance on academic presentations and paper submissions (3) 14th Guidance on academic presentations and paper submissions (4) 15th Guidance on academic presentations and paper submissions (5)
Class Format	Lectures and seminars. [Active learning] Presentations and discussions. [Use of information devices] Used for presentations. [Feedback to students regarding submission of work, etc.] To be provided as needed. [Form of implementation in the event that face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Acquire the elemental technologies and knowledge necessary for research.
Evaluation Method	The content of discussions in each lecture, and the submission and content of reports. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and

	reports given in class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades will be expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades will be expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	There is no requirement for preparation or review, but students are expected to work independently on their research.
Office Hours	at any time.

Course Name	Advanced Practicum in the Electronics Devices I			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		Second year	Integrated Systems Engineering	2 hours

Class Outline	Deepen your understanding of electronic devices used in the fi elds of power and energy, and acquire cutting-edge technology.
Lesson Plan	1st Trends in cutting-edge electronic device technology used in the domestic power and energy sector 2nd Trends in cutting-edge electronic device technology used in the domestic power and energy sector 3rd Trends in cutting-edge electronic device technology used in the domestic power and energy sector 4th Trends in cutting-edge electronic device technology used in the domestic power and energy sector 5th Trends in cutting-edge electronic device technology used in the domestic power and energy sector 6th Trends in cutting-edge electronic device technology used in the power and energy sector overseas 7th Trends in cutting-edge electronic device technology used in the power and energy sector overseas 8th Trends in cutting-edge electronic device technology used in the power and energy sector overseas 9th Trends in cutting-edge electronic device technology used in the power and energy sector overseas 10th Trends in cutting-edge electronic device technology used in the power and energy sector overseas 11th Technical challenges and prospects for electronic devices used in the power and energy fi elds 12th Technical challenges and prospects for electronic devices used in the power and energy fi elds 13th Technical challenges and prospects for electronic devices used in the power and energy fi elds 14th Technical challenges and prospects for electronic devices used in the power and energy fi elds 15th Technical challenges and prospects for electronic devices used in the power and energy fi elds
Class Format	Exercises [Active learning] Available Students will be asked to conduct literature research and discussions, and to make presentations as appropriate depending on the progress of their research. [Use of information devices] Available [Educational method] Students will research previous research themselves and discuss the results of their research to position their research and promote it. [Form of class when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software ”Meet” based on Google Classroom.
Achieving Goals	Deepen your understanding of electronic devices used in the fi elds of power and energy, and master cutting-edge technology. [Evaluation method in the event that face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on assignments and reports submitted in class, with 100% of the grade being allocated to the students.

Evaluation Method	Attendance and Reports
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades will be expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades will be expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Nothing in particular.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	In preparation for class, you should summarize theories related to the lecture topic and trends in cutting-edge technology. Inreview, you should organize the discussions during the lecture and strive to deepen your understanding through literature research. At the same time, you should aim to spend the same amount of time as the class itself reviewing by reorganizing yournotes in your own way, including the notes on the board and oral explanations given in class, and solving example problems introduced in class, as well as working on assignments given in class. You should also resolve any questions that arise during this work by asking your instructor in subsequent classes. If you are absent for any reason, ask to see the instructor's notes from that class and complete your own notes.
Office Hours	at any time.

Course Name	Seminar of Electronics and Information Tech.IA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Masanori Sato		First year	Electronics and Information Science	2 hours

Class Outline	Students will conduct technical research and discussions using papers related to robotics, acquire the knowledge necessary for master's thesis research, and discuss research topics for completing the master's thesis.
Lesson Plan	1st Organizing research topics 2nd Searching for a master's thesis topic 3rd Survey of the current state of previous research related to the master's thesis 4th Collection of previous research papers related to the master's thesis 5th Identifying issues in previous research related to the master's thesis 6th Discussing specifi c measures to resolve issues 7th Implementing concrete measures to solve problems 8th Review of specifi c measures to resolve issues 9th Preliminary experiment planning 10th Conducting preliminary experiments 11th Discussion of the results of the preliminary experiment 12th Deciding on a research topic for your master's thesis 13th Planning a research topic for your master's thesis 14th Preliminary experiment on the research topic of the master's thesis 15th Discussion of the results of preliminary experiments related to the research topic of the master's thesis
Class Format	Group reading and practical training. [Active learning] Available. Literature research and assignments to reconfi rm the content of the class may be assigned. [Use of information devices] Available. [Feedback to students regarding the submission of work, etc.] Provided when returning assignments and papers. [Educational method] Research previous research and discuss the results of the research to position the research and promote it. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	The goal is to acquire knowledge about the research topic and related technologies.
Evaluation Method	Comprehensive evaluation will be based on the attitude towards seminar presentations, reports, and research. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the attitude towards lectures in class, quizzes given as appropriate during the

	class, and the results of reports, with 100% of the points allocated to the regular grades.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous research papers, etc.
Requirements	[Prerequisite Courses] None in particular. [Other] Please review the contents of the prerequisite courses before the start of classes. Please carry out the preparation and review items below. Attendance of more than 2/3 of the lecture hours is required.
Notes on course enrollment	Lectures and practical training are conducted on the assumption that students have knowledge of robotics, control engineering, measurement engineering, and programming.
Preparation and review	Students will be instructed to research the materials (papers, etc.) that will be distributed as preparation. After discussing the materials, students will be instructed to carry out review tasks such as verifi cation experiments.
Office Hours	Present during lectures

Course Name	Studies in Social Communication			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Misato Ichise		First year	Environmental Planning	2 hours

Class Outline	Communication refers to the interaction of information between humans and is an important form of social behavior. In society and organizations, improving communication and social skills among participants is crucial to building smooth human relationships through mutual cooperation. This course will study the psychological processes of interpersonal relationships and people's awareness and behavior in groups from a clinical psychology perspective. The aim is to understand the importance of communication in society and organizations and to acquire social skills through social skills training.
Lesson Plan	1st The need for communication in society 2nd Social Skills and Their Applications 3rd Interpersonal relationships and interpersonal stress 4th social impact 5th Social Dilemma 6th Social Identity 7th Social Networks 8th Groups and organizations 9th social comparison 10th Causal attribution 11th social motivation 12th social cognition 13th Interpersonal perception and impression formation 14th social reasoning 15th Interpersonal Interactions
Class Format	Lectures and exercises [Active learning] Students will have discussions among themselves. [Use of information devices] Students may access Google Classroom using a laptop to provide materials or review lectures. [Feedback to students regarding submission of work , etc.] Responses will be given individually or to the entire class depending on the content. [Form of instruction when face-to-face classes cannot be held due to special circumstances] Google Classroom and Zoom will be used.
Achieving Goals	・Understand the importance of communication in society. ・Acquire social skills through social skills training. ・Understand interpersonal communication in clinical psychology.
Evaluation Method	Students will be evaluated based on their regular attendance, active participation in class, and the results of the summary report they submit at the end of each class. Absences will result in

	points being deducted. Details will be explained in the fi rst lecture.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and Dis considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	If necessary, handouts prepared by the instructor will be distributed as appropriate.
Requirements	[Prerequisite Courses] None in particular [Other] Students who are absent fi ve or more times will not receive credits.
Notes on course enrollment	・Please bring writing implements to each class. ・Lectures may be held online, so please check Google Classroom carefully. ・Class attendance points, which account for more than half of the grade, are naturally awarded based on attendance and actual eff ort, so please be aware that if you are absent more than three times without a special reason, it will be diffi cult to earncredits.
Preparation and review	Please spend at least 30 minutes preparing for each class and 30 minutes reviewing, gathering information from various media and relating it to the class content.
Office Hours	This will be explained during the lecture. Please also refer to the information posted on notices and in the AAA system.

Course Name	Advanced Studies in Information Technologies II			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Kazuto Doi		First year	Electronics and Information Science	2 hours

Class Outline	In the Information Technology Special Research II course, students will be given comprehensive learning and research basedon the information technology necessary for the research they aim to achieve in their doctoral program, and will be given guidance for actually presenting at academic conferences and submitting papers. This course corresponds to the policy for awarding degrees and the policy for organizing and implementing educational curriculum.
Lesson Plan	1st Understanding the issues necessary for the research topic 2nd Preparation of documents to be submitted to the Medical Research Ethics Committee 3rd Uniqueness of research themes and patent application procedures 4th Practical research guidance and research ethics ・Search and research previous papers 5th Practical research guidance and confl icts of interest ・Summary and report of previous papers 6th Practical research guidance and thesis writing ・Formulation of specifi c research plans 7th Practical research guidance and key points for academic papers ・Adjustment of research plans and necessary equipment, etc. 8th Practical research guidance and experimental equipment required for the theme ・Research progress report 9th Practical research guidance and safety ・Formulation of improvement plans 10th Practical research guidance and development environment management ・Preparing for academic presentations, etc. 11th Practical research guidance and slide preparation ・Correction of academic presentation materials 12th Practical research guidance and data organization ・Thesis writing guidance 13th Practical research guidance and thesis structure ・Proofreading of thesis (fi rst draft) 14th Practical research guidance and originality compared to previous papers ・Guidance on additional experiments 15th Practical research guidance and thesis writing guidance ・Data compilation and paper writing guidance 16th Practical research guidance and writing of thesis abstracts ・Thesis submission guidance
Class Format	Lectures and seminars [Active learning] Yes. Includes seminars and practical training. [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational methods] Students will conduct seminars, practical training, and write papers, summarizing the results and deepening their understanding. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "Zoom" or "Meet" based on Google Classroom.
Achieving Goals	Comply with the degree awarding policy and curriculum implementation policy.

Evaluation Method	The evaluation will be made up of 100 points, with 50 points for the academic research presentation in this fi eld and 50 points for the written paper. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] The evaluation will be made up of 100 points based on the student's attitude in class and the regular points based on the reports they submit along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades will be expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades will be expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Previous papers and academic journals necessary for the research content
Requirements	Nothing in particular
Notes on course enrollment	Maintain research ethics.
Preparation and review	Students are required to write accurate research notes, save data, and devote at least 60 hours of self-study time to preparation and review. Preparation: Based on the preparation items presented for each lecture, students should read the relevant sections of textbooks and reference books related to each lecture topic and handouts, and summarize their own thoughts. (2 hours) Review: Based on the notes taken during lectures, students should organize the lecture content and their own thoughts, andstrive to deepen their understanding by reading related literature, etc. (2 hours)
Office Hours	Instructions will be given during the lesson.

Course Name	Medical Engineering Special Exercise II			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising professors (Masakatsu Motomura, Koji Kiyoyama, Futari Doi)		First year	Integrated Systems Engineering	2 hours

Class Outline	In order to acquire the ability to conceive, design and develop new medical equipment in the medical fi eld, students will study fi elds such as information engineering, systems engineering and control engineering, which are necessary for the development of medical equipment, as well as engage in practical engineering simulations and the production of equipment required for the development theme.
Lesson Plan	1st Guidance for Special Seminar on Medical Engineering II 2nd Research required for medical device development 3rd Previous papers in this fi eld and novelty 4th Signifi cance of articles in related academic journals and research themes 5th Materials and testing equipment required for the research topic 6th Design and manufacture of equipment for research themes 7th Verifi cation of developed equipment 8th Electrical Safety in the Research Environment 9th Research Ethics 10th Confl ict of interest in medical research 11th Conferences and Abstract Submissions 12th Presentation slides and presentation 13th Research presentations and seminars 14th Principles for submitting to academic journals 15th Comprehensive evaluation of developed equipment Improvements to development equipment and addition of functions
Class Format	Lectures and seminars [Active learning] Yes. Includes seminars and practical training. [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding the submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational methods] Lectures and seminars/practical training will be conducted to deepen understanding. [Form when face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software ”Zoom” or ”Meet” will be used.
Achieving Goals	Acquire general knowledge of medical electronics engineering and be able to investigate and verify research topics.
Evaluation Method	20 points for class attitude + 80 points for fi nal exam = 100 points in total (20 points based on overall evaluation of attitude during lectures, questions, opinions, etc.)

	[Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be changed to 100% based on attitude during lectures and regular marks based on reports submitted as appropriate along the way.
Evaluation criteria	Grades are expressed in fi ve levels: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Materials will be distributed at the time of the ceremony. Reference book: Clinical Engineering Series, Medical Electronics, by Masayuki Matsuo, Corona Publishing
Requirements	Nothing in particular
Notes on course enrollment	Nothing in particular
Preparation and review	Preparation: Research the content of each lecture in your textbook, etc., and prepare for class. (Approximately 1 hour) Review: Organize the textbook and lecture content, review practice problems, etc., and deepen your understanding. (Approximately 1 hour)
Office Hours	Instructions will be given during the lecture.

Course Name	Introduction to high energy physics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Hideki Hamagaki		First year	Electronic and Information Science	2 hours

Class Outline	The ultimate constituents of matter and the laws that govern their behavior have long intrigued humanity. Only recently hasdeliberate, systematic research into this topic become possible. This course will trace historical progress and provide an overview of where we are today. Much of this progress has relied on research using high-energy accelerators, so we will trace thehistory of high-energy physics. We will provide as detailed an explanation as possible of the theory of relativity and quantum theory, which are the foundations of modern physics. We will also attempt to explain quantum entanglement, the subject of the 2022 Nobel Prize in Physics and the foundation ofquantum computers.
Lesson Plan	1st Orientation/Introduction 2nd Classical Mechanics and Electromagnetism 3rd Special theory of relativity 4th Discovery of electrons and X-rays 5th Atomic nuclei, protons, and neutrons 6th Blackbody radiation and quantum theory 7th Quantum Mechanics Part 1 8th Quantum Mechanics Part 2 9th relativistic quantum mechanics 10th Strong and weak interactions 11th Quantum Entanglement Part 1 12th Quantum Entanglement Part 2 13th General Relativity, Black Holes and Gravitational Waves 14th Hierarchy of Nature 15th Research Topics of the 21st Century
Class Format	Half of the classes will be held in a face-to-face intensive lecture format, with four classes per day over two days (a total of eight classes), and the other half will be held remotely via the internet.
Achieving Goals	・Understand the outline of "high energy physics," which made great progress in the 20th century. ・Understand the current state of modern physics. ・Understand the basics of the theory of relativity and quantum theory. ・Understand the components of matter and their interactions.
Evaluation Method	The evaluation will be changed to 100% based on regular grades based on the results of assignments and reports submittedduring class.
Evaluation criteria	The grades are expressed in two types: N and D, where N is a pass and D is a fail.
Textbook/ Reference Books	none.

Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	Spend the same amount of time as the class itself reorganizing your notes, including the notes on the board and oral explanations given in class, and working on the assignments given in class.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Seminar on Industrial Technology Ⅰ A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		First year	ProductionTechnology	2 hours

Class Outline	Students will decide on a thesis topic, research related literature, consider problems and issues to be solved, and consider , and then create a research plan. In IA, literature research will be the focus, and the direction of research will be clarifi ed. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Survey of social needs Investigate the social demands for next-generation ships and understand the background and necessity of the research. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you have (for at least two hours). 2nd Research into technical issues Investigate the technical issues required to realize societal demands for next-generation ships. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours). 3rd Decide on a thesis topic Based on the technical issues investigated in 2), the direction of this research will be discussed and decided. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc. and record any questions you may have (for at least two hours). 4th Literature survey on the technical fi eld targeted by this research (domestic literature) Research the technical fi eld (domestic) that will be the subject of this research and organize the technical issues that need to be solved. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or any questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you have (for at least two hours). 5th Literature survey on the technical fi eld targeted by this research (overseas literature) Research the technical fi eld (overseas) that is the subject of this research and organize the technical issues that need to be solved. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in

	the lecture and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc. and record any questions you have (for at least two hours).
6th	Review of literature survey results related to the technical fi eld targeted by this research (domestic literature) 4)Review the results of the literature survey conducted in the technical fi eld targeted by this research and organize the technical issues. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
7th	Review of literature survey results related to the technical fi eld targeted by this research (overseas literature) 5)Review the results of the literature survey conducted in the technical fi eld targeted by this research and organize the technical issues. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
8th	Summary of the results of a review of domestic literature related to the technical fi eld targeted by this research 6)Compile the results of the domestic literature review you conducted into a document. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
9th	Summary of the results of a review of overseas literature related to the technical fi eld targeted by this research 7)Compile the results of the review of overseas literature conducted in a document. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
10th	Consideration of the relationship between the results of the literature review and the issues to be resolved in this study Based on the results of the trend surveys conducted in 3) to 9), organize the research results in the fi eld and the issues that need to be resolved in the future. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you have (for at least two hours).
11th	Consideration of measures to address technical issues based on the results of a domestic literature survey Based on the results of the domestic literature survey compiled in 8), consider measures to address the technical issues targeted by this research. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you may have (for at least two hours).

	12th Consideration of measures to address technical issues based on the results of overseas literature surveys Based on the results of the overseas literature survey compiled in 9), consider measures to address the technical issues targeted by this research. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you may have (for at least two hours). 13th Examination of the technical issues targeted in this study and the appropriateness of the measures taken Organize the technical issues necessary to improve self-propulsion performance. Discuss the validity of the results of the studies in 11) and 12) as the technical issues and solutions targeted in this study. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile andkeep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you have (for at least two hours). 14th Drafting a general research plan Based on the results of the discussion in 12), develop an outline of your research plan. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and keep a record of any questions you may have in your research notebook. If there is anything you do not understand, reread and review your lecture notes and references, and record any questions you may have (for at least two hours). 15th summary Summarize 11) to 14) and discuss the validity of the proposed research plan. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review your lecture notesand references, and record any questions you have (for at least two hours).
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Use of computers in the lab. [Feedback to students regarding submission of results, etc.] Discussion will be held on the content of submitted research materials. [Class method] Students will carry out actual calculations for specifi c example problems, identify problems, and repeatedly consider solutionsto ensure the content and level of a master's thesis in engineering. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	The direction of research will be clarifi ed by researching related papers on the topic of the

	master's thesis.
Evaluation Method	The judgement will be based on seminar presentations, reports, and daily attitude towards research.
Evaluation criteria	Evaluation criteria: A score of 60 or above is considered a pass. Students enrolled before 2018: A (80-100), B (70-79), C (60-69), D (under 60). Students enrolled after 2019: S (90-100), A (80-89), B (70-79), C (60-69), D (under 60).
Textbook/ Reference Books	Distribution of materials
Requirements	none.
Notes on course enrollment	none.
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	at any time

Course Name	Practice in Industrial Technology Ⅰ B			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		First year	ProductionTechnology	2 hours

Class Outline	Students will decide on a thesis topic, research related literature, consider problems and issues to be solved, and consider create a research plan. In the IB, students will create a research plan for their research topic, conduct preliminary research, and consider the validityof the plan they have created. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Summary of the technical issues addressed in this research Summarize the technical issues considered in IA and determine the priorities of the technical issues to be addressed. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you have (for at least two hours). 2nd Deciding on the specifi c theme of the master's thesis and the details of the problem to be solved Based on the results of the examinations in IA and IB 1), break down the problem to be solved and from there, decide on the specifi c details of the theme to be addressed in the master's thesis. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review the lecture notesand references, and record any questions you have (for at least 2 hours). 3rd Consider specifi c measures and implementation items to solve the issues 2)List the measures and implementation items necessary to solve the problem set in step 1. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review your lecturenotes and references, and record any questions you may have (for at least 2 hours). 4th Presentation and discussion of specifi c measures and implementation items to solve the issues 3)Give a presentation on the strategies and challenges you listed and discuss their validity with your supervisor. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of thesein your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc.and record any questions you have (for at least two hours). 5th Review of measures and implementation items Based on the discussion in 4), make any necessary revisions to the measures and implementation items and decide how to proceed with the research. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions

		you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review your lecture notes, references, etc. and record any questions you have (for at least 2 hours).
	6th	Examine the appropriateness of measures and implementation details through preliminary research (policy consideration) 5)Preliminary research will be conducted to examine the validity of the research approach established in step 5.However, fi rst, the direction for this preliminary research (what to verify and how) will be decided through discussion with your supervisor. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lecture,and record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture, and compile and keep a research notebook. If there is anything you do not understand, reread and review your lecture notes, references, etc., and record any questions you have (for at least two hours).
	7th	Examine the validity of measures and implementation details through preliminary research (trial calculations) 6)Carry out trial calculations in accordance with the policy discussed in step 6 and consider the appropriateness of the measures. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review your lecturenotes and references, and record any questions you may have (for at least 2 hours).
	8th	Examine the validity of the measures and implementation details through preliminary research (comparison and verifi cation with experimental results) The validity of the measures will be examined by comparing the results of the study in 6) and 7) with the experimental results. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you have (for at least 2 hours).
	9th	Examine the validity of measures and implementation details through preliminary research (presentationof the results of the study) Summarize the results of your investigations in 6)-8) and give a presentation, then verify the validity of your strategy with your supervisor. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and compile andkeep a research notebook. If there is anything you do not understand, reread and review your lecture notes, references, etc., and record any questions you have (for at least 2 hours).
	10th	Review the appropriateness of measures and implementation details through preliminary research (summary) Based on the discussion in 9), consider any necessary revisions, decide on the measures and implementation details, and tentatively decide on the research implementation policy. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture, and compile and keep a research notebook. If there is anything you do not understand, reread and review the lecture notes, references, etc., and record any questions you have (for at least two hours).
	11th	Research plan development (schedule review) Based on the implementation policy established in 9), plan a research schedule and begin actual research in accordance with that plan. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lectureand record any points you do not understand or questions you have (for at least two hours).

	[Review] After the lecture, use your lecture notes to confi rm the content discussed in the lecture and write themdown in your research notebook. If there is anything you do not understand, reread and review your lecture notes, references, etc. and record any questions you have (for at least two hours). 12th Research plan development (comparison with literature) While proceeding with your research based on the schedule drawn up in 11), you will also conduct a parallel survey of related literature and compare it with your own research status to confi rm the appropriateness of your research progress. [Preparation] Before the lecture, read the distributed materials and references for the relevant part of the lecture,and record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and compile andkeep a research notebook. If you have any questions, reread and review your lecture notes and references, and record any questions you have (for at least two hours). 13th Research planning (risk assessment) Continue to proceed with your research based on the schedule set out in 11), while simultaneously analyzing risksthat could hinder the progress of your research. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and compile andkeep a research notebook. If you have any questions, reread and review your lecture notes and references, and record any questions you have (for at least two hours). 14th Research planning (considering risk countermeasures) Continue to proceed with your research based on the schedule drawn up in 11), while also considering recovery plans in the event that risks that may hinder the progress of your research as discussed in 13) arise, and revise theschedule to refl ect these in 11). [Preparation] Before the lecture, read the distributed materials and references relevant to the lecture and record any points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile themin your research notebook. If you have any questions, reread and review your lecture notes, references, etc., andrecord any questions you have (for at least two hours). 15th Research plan formulation (summary) Continue your research based on the schedule set out in 11), while summarizing and verifying the results of yourresearch up to 14). Based on the results of this verifi cation, make any necessary revisions to your plan and fi nalize your research plan incorporating these revisions. [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and compile theminto your research notebook. If you have any questions, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Lab computers will be used. [Feedback to students regarding submission of results, etc.] The content of submitted research materials will be discussed. [Class method] Students will perform actual calculations for specifi c example problems, identify problems, and repeatedly consider solutions toensure the content and level of a master's thesis in engineering. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance).

	[Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	Develop a research plan for your master's thesis and evaluate its validity.
Evaluation Method	The judgement will be based on seminar presentations, reports, and daily attitude towards research.
Evaluation criteria	Evaluation criteria: A score of 60 or above is considered a pass. Students enrolled before 2018: A (80-100), B (70-79), C (60-69), D (under 60). Students enrolled after 2019: S (90-100), A (80-89), B (70-79), C (60-69), D (under 60).
Textbook/ Reference Books	Distribution of materials
Requirements	none.
Notes on course enrollment	none.
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	at any time.

Course Name	Seminar on Industrial Technology IA			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Koichi Okada		First year	Production Technology	2 hours

Class Outline	Decide on a research theme for your master's thesis, and investigate and understand the background and necessity of said research. Also, research related literature and develop a research plan to advance said research. If necessary, conduct trial calculations and preliminary experiments. In IA, literature research will be the main focus. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department . Please also refer to the curriculum map.
Lesson Plan	1st Introduction to research content For self-study, please refer to the preparation and review section. 2nd Identifying and examining research issues For self-study, please refer to the preparation and review section. 3rd Considering solutions to problems For self-study, please refer to the preparation and review section. 4th Related literature survey 1: Mainly domestic papers For self-study, please refer to the preparation and review section. 5th Related literature survey 2: Mainly domestic journals For self-study, please refer to the preparation and review section. 6th Related Literature Survey 3 Overseas Literature For self-study, please refer to the preparation and review section. 7th Selection of references For self-study, please refer to the preparation and review section. 8th Research and analysis of the background of research For self-study, please refer to the preparation and review section. 9th Research and analysis of research methods For self-study, please refer to the preparation and review section. 10th Consideration of potential master's thesis research topics For self-study, please refer to the preparation and review section. 11th Consideration of potential master's thesis research topics (continued) For self-study, please refer to the preparation and review section. 12th Master's thesis research topic proposal For self-study, please refer to the preparation and review section. 13th Deciding on a master's thesis research topic For self-study, please refer to the preparation and review section. 14th Developing a research plan for a master's thesis (fi rst year) For self-study, please refer to the preparation and review section. 15th Developing a research plan for the master's thesis (2nd year) For self-study, please refer to the preparation and review section.
Class Format	Seminar format [Active learning] Yes Research plans may be developed, trial calculations performed as necessary, and preliminary experiments may be carried out. [Use of information devices] None in particular [Class method] Not only will the theory be explained in a logical and systematic manner, but students will also be able to learn by actually calculating specifi c examples themselves. [Utilization of practical experience] None in particular

	[Form of class when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google classroom.
Achieving Goals	By researching the literature related to the topic of the trainee's thesis, students will understand the research content and research direction. They will also acquire basic knowledge about the numerical analysis and various experiments required for the research.
Evaluation Method	Evaluation will be based on the research attitude and level of understanding of the research content.
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Materials such as academic papers, academic journals, and related books will be distributed as needed.
Requirements	[Prerequisite Courses] None in particular. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	As preparation, students will read through relevant materials and conduct research (approximately 2 hours), and as review, they will organize and reconfi rm the content covered during the lecture to deepen their understanding (approximately 2 hours).
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Practice in Industrial Technology Ⅰ B			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Koichi Okada		First year	Production Technology	2 hours

Class Outline	Decide on a research theme for your master's thesis, and investigate and understand the background and necessity of said research. Also, research related literature and develop a research plan to advance said research. If necessary, conduct trial calculations and preliminary experiments. At the IB, you will focus on developing a research plan and preparing for research. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department. Please also refer to the curriculum map.
Lesson Plan	1st Creating a research plan Deciding on implementation details For self-study, please refer to the preparation and review section. 2nd Research plan creation schedule For self-study, please refer to the preparation and review section. 3rd Research plan creation (mid-term) For self-study, please refer to the preparation and review section. 4th Experimental planning For self-study, please refer to the preparation and review section. 5th Test equipment operation planning and adjustment For self-study, please refer to the preparation and review section. 6th Detailed examination of test piece material, dimensions, etc. For self-study, please refer to the preparation and review section. 7th Test specimen production plan development For self-study, please refer to the preparation and review section. 8th Numerical analysis Analysis content selection For self-study, please refer to the preparation and review section. 9th Numerical analysis Analysis plan formulation For self-study, please refer to the preparation and review section. 10th Numerical analysis Analysis software Usage learning 1 (model creation) For self-study, please refer to the preparation and review section. 11th Numerical analysis software usage learning 2 (calculation result analysis) For self-study, please refer to the preparation and review section. 12th Numerical Analysis Analysis Software Exercise 1 (2D Problems) For self-study, please refer to the preparation and review section. 13th Numerical Analysis Analysis Software Exercise 2 (3D Problems) For self-study, please refer to the preparation and review section. 14th Numerical Analysis Analysis Summary For self-study, please refer to the preparation and review section. 15th Research summary For self-study, please refer to the preparation and review section.
Class Format	[Active learning] Yes Research plans may be developed, trial calculations performed as necessary, and preliminary experiments may be carried out. [Use of information devices] None in particular [Class method] Not only will the theory be explained in a logical and systematic manner, but students will also be able to learn by actually calculating specifi c examples themselves. [Utilization of practical experience] None in particular [Form of class when face-to-face classes cannot be held due to special circumstances]

	Instructions will be given via Google classroom.
Achieving Goals	Students will acquire the ability to correctly understand the background and goals of research and to independently plan research.
Evaluation Method	Evaluation will be based on the research attitude and level of understanding of the research content.
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Materials such as academic papers, academic journals, and related books will be distributed as needed.
Requirements	[Prerequisite Courses] None in particular. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	As preparation, students will read through relevant materials and conduct research (approximately 2 hours), and as review, they will organize and reconfi rm the content covered during the lecture to deepen their understanding (approximately 2 hours).
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Thermal Engineering			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Yutaka Matsukawa		First year	Production Technology	2 hours

Class Outline	Thermal phenomena are widely used in industry, for example, to transfer energy and generate power using heat. Thermal engineering is an engineering fi eld that utilizes thermal phenomena. In this class, you will learn about thermal engineering and how to apply it. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Marine Fluid Engineering, Mechanical Fluid Engineering . Please also refer to the curriculum map.
Lesson Plan	1st Fundamentals of Thermodynamics (Preparation: None. Review: Organize the contents of the lesson.) 2nd Applications of Thermodynamics (Preparation: None. Review: Organize the contents of the lesson.) 3rd Thermodynamic Calculations (Preparation: None. Review: Organize the contents of the lesson.) 4th Overview of Heat Transfer (Preparation: None. Review: Organize the contents of the lesson.) 5th Fundamentals of Heat Conduction (Preparation: None. Review: Organize the contents of the lesson.) 6th Applications of thermal conduction (Preparation: None. Review: Organize the contents of the lesson.) 7th Heat Transfer Fundamentals (Preparation: None. Review: Organize the contents of the lesson.) 8th Heat Transfer Applications (Preparation: None. Review: Organize the contents of the lesson.) 9th Heat Transfer Calculations (Preparation: None. Review: Organize the contents of the lesson.) 10th Thermal Radiation Basics (Preparation: None. Review: Organize the contents of the lesson.) 11th Applications of thermal radiation (Preparation: None. Review: Organize the contents of the lesson.) 12th Fundamentals of Heat Transfer (Preparation: None. Review: Organize the contents of the lesson.) 13th Applications of heat transfer (Preparation: None. Review: Organize the contents of the lesson.) 14th Combustion Basics (Preparation: None. Review: Organize the contents of the lesson.) 15th Combustion Applications (Preparation: None. Review: Organize the contents of the lesson.)
Class Format	Lectures [Active learning] Discussion of class content and reports. [Use of information devices] None in particular. [Feedback to students regarding submission of work, etc.] Individual questions regarding reports will be answered after submission. [Teaching methods] Students will develop the ability to apply the theories explained in class through concrete examples and practice problems. [Form of instruction when face-to-face classes cannot be held due to special circumstances]

	Instructions will be given via Google Classroom and classes will be held online.
Achieving Goals	・Understand the basics of thermodynamics. ・Understand the basics of heat transfer. ・Understand the basics of combustion.
Evaluation Method	The evaluation will be based on the report (100 points). Points will be deducted if the student's attitude is poor.
Evaluation criteria	[Students enrolled in 2018 or earlier] Exams and grades will be graded using four levels: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are consideredpassing grades, and Fail are considered failing grades. [Students enrolled in 2019 or later] Exams and grades will be graded using fi ve levels: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points,B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing grades,and D is considered failing grades.
Textbook/ Reference Books	Nothing in particular.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	Spend the same amount of time as the class to review the content of each lesson and write a report.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Fluid Dynamics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Yutaka Matsukawa		First year	Production Technology	2 hours

Class Outline	Fluid fl ow phenomena appear in a variety of industrial situations. Examples include the fl ow of air and water around vehicles, and the fl ow of various fl uids in pipes. Fluid mechanics is an academic fi eld necessary for understanding fl uid fl ow phenomena. In this class, you will learn about the contents of fl uid mechanics and how to apply it. [Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map] Structural Engineering, Marine Fluid Engineering, Mechanical Fluid Engineering. Please also refer to the curriculum map.
Lesson Plan	1st Fluid Flow Overview (Preparation: None. Review: Organize the contents of the lesson.) 2nd Laws of Fluid Flow (Preparation: None. Review: Organize the contents of the lesson.) 3rd Applications of Bernoulli's Principle and the Law of Momentum (Preparation: None. Review: Organize the contents of the lesson.) 4th Viscous Flow Fundamentals (Preparation: None. Review: Organize the contents of the lesson.) 5th Fundamentals of Pipe Flow (Preparation: None. Review: Organize the contents of the lesson.) 6th Applications of pipe fl ow (Preparation: None. Review: Organize the contents of the lesson.) 7th Pipe fl ow calculation (Preparation: None. Review: Organize the contents of the lesson.) 8th Fundamentals of Turbulence (Preparation: None. Review: Organize the contents of the lesson.) 9th Turbulence in internal fl ows (Preparation: None. Review: Organize the contents of the lesson.) 10th Turbulence in external fl ows (Preparation: None. Review: Organize the contents of the lesson.) 11th Turbulence calculations (Preparation: None. Review: Organize the contents of the lesson.) 12th Compressible Flow Fundamentals (Preparation: None. Review: Organize the contents of the lesson.) 13th Applications of compressible fl ow (Preparation: None. Review: Organize the contents of the lesson.) 14th Low-Speed Aerodynamics (Preparation: None. Review: Organize the contents of the lesson.) 15th High-Speed Aerodynamics (Preparation: None. Review: Organize the contents of the lesson.)
Class Format	Lectures [Active learning] Discussion of class content and reports. [Use of information devices] None in particular. [Feedback to students regarding submission of work, etc.] Individual questions regarding reports will be answered after submission. [Teaching methods] Students will develop the ability to apply the theories explained in class through concrete examples and practice problems.

	[Form of instruction when face-to-face classes cannot be held due to special circumstances] Instructions will be given via Google Classroom and classes will be held online.
Achieving Goals	・Understand the basics of pipe fl ow. ・Understand the basics of turbulence. ・Understand the basics of aerodynamics.
Evaluation Method	The evaluation will be based on the report (100 points). Points will be deducted if the student's attitude is poor.
Evaluation criteria	[Students enrolled in 2018 or earlier] Exams and grades will be graded using four levels: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are consideredpassing grades, and Fail are considered failing grades. [Students enrolled in 2019 or later] Exams and grades will be graded using fi ve levels: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points,B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing grades,and D is considered failing grades.
Textbook/ Reference Books	Nothing in particular.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	Spend the same amount of time as the class to review the content of each lesson and write a report.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Exercises in Environmental Planning II A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Supervising professors (Kamohara, Fujihara, Hinata, Nakamichi, Mochida, Wang)		Second year	Environmental Planning	2 hours

Class Outline	We provide research guidance for writing a master's thesis.
Lesson Plan	1st Discussion of research progress 2nd Creating presentation materials 3rd Progress Presentation 4th Data collection (intermediate) 5th Data Visualization (Intermediate) 6th Data Analysis (Interim) 7th Data analysis discussion (midterm) 8th Discussion of Data Analysis (Revised) 9th Data Collection (Correction) 10th Data Visualization (Correction) 11th Data Analysis (Correction) 12th Discussion on data analysis (towards conclusion) 13th Data analysis discussion (summary) 14th Creating presentation materials 15th Progress Presentation
Class Format	Seminars [Active Learning] Available. Progress reports will be conducted in a style of your own design. [Use of Information Devices] Students will access Google Classroom using their smartphones or laptops to provide materials and write refl ections at the end of class. Please bring an accessible information device. [Feedback to students regarding submission of work , etc.] Responses will be given individually or to the entire class, depending on the content. Lectures and Exercises [Forms for when face-to-face classes cannot be held due to special circumstances] We plan to use Google Classroom and the conference systems "meet" and "zoom."
Achieving Goals	The goal is to organize the content into a form that can be presented mid-term by promoting research toward the creation ofa master's thesis.
Evaluation Method	Evaluation will be based on research progress reports given in seminars.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A

	being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Distribute materials and provide information as needed.
Requirements	Students are required to take Environmental Planning Seminar IA and Environmental Planning Seminar IB.
Notes on course enrollment	none.
Preparation and review	It is necessary to secure suffi cient time and eff ort to advance research.
Office Hours	We are available during set offi ce hours and whenever we are available.

Course Name	Semiconductor Engineering			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Koji Kiyoyama		First year	Electronics and Information Science	2 hours

Class Outline	This course focuses on the characteristics of semiconductor devices used in integrated circuits (ICs). First, the device structures and basic characteristics of complementary metal-oxide-semiconductor (CMOS) transistors, which are currently mainstream, will be explained. Additionally, small-signal equivalent circuit models of transistors will be introduced. Furthermore, the amplifi cation mechanism and frequency responses of amplifi er circuits using transistors in various confi gurations will be discussed. A simulator will be used in class or for homework. The circuit simulator LTspice should be installed on the student's PC.
Lesson Plan	1st Band Structure and Density of State 2nd Fermi Level and Carrier Density 3rd Carrier Transport in Semiconductor 4th PN Junction 5th Current-Voltage Characteristics of PN junction 6th PN junction Exercise 7th Bipolar Transistor, Concept, and its Characteristic 8th MOS(Metal-Oxide-Semiconductor) Structure and its Characteristics 9th MOS Transistor, DC, Operation 10th MOS Transistor Exercise 11th DC transfer characteristic of CMOS NOT circuit 12th DC transfer characteristic of CMOS NOT circuit 13th Performance evaluation of CMOS NOT circuit and Power dissipation 14th Other Semiconductor Devices 15th Summary of lecture
Class Format	Lecture (Combination of face-to-face and online) [Active Learning]: Yes ・Includes practical exercises and discussions using simulators. [Use of Information Equipment]: None in particular ・Supplementary materials will be distributed in PDF format. [Feedback to students on submission of outcomes, etc.]: ・Supplementary explanations will be provided upon returning assignments. [Teaching Methods]: ・Enhancing understanding by incorporating simulations for knowledge acquisition. [Format in case face-to-face classes cannot be conducted due to special circumstances]: ・Google Classroom will be the primary platform, with the use of the conference system software "Zoom."
Achieving Goals	The ultimate objective of this lecture is to achieve mastery of basic semiconductor device

	knowledge.
Evaluation Method	Grading will be based on class attendance (40%) and submitted reports (60%).
Evaluation criteria	In the above method of evaluation, the ratings are as follows: (Ratings are represented by fi ve categories: S, A, B, C, and D.) ・”S” corresponds to a score range of 100-90 points. ・”A” corresponds to a score range of 89-80 points. ・”B” corresponds to a score range of 79-70 points. ・”C” corresponds to a score range of 69-60 points. ・”D” (59 points or below) is considered a failing grade.
Textbook/ Reference Books	The lecture materials are provided through Google Classroom. References (handouts) will be provided as needed.
Requirements	No specifi c requirements.
Notes on course enrollment	The students are recommended to have knowledge of electronic circuits.
Preparation and review	The preparation and review will be specifi ed at each lecture and should be done for every session.
Office Hours	As necessary.

Course Name	Information processing circuits			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Keiichi Hirose and Kazuhiro Kajiwara		First year	Electronics and Information Science	2 hours

Class Outline	In this special course, students will fi rst learn the basic concepts and confi gurations of information processing circuits. Next, they will study the basic theory and architecture of intelligent functional elements such as microprocessors and digital signal processors (DSPs). Furthermore, they will learn about circuit confi gurations, operating functions, and operating characteristics by looking at design methods such as ASICs and HDLs, and power electronic circuits that use DSPs as representative information processing circuits.
Lesson Plan	1st guidance Understand the positioning of the subject, the goals to be achieved, etc. 2nd Wiring logic and program logic Understand the basic structure of information processing times. (Hirose) 3rd CPU architecture Understand CPU architecture.(Hirose) 4th DSP Architecture Understand DSP architecture and be able to explain its operation. (Hirose) 5th Parallel Processing Systems and Algorithms (1) You will be able to understand the structure of parallel processing systems and processing algorithms. (Hirose) 6th Parallel Processing Systems and Algorithms (2) You will be able to understand the structure of parallel processing systems and processing algorithms. (Hirose) 7th ASIC (Application Specifi c IC) (1) Be able to explain manufacturing technology, design methods, and the relationship between design and simulators.(Hirose) 8th ASIC (Application Specifi c IC) (1) Be able to explain manufacturing technology, design methods, and the relationship between design and simulators.(Hirose) 9th ASIC (Application Specifi c IC) (3) Be able to explain manufacturing technology, design methods, and the relationship between design and simulators.(Kajiwara) 10th Hardware Description Language (HDL) (1) Understand the hardware description language HDL and be able to write simple programs. (Kajiwara) 11th Hardware Description Language (HDL) (1) Understand the hardware description language HDL and be able to write simple programs. (Kajiwara) 12th Analysis Simulator You will be able to understand how electronic circuit analysis simulators work.(Kajiwara) 13th Application to image processing systems (1) You will be able to understand the applications of image processing systems.(Kajiwara) 14th Application to image processing systems (2) You will be able to understand the applications of image processing systems.(Kajiwara) 15th Assessment and Guidance Hirose and Kajiwara were in charge of the fi rst evaluation and instruction (Kajiwara)
Class Format	lecture
Achieving Goals	Be able to explain the structure, function, and relationships between information processing circuits using technical terms.
Evaluation Method	Evaluation will be based on report assignments and presentations in lectures.
Evaluation criteria	

Textbook/ Reference Books	Textbooks: Will be indicated as appropriate.
Requirements	
Notes on course enrollment	
Preparation and review	Instructions regarding assignments will be given during class.
Office Hours	

Course Name	Lecture on Applied Mathematics A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Takashi Kato		First year	Common to all majors	2 hours

Class Outline	From the perspective of applied mathematics as a means to understand physics and engineering, rather than pursuing mathematical rigor, students focus on how to use it to elucidate phenomena and consider its applications. Students will learn to understand mathematical methods for solving specifi c problems such as multiplication, vibration, competition, planetary motion,balance and vibration of strings, heat conduction, and fl uid motion.
Lesson Plan	1st Mathematics of growth (function of change) 2nd Mathematics of Multiplication (Law of Change) 3rd Mathematics of growth (constant change in growth rate) 4th Mathematics of growth (nonlinear growth) 5th Mathematics of vibration (simple harmonic motion) 6th Mathematics of vibration (Newton's laws of mechanics) 7th Mathematics of vibration (vibration equations and fundamental solutions) 8th Mathematics of vibration (second-order diff erential equations with constant coeffi cients) 9th Mathematics of vibration (damped vibration) 10th Mathematics of competition (when there is one-sided infl uence) 11th Mathematics of confl ict (when they aff ect each other) 12th Mathematics of planetary motion (planetary equations of motion) 13th Mathematics of planetary motion (Kepler's laws) 14th Mathematics of planetary motion (circular orbits) 15th Mathematics of planetary motion (quadratic (elliptical) orbits)
Class Format	Lectures [Active learning] None [Use of information devices] None in particular (however, supplementary materials will be distributed) [Feedback to students regarding submission of work, etc.] Supplementary explanations will be provided when returning assignments [Educational method] Lecture format according to each theme. [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, and the conference system software "Zoom" or "Meet" will be used.
Achieving Goals	Students will be introduced to specifi c problems such as multiplication, vibration, competition, planetary motion, balance andvibration of strings, heat conduction, and fl uid motion, and will be given an understanding of mathematical methods for dealing with these problems.
Evaluation Method	Evaluation will be based solely on the fi nal exam. However, regardless of the fi nal exam results, a minimum of two-thirds lecture attendance is required to receive credits (pass).

	[Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based solely on regular marks based on assignments and reports submitted during class, with 100% of thepoints allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Distribute printouts.
Requirements	none.
Notes on course enrollment	It is desirable to have a basic understanding of algebra, geometry, analysis, etc.
Preparation and review	Report assignments covering the content of multiple lectures will be distributed in advance, so please do your homework. After each lecture, you will review the content by submitting a report on that content. Also, at the beginning of each lecture, there will be a short quiz on the content of the previous lecture, so you can review it repeatedly. Overall, you will need to prepare and review in order to digest the same amount of content as in class.
Office Hours	Coordinate with the students.

Course Name	Fracture and Strength of Materials			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Koichi Okada		First year	Prodcution Technology	2 hours

Class Outline	This course will be lectured in a round-robin format on the basic theory of linear fracture mechanics, which provides the basic concepts for establishing safe manufacturing and usage conditions, assuming the presence of defects and cracks in the materials that make up machines and structures, and its main application areas of brittle fracture and fatigue fracture. [Particularly relevant majors, departments, and laboratories as specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department . Please also refer to the curriculum map.
Lesson Plan	1st General properties of strain Displacement components and strain components, compatibility conditions of strain For self-study, please refer to the preparation and review section. 2nd General properties of stress (1) Stress in each coordinate system For self-study, please refer to the preparation and review section. 3rd General Properties of Stress (2) Equation of Stress Balance For self-study, please refer to the preparation and review section. 4th Fundamentals of Elasticity Theory (1) Constitutive Equations, Boundary Conditions For self-study, please refer to the preparation and review section. 5th Fundamentals of Elasticity Theory (2) Plane Strain State For self-study, please refer to the preparation and review section. 6th Fundamentals of Elasticity Theory (3) Plane Stress State For self-study, please refer to the preparation and review section. 7th Stress Intensity Factor (1) Strength Evaluation Based on Stress Standard For self-study, please refer to the preparation and review section. 8th Stress concentration factor (2) Stress concentration and stress concentration factor For self-study, please refer to the preparation and review section. 9th Stress Intensity Factor (3) Stress fi eld near the crack tip and defi nition of stress intensity factor For self-study, please refer to the preparation and review section. 10th Stress intensity factor (4) Stress intensity factor for the deformation mode of the crack surface For self-study, please refer to the preparation and review section. 11th Stress Intensity Factor (5) Strength evaluation of cracked components based on stress intensity factors For self-study, please refer to the preparation and review section. 12th Fracture Mechanics (1) Fracture Toughness For self-study, please refer to the preparation and review section. 13th Fracture Mechanics (2) Brittle Fracture and Ductile Fracture For self-study, please refer to the preparation and review section. 14th Fatigue Fracture (1) Fatigue Crack Propagation Mechanism For self-study, please refer to the preparation and review section. 15th Fatigue failure (2) Fatigue life evaluation, Paris law For self-study, please refer to the preparation and review section.
Class Format	Lectures [Active learning] Yes. Students may be assigned assignments to review the content of the class. [Use of information devices] None in particular. [Class method] Not only will the theory be explained in a logical and systematic manner, but students will also be given practical examples tolearn by actually calculating them themselves.

	[Feedback to students regarding the submission of work, etc.] Assignments will be returned in the next class. At that time, additional explanations may be given on points that many students have struggled with, such as points to note. [Utilization of work experience] Yes. Faculty members with work experience in product research and development will use that experience in their classes. [Form of class when face-to-face classes cannot be held due to special circumstances] Notifi cation will be made via Google classroom.
Achieving Goals	- Understand the basic equations of two-dimensional elasticity. - Understand the elastic stress fi eld and displacement fi eld near the crack tip. - Understand the concept of linear fracture mechanics.
Evaluation Method	The overall evaluation will be based on 2/3 of the regular marks based on the results of exercises and reports given during class, and 1/3 of the marks will be based on the fi nal exam. Details will be explained in the fi rst class.
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Textbook: Distribute appropriate handouts. Reference books: Hironori Murakami and others: Introduction to Fracture Mechanics, published by Ohm-Mori Hideo Kobayashi: Fracture Mechanics, published by Kyoritsu Shuppan Takeshi Kanazawa and others: Brittle Fracture 2, published by Baifukan
Requirements	None in particular. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	Preparation: Skip through the materials distributed for the next lecture (approximately 1.5 hours). Review: Organize materials and lecture notes, and solve sample problems and practice problems covered during the lecture(approximately 2.5 hours).
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Fracture Control for Structures			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Koichi Okada		First year	Prodcution Technology	2 hours

Class Outline	In strength design to evaluate the safety of structures, it is necessary to be able to estimate the strength for possible failure modes corresponding to the nature of external forces and the structural style. Failure strength is broadly divided into deformation strength and crack strength; the former is failure due to excessive deformation, and includes yielding, collapse, buckling, and creep failure, while the latter is failure due to the initiation and propagation of cracks, and includes brittle failure, fatigue failure, and stress corrosion cracking. This lecture will be held in a round-robin format to discuss these failure phenomena, methods for evaluating their strength, and ideas for preventing failure. [Particularly relevant departments, departments, and laboratories as specifi ed in the curriculum map] Structural Engineering Department, Materials Engineering Department, Mechanical and Fluid Engineering Department . Please also refer to the curriculum map.
Lesson Plan	1st Ductile failure (yielding) Elastic-plastic response of materials, yield conditions, yield strength For self-study, please refer to the preparation and review section. 2nd Collapse, limit design, plastic joints, limit theorems For self-study, please refer to the preparation and review section. 3rd Limit analysis and collapse strength Collapse of frame structures, collapse of fl at plates due to lateral load For self-study, please refer to the preparation and review section. 4th Column buckling: Elastic buckling, approximate calculation method for buckling load, plastic buckling For self-study, please refer to the preparation and review section. 5th Buckling of fl at plates: Elastic buckling, plastic buckling, and post-buckling behavior For self-study, please refer to the preparation and review section. 6th Brittle fracture 1 Characteristics of brittle fracture For self-study, please refer to the preparation and review section. 7th Brittle Fracture 2 Various Fracture Criteria and Fracture Mechanics For self-study, please refer to the preparation and review section. 8th Fracture toughness evaluation methods: Fracture toughness test, brittle crack propagation arrest test, transition temperature test For self-study, please refer to the preparation and review section. 9th Fatigue failure 1 Characteristics of fatigue failure, SN diagram For self-study, please refer to the preparation and review section. 10th Fatigue failure 2 Various infl uencing factors and cumulative damage For self-study, please refer to the preparation and review section. 11th Fatigue crack propagation characteristics 1 Fatigue crack propagation test, treatment by fracture mechanics For self-study, please refer to the preparation and review section 12th Fatigue crack propagation characteristics 2 Crack opening and closing concept For self-study, please refer to the preparation and review section. 13th Environmental strength: corrosion, deterioration of material strength due to corrosion For self-study, please refer to the preparation and review section. 14th Stress corrosion cracking and corrosion fatigue Characteristics of stress corrosion cracking, characteristics of corrosion fatigue, treatment by fracture mechanics For self-study, please refer to the preparation and review section. 15th Creep rupture High temperature strength properties, creep rupture characteristics, creep rupture strength For self-study, please refer to the preparation and review section.
Class Format	Lectures

	[Active learning] Yes. Students may be assigned assignments to review the content of the class. [Use of information devices] None in particular. [Class method] Not only will the theory be explained in a logical and systematic manner, but students will also be given practical examples tolearn by actually calculating them themselves. [Feedback to students regarding the submission of work, etc.] Assignments will be returned in the next class. When returning assignments, additional explanations may be given on points that many students have struggled with, such as points to note. [Utilization of work experience] Yes. Faculty members with work experience in product research and development will use that experience in their classes. [Forms for when face-to-face classes cannot be held due to special circumstances] Notifi cation will be made via Google classroom.
Achieving Goals	・Understand the failure mechanism of each failure mode. ・Understand the concept of strength evaluation method for each failure mode.
Evaluation Method	The overall evaluation will be based on one-third of the results of exercises and reports given during class, and two-thirds of the results of the fi nal exam. Details will be explained in the fi rst class.
Evaluation criteria	Grades are expressed in fi ve categories: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	Distribute printouts.
Requirements	None in particular. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular.
Preparation and review	Preparation: Skip through the materials distributed and review the next lecture (approximately 1.5 hours). Review: Organize materials and lecture notes, and solve sample problems and exercises covered during the lecture (approximately 2.5 hours).
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Fundamental Theory of the Finite Element Method			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Katsuhiko Kuroda		First year	Prodcution Technology	2 hours

Class Outline	Computers are now being used as useful development tools at each stage of product development. Unlike exact solutions that analytically fi nd continuum models using diff erential equations, the fi nite element method is a method of fi nding numerical solutions by approximating partial diff erential equations consisting of a fi nite number of degrees of freedom with algebraic equations. In this lecture, we will mainly study two-dimensional elasticity problems. Furthermore, we will practice static analysis and vibration mode analysis of spring-mass systems and beam structures using general-purpose fi nite element analysis software and MATLAB.
Lesson Plan	1st Guidance and Finite Element Method 2nd Fundamentals of Mechanics of Materials 3rd Fundamentals of fi nite element method, matrix method 4th Element stiff ness matrix and global stiff ness matrix 5th Stress and Strain Calculations 6th Spring element (series spring) 7th Spring element (parallel spring) 8th Truss element, angled truss element 9th Exercises using general-purpose fi nite element analysis software: truss elements 10th Beam element 11th Exercises using MATLAB, spring elements 12th MATLAB exercises, beam elements 13th Exercises using general-purpose fi nite element analysis software, beam elements 14th Eigenvalues and natural frequencies of beam elements 15th Exercises using general-purpose fi nite element analysis software: Modal analysis of beam elements
Class Format	Lectures, practical training (programming with MATLAB, analysis with general-purpose CAE using FEMAP or ANSYS) [Active learning] Yes, assignments may be assigned to review the content of the class. [Use of information devices] None in particular [Feedback to students regarding the submission of deliverables, etc.] When returning assignments, we may provide additional explanations on points that many students have struggled with, etc. [Utilization of work experience] None [Form of use when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	To understand how to handle two-dimensional elastic problems using the fi nite element method, and to be able to perform simple MATLAB programming and CAE analysis.

Evaluation Method	Several report assignments and presentations.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four types: excellent, good, pass, and fail, with excellent being 80 to 100 points, good being 70 to79 points, pass being 60 to 69 points, and fail being 59 points or less. Excellent, good, and pass are considered passing, andfail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve types: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70 to79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is consideredfailing.
Textbook/ Reference Books	Print distribution
Requirements	Nothing in particular
Notes on course enrollment	Bring a scientifi c calculator
Preparation and review	Before each lecture, spend about two hours reading over the relevant lecture content using the distributed materials to ensure you understand it before the lecture. If you do not understand, be prepared to ask questions during the lecture. After the lecture, spend about two hours again organizing the lecture content using the materials and notes, aiming to master the content.
Office Hours	at any time.

Course Name	Vibration Analysis, adv.			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Katsuhiko Kuroda		First year	Prodcution Technology	2 hours

Class Outline	In industrial products, weight reduction is being promoted to reduce production costs, and as materials are becoming lighter, i.e. thinner, vibration and noise problems appear to be occurring more frequently. Countermeasures for these problems areinvestigated and implemented using fi nite element methods and vibration experiments, but it is necessary to understand thefundamentals of vibration beforehand. In this lecture, you will learn about the basics of mechanical vibration, from lumped parameter systems to the application of distributed parameter systems, as well as vibration reduction techniques. You will alsoacquire basic vibration simulation techniques using general-purpose fi nite element analysis software and the numerical calculation software MATLAB.
Lesson Plan	1st Guidance: What are noise and vibration issues? 2nd Fundamentals of Vibration Engineering 3rd One degree of freedom undamped free vibration 4th One degree of freedom damped free vibration 5th 1 degree of freedom forced vibration 6th 1 degree of freedom transient vibration 7th Two-degree-of-freedom undamped free vibration 8th Two-degree-of-freedom undamped forced vibration 9th Modal analysis 10th Exercises using general-purpose fi nite element analysis software 11th Vibration of strings and rods 12th Bending vibration of a beam 13th MATLAB vibration simulation, single degree of freedom system 14th MATLAB vibration simulation, two-degree-of-freedom system 15th Presentation and summary
Class Format	Lectures, exercises (programming with MATLAB, analysis with general-purpose CAE using FEMAP or ANSYS) [Active learning] Yes, assignments may be assigned to review the content of the class. [Use of information devices] None in particular [Feedback to students regarding submission of work, etc.] When returning assignments, we may provide additional explanations on points that many students have struggled with, etc. [Utilization of work experience] None [Form of use when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software ”meet” based on Google Classroom.
Achieving Goals	To be able to solve simple equations of motion and understand various vibration and noise

	problems. To also be able to perform simple MATLAB programming and CAE analysis.
Evaluation Method	Several report assignments and presentations.
Evaluation criteria	A combined score of 60% or more in report assignments and presentations will be considered a pass.
Textbook/ Reference Books	Print distribution.
Requirements	Students who graduate from the Mechanical Engineering course must have earned credits in Mechanical Mechanics II or Vibration Engineering. This does not apply to students in the maritime and architectural fi elds.
Notes on course enrollment	Bring a scientifi c calculator
Preparation and review	Before each lecture, spend about two hours reading over the relevant lecture content using the distributed materials to ensure you understand it before the lecture. If you do not understand, be prepared to ask questions during the lecture. After the lecture, spend about two hours again organizing the lecture content using the materials and notes, aiming to master the content.
Office Hours	at any time.

Course Name	Seminar on Ship Waves			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		First year	Prodcution Technology	2 hours

Class Outline	As long as a ship sails on the water's surface, knowledge of water waves is essential, and in that sense, wave-making theory is the most iconic fi eld in ship hydrodynamics. In this lecture, in order to understand the theory of steady wave-making resistance related to ship waves, we will fi rst learn about the free surface conditions of water waves, and then we will start from a mathematical foundation and thoroughly discuss analytical treatments for calculating the waves generated by submerged cylinders and the wave-making resistance they acton . [Particularly relevant departments, departments, and laboratories specifi ed in the curriculum map] - Marine Fluid Engineering Department (Ikegami, Kagemoto, Hori, Ishikawa laboratories) - Structural Engineering Department (Matsuoka Laboratory) [Off ered every other year, canceled in 2025]
Lesson Plan	1st Free surface conditions , kinematic conditions on the water surface , pressure conditions, Rayleigh's virtual friction , and linear free surface conditions [Preparation] Before the lecture, read the handouts and references for the relevant parts of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you may have (for at least 2 hours). 2nd Free surface conditions , kinematic conditions on the water surface , pressure conditions, Rayleigh's virtual friction , and linear free surface conditions [Preparation] Before the lecture, read the handouts and references for the relevant parts of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you may have (for at least 2 hours). 3rd Wave displacement of sine waves, wave potential, and small amplitude waves [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to check the content discussed in the lecture and write them down in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you have (for at least 2 hours) 4th Flow fi eld around a cylinder placed under a free surface, wave-making Green's function, and integral exponential function extended to the complex domain Ei [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (more than 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you may have (more than 2 hours). 5th Flow fi eld around a cylinder placed under a free surface

	, wave-making Green's function, and integral exponential function extended to the complex domain Ei [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (more than 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you may have (more than 2 hours).
6th	Waves , local disturbance waves, and trailing free wavescaused by a submerged cylinder [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If you have any questions, reread your lecture notes and references, and record any questions you have (for at least 2 hours).
7th	Waves , local disturbance waves, and trailing free waves caused by a submerged cylinder [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If you have any questions, reread your lecture notes and references, and record any questions you have (for at least 2 hours).
8th	Wave-making resistance formula based on momentum theorem, integral at downstream inspection surface, asymptotic form of disturbance potential [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (2 hours or more). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you have (2 hours or more).
9th	Wave-making resistance formula based on momentum theorem, integral at downstream inspection surface, asymptotic form of disturbance potential [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (2 hours or more). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you do not understand anything, reread your lecture notes, references, etc., and record any questions you have (2 hours or more).
10th	Wave-making resistance acting on a submerged cylinder: Wave-making resistance coeffi cient Cw, Froude number Fn [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If you have any questions,
11th	Second approximation of velocity potential around a submerged cylinder - Correction of disturbances in cylinder boundary conditions due to waves [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you have any questions, reread your lecture notes, references, etc., and recordany questions you have (at least 2 hours).
12th	Second approximation of velocity potential around a submerged cylinder - Correction of disturbances in cylinder boundary conditions due to waves [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you have any

	questions, reread your lecture notes, references, etc., and recordany questions you have (at least 2 hours). 13th Wave-making resistance acting on a submerged cylinder due to pressure integrals and consistency with wave-making resistance values due to momentum theorem [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you have any questions, reread your lecture notes, references, etc. and reviewthem, and record any questions you have (for at least 2 hours). 14th Wave-making resistance acting on a submerged cylinder due to pressure integrals and consistency with wave-making resistance values due to momentum theorem [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least 2 hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If you have any questions, reread your lecture notes, references, etc. and reviewthem, and record any questions you have (for at least 2 hours). 15th Summary and Q&A [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least two hours).
Class Format	lecture
Achieving Goals	To become familiar with the mathematical treatment of steady shipbuilding wave resistance theory.
Evaluation Method	Evaluation will be based primarily on the level of understanding in the written exam held at the end of the semester and the results of reports on exercises given from time to time, but will also take into account the student's attitude towards the lectures.
Evaluation criteria	Using the above evaluation method, a score of 60 or above is considered a pass, and grades will be evaluated as follows: [Students entering before 2018] Grades will be evaluated on a four-point scale of excellent, good, pass, and fail, with excellent being 80-100 points, good being 70-79 points, pass being 60-69 points, and fail being 59 points or less. Excellent, good, and pass are considered passes, and fail is considered a fail. [Students entering after 2019] Grades will be evaluated on a fi ve-point scale of S, A, B, C, and D, with S being 90-100 points, A being 80-89 points, B being 70-79 points, C being 60-69 points, and D being 59 points or less. S, A, B, and C are considered passes, and D is considered a fail.
Textbook/ Reference Books	Each student will download, print, and bring along their own lecture notes as they progress through the above syllabus. ●Lecture notes: http://www.ship.nias.ac.jp/personnel/horiken/Lecture_Note/Lecture-Note_Ship-Hydro.htm ●Reference books: "Fluid Mechanics, Volume 2" by Sir H. Lamb (co-translated by Imai Isao and Hashimoto Hidenori), TokyoTosho Co., Ltd. "Water Waves" by JJ Stoker, Interscience Publishers, Inc., New York
Requirements	It is recommended that students take "Vector Analysis" in their undergraduate program and "Special Topics in Mathematical Sciences B" in the fi rst semester of their fi rst year in

	graduate school.
Notes on course enrollment	Please take this course with a desire to learn and experience the thrill of steady-state shipbuilding wave resistance theory andto acquire a sense of fl uid engineering.
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you may have (for at least two hours). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least two hours).
Office Hours	Questions etc. will be accepted at the laboratory at any time.

Course Name	Motion on Ships in Waves			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
to be decided		First year	Prodcution Technology	2 hours

Class Outline	Ships and marine structures are exposed to wind, waves, and currents, and once marine structures are moored at a designated location, they are not expected to be moved or evacuated. Therefore, when developing and designing marine structures, they are designed under more severe design conditions so that they can fully withstand these. First, the signifi cance, history,and current state of marine development will be explained. Next, the instructor will lecture on the development and design ofoff shore oil and gas development, megafl oats, and marine renewable energy utilization, which he has previously been involved in developing and designing at a company, including their types, performance, and mooring methods. [Class canceled in 2025]
Lesson Plan	1st The signifi cance of marine development, its history and current status Exclusive Economic Zone, Basic Act on the Oceans, Paris Agreement 2nd Aquapolis Semi-submersible fl oating structure and fl oating city using our own technology 3rd Off shore oil storage base Large fl oating structure design technology, oil spill prevention 4th Off shore oil storage base Mooring technology for large fl oating structures, demonstration observation 5th emisubmersible oil drilling rig Development History 6th Semisubmersible oil drilling rig Wave-free shape 7th fl oating wave bank Internal fl uid motion control, open sea type fl oating breakwater 8th Megafl oat Elastic response analysis 9th Megafl oat Off shore connection and demonstration observation 10th Multi-connected fl oating system Multidirectional free connection method 11th Multi-connected fl oating system Trailered articulated barge 12th Floating Bridge Swing-type fl oating bridge 13th Floating Bridge Elastic response analysis 14th Floating off shore wind power generation History of wind power generation and the current situation around the world 15th Floating off shore wind power generation Spar-type fl oating structure, hybrid structure
Class Format	The course will be conducted in a lecture format, with participants being asked to answer questions as appropriate. Studentswill also be given assignments and asked to submit reports.
Achieving Goals	Understand the history of the development of marine engineering, its economic and security implications, and the current state of technology.
Evaluation Method	Evaluation will be based on questions and answers during the lecture, presentation content, and reports.
Evaluation criteria	A score is assigned based on the degree of achievement of the goal. If it is possible to explain it to the general public, it is aC; if it is possible to understand what an expert is saying, it is a B; if it is possible to discuss it with an expert, it is an A.

Textbook/ Reference Books	Distribute your own text.
Requirements	None in particular.
Notes on course enrollment	None in particular.
Preparation and review	Textbooks for the next lecture will be distributed each time, so be sure to review them after each lecture. Also, read throughthe textbooks for the next lecture and organize any questions you might have. A simple oral examination will be conducted atthe beginning of the next lecture.
Office Hours	Instructions given during lectures

Course Name	Resistance and Propulsion of Ships			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Satoru Ishikawa		First year	Prodcution Technology	2 hours

Class Outline

Accurately estimating ship resistance and developing a hull form with minimal resistance are extremely important in ship design. Furthermore, without a propulsion device (typically a screw propeller) that generates thrust commensurate with the resistance, a ship cannot move forward at a constant speed. This special course aims to train engineers who will work in ship design in the future, and will explore the relationship between a ship's hydrodynamic performance and ship design. Specifi cally, students will learn about hull form design methods based on ship resistance and propulsive performance, propeller characteristics and design methods, ship maneuvering performance and steering device design methods, and the principles and design methods of energy-saving devices. Finally, they will deepen their understanding of analytical methods for actual ship performance.

[Particularly relevant majors, departments, and laboratories specifi ed in the curriculum map]

Marine Engineering Laboratory, Water Surface Wave Dynamics Laboratory, Marine Fluid and Motion Mechanics Laboratory

. Please also refer to the curriculum map.

Lesson Plan

1st Resistance components and ship shape
Separation of resistance components and their similarity law
[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour).
[Review] After the lecture, use your lecture notes to review the content discussed in the lecture and write them down in your research notebook. If there is anything you do not understand, reread your lecture notes, references,etc. and record any questions you may have (for at least one hour).

2nd Estimation method of ship resistance and use of CFD
Estimation methods for wave-making resistance and viscous resistance, and hull form optimization using CFD
[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture, and recordany points you do not understand or questions you have (for at least one hour).
[Review] After the lecture, use your lecture notes to review the content discussed in the lecture, and keep a record of any questions you have in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc., and record any questions you have (for at least one hour).

3rd Wave-making resistance, viscous resistance and hull form optimization
Hull form optimization based on an understanding of the relationship between resistance components and hull form
[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (at least one hour).
[Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (at least one hour).

4th Self-propulsion test and self-propulsion elements
General properties of self-propulsion elements
[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least one hour).
[Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least one hour).

	5th	Propulsive performance and stern shape design method A stern shape design method based on an understanding of the relationship between self-propulsion elements and hull form [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least one hour).
	6th	Hull form evaluation using theory and CFD Hull form design methods based on evaluation of stern fl ow fi elds through calculations [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least one hour).
	7th	Performance and propeller theory to consider in propeller design Propeller independent performance, cavitation, and propeller vibratory force [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or any questions you have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc., and record any questions you have (for at least one hour).
	8th	Basic theory of propeller design Propeller design fl ow [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least one hour).
	9th	Propeller design in wakes Propeller design method taking into account wake fl ow at the stern [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least one hour).
	10th	Estimation and evaluation of maneuverability Maneuverability performance to be considered when designing a hull form and how to evaluate it [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or any questions you have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least one hour).
	11th	Performance and evaluation in waves Wave performance that should be considered when designing a hull form and how to evaluate it [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of them in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you have (for at least one hour).
	12th	Energy-saving devices and propulsion effi ciency General ideas for improving propulsion effi ciency

	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you may have (for at least one hour). 13th Improved effi ciency through energy-saving devices Principles of improving effi ciency through energy-saving devices [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least one hour). 14th Analysis of propulsive performance during navigation Analysis of sea margin and propulsive performance during navigation [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread and review the lecture notes and references, and record any questions you may have (for at least one hour). 15th Actual sea performance analysis Constant speed control, constant rotational speed control, constant torque control, constant power control [Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and recordany points you do not understand or questions you may have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these in your research notebook. If there is anything you do not understand, reread your lecture notes, references, etc. and record any questions you may have (for at least one hour).
Class Format	Seminar format [Active learning] Yes Students will deepen their understanding of pre-assigned assignments through presentations and discussions in lectures. [Use of information devices] Use of computers in the lab. [Feedback to students regarding submission of results, etc.] Discussion will be held on the content of submitted research materials. [Class method] For a given theme, students will combine prepared materials with information they have collected themselves to compile thecurrent situation and future challenges, thereby gaining a deeper understanding of the state of cutting-edge technology in the fi eld. [Utilization of work experience] Yes The class content will refl ect the instructor's work experience at a shipyard (practical experience in ship design from the perspective of ship propulsion performance). [Form for when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "meet" based on Google Classroom.
Achieving Goals	By learning about the relationship between a ship's hydrodynamic performance and hull design, students will acquire the ability to apply improvements to ship resistance and propulsion performance in their design.
Evaluation Method	Students will be evaluated based on their participation in the seminar and the content of the report they write on the assigned topic.

Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Distributed materials Reference book Ogihara et al. Naval and Ocean Engineering Series ⑪ Ship Performance Design Seizando Bookstore
Requirements	[Prerequisite Courses] There are no specifi c prerequisites, but to understand the lectures, it is desirable that you have acquired basic knowledge of fl uid mechanics and ships. Please be sure to refer to the curriculum map.
Notes on course enrollment	Nothing in particular
Preparation and review	[Preparation] Before the lecture, read the handouts and references for the relevant part of the lecture and record any pointsyou do not understand or questions you have (for at least one hour). [Review] After the lecture, use your lecture notes to review the content discussed in the lecture and keep a record of these inyour research notebook. If there is anything you do not understand, reread and review the lecture notes and references, andrecord any questions you have (for at least one hour).
Office Hours	Friday, 4th period. We are available to answer any questions at any time. Please refer to the information posted on the notice board and in the AAA system.

Course Name	Landscape Design			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Li Huan		First year	Environmental Planning	2 hours

Class Outline	The special course in landscape design focuses on the city of Nagasaki, but also incorporates examples from cities and regions overseas, studying specifi c locations and subjects and using related materials and information to learn about the perspectives and methods of landscape design. Students also make specifi c discoveries through fi eldwork in the city and learn about the process of forming concepts related to landscape design. A diff erent location is selected for fi eldwork each year. Research isconducted on landscape resources, focusing on the region's topography, nature, historical buildings, etc.
Lesson Plan	1st Guidance and detailed lesson plans About the concept and importance of landscape. About the overall lesson plan. 2nd Basic theory of landscape planning Humans and landscapes, viewpoints, gazes, regional identity, landscaping, etc. 3rd Urban and regional landscapes Urban location and regional landscape formation 4th Landscape Theory Landscape Planning Perspectives and Theories 5th Nagasaki's Historical Landscape - Fieldwork ① Nagasaki City's Natural Location 6th Nagasaki Slopes - Fieldwork ② About the townscape on the slope 7th Nagasaki River Landscape - Fieldwork 3 Considering the landscape with a focus on rivers 8th Landscape Resources No. 1 Landscape and local tourism 9th Landscape Resource No. 2 Types of landscape resources 10th Planning and use of landscape resources About urban planning and landscape planning 11th Nagasaki cityscape - Fieldwork 4 Historical landscape of the city 12th Diff erent Cultures and Landscapes in Nagasaki - Fieldwork ⑤ Considering the landscape with a focus on the history of international exchange 13th Religious Architecture and Landscape - Fieldwork ⑥ Temples, shrines, churches, etc. 14th Organizing materials for landscape design Elements and perspectives related to landscape design 15th Forming a concept for landscape design Examination of concepts in landscape design. Lesson summary.
Class Format	Lectures and seminars [Active learning] Yes [Use of information devices] No [Feedback on assignment submissions] Supplementary explanations may be provided when returning assignments, etc. [If face-to-face classes cannot be held due to special circumstances] Notifi cation will be made via Google Classroom.
Achieving Goals	Deepen your understanding of the research subject and landscape planning
Evaluation Method	The evaluation will be based on a comprehensive assessment of class work, fi eldwork, reports, etc. The maximum score is 100 points.
Evaluation criteria	[Students entering before 2018]

	Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Printed materials will be presented or specifi c reference materials will be provided at the library.
Requirements	Environmental Planning, for fi rst-year students (second-year students can also take this course)
Notes on course enrollment	You may be asked to prepare materials in advance. In such cases, you will be given specifi c instructions.
Preparation and review	Each week, approximately 2 hours will be allocated for preparation and review.
Office Hours	Notifi cation will be given during class if necessary.

Course Name	Advanced Theory of Semiconductor			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Koji Kiyoyama		First year	Electronics and Information Science	2 hours

Class Outline	This course focuses on the characteristics of semiconductor devices used in integrated circuits (ICs). First, the device structures and basic characteristics of complementary metal-oxide-semiconductor (CMOS) transistors, which are currently mainstream, will be explained. Additionally, small-signal equivalent circuit models of transistors will be introduced. Furthermore, the amplifi cation mechanism and frequency responses of amplifi er circuits using transistors in various confi gurations will be discussed. A simulator will be used in class or for homework. The circuit simulator LTspice should be installed on the student's PC.
Lesson Plan	1st Band Structure and Density of State Submit the preparation and review assigned during the lecture by the specifi ed deadline. 2nd Fermi Level and Carrier Density Submit the preparation and review assigned during the lecture by the specifi ed deadline. 3rd Carrier Transport in Semiconductor Submit the preparation and review assigned during the lecture by the specifi ed deadline. 4th PN Junction Submit the preparation and review assigned during the lecture by the specifi ed deadline. 5th Current-Voltage Characteristics of PN junction Submit the preparation and review assigned during the lecture by the specifi ed deadline. 6th PN junction Exercise Submit the preparation and review assigned during the lecture by the specifi ed deadline. 7th Bipolar Transistor, Concept, and its Characteristic Submit the preparation and review assigned during the lecture by the specifi ed deadline. 8th MOS(Metal-Oxide-Semiconductor) Structure and its Characteristics Submit the preparation and review assigned during the lecture by the specifi ed deadline. 9th MOS Transistor, DC, Operation Submit the preparation and review assigned during the lecture by the specifi ed deadline. 10th MOS Transistor Exercise Submit the preparation and review assigned during the lecture by the specifi ed deadline. 11th DC transfer characteristic of CMOS NOT circuit Submit the preparation and review assigned during the lecture by the specifi ed deadline. 12th DC transfer characteristic of CMOS NOT circuit Submit the preparation and review assigned during the lecture by the specifi ed deadline. 13th Performance evaluation of CMOS NOT circuit and Power dissipation Submit the preparation and review assigned during the lecture by the specifi ed deadline. 14th Other Semiconductor Devices Submit the preparation and review assigned during the lecture by the specifi ed deadline. 15th Summary of lecture Submit the preparation and review assigned during the lecture by the specifi ed deadline.

Class Format	Lecture (Combination of face-to-face and online) [Active Learning]: Yes ・Includes practical exercises and discussions using simulators. [Use of Information Equipment]: None in particular ・Supplementary materials will be distributed in PDF format. [Feedback to students on submission of outcomes, etc.]: ・Supplementary explanations will be provided upon returning assignments. [Teaching Methods]: ・Enhancing understanding by incorporating simulations for knowledge acquisition. [Format in case face-to-face classes cannot be conducted due to special circumstances]: ・Google Classroom will be the primary platform, with the use of the conference system software "Zoom."
Achieving Goals	The ultimate objective of this lecture is to master basic semiconductor device knowledge.
Evaluation Method	Grading will be based on class attendance (40%) and submitted reports (60%).
Evaluation criteria	In the above method of evaluation, the ratings are as follows: (Ratings are represented by fi ve categories: S, A, B, C, and D.) ・"S" corresponds to a score range of 100-90 points. ・"A" corresponds to a score range of 89-80 points. ・"B" corresponds to a score range of 79-70 points. ・"C" corresponds to a score range of 69-60 points. ・"D" (59 points or below) is considered a failing grade.
Textbook/ Reference Books	The lecture materials are provided through Google Classroom. References (handouts) will be providedas needed.
Requirements	No specifi c requirements.
Notes on course enrollment	The students are recommended to have knowledge of electronic circuits.
Preparation and review	The preparation and review will be specifi ed at each lecture and should be done for every session.
Office Hours	As necessary.

Course Name	Fundamental Physics for Measurement			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Yoshito Tanaka		First year	Electronics and Information Science	2 hours

Class Outline	This course will provide an overview of the various fundamental physical processes involved in measurement technology, andstudents will be asked to design measurement equipment.
Lesson Plan	1st What is physical measurement? This lecture will provide an overview of physical measurement and clarify the objectives of the lecture. It will explain what a physical quantity is and consider how familiar objects such as thermometers measure physical quantities. 2nd Electrical signals and digital values Most measurements involve converting physical quantities into electrical signals and quantifying them as digital values. This course will explain the overview of this process and teach students about the behavior and handling ofelectrical signals. It will also teach students how to handle digital values as measurement values. 3rd What is a detector? A detector is required to convert a physical quantity into an electrical signal. We will learn about the types of detectors available and how they convert physical quantities. Each student will be asked to list the physical quantity they would like to measure and research what kind of detector they would need. 4th Measurement of movement and vibration Learn how motion and vibration measurements are made and what types of detectors exist. 5th Pressure measurement Learn how pressure is measured and what types of detectors exist. 6th Temperature measurement Learn how temperature is measured and what types of detectors exist. 7th Measurement of substances Learn how materials are measured and what types of detectors exist. 8th What is electrical signal conversion and processing? Students will learn how the electrical signal from the detector is converted and what processing is required to obtain a digital value. 9th amplifi cation Learn how to amplify electrical signals. 10th noise Learn what noise is. 11th Filter Learn about the types of fi lters and how to design them. 12th AD conversion Learn about the types of AD converters and how to use them. 13th Error Estimation Learn how to estimate error. 14th Traceability Learn about instrument traceability. 15th Physical measurement device design Summarize general matters related to designing measuring equipment and prepare for report writing.
Class Format	Lectures [Active learning] Yes. Research tasks will be assigned and students will be asked to make presentations as appropriate. [Use of information devices] None in particular , however reference materials may be distributed in PDF format. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] When returning assignments, additional explanations may be provided.

	[Educational methods] Theories will be explained systematically, and students will be encouraged to use them through discussions and assignments to increase their understanding. [Form of lectures when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Zoom" based on Google Classroom.
Achieving Goals	・Understand the components of measuring equipment. ・Understand the causes of measurement errors. ・Be able to design a simple measurement system.
Evaluation Method	The total score will be 100 points, with 10 points for submitting exercises and 90 points for reports. Details will be explained during the first lecture. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] The evaluation will be changed to 100% of the regular points from the exercises and assignments completed in lectures.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing, and Failare considered failing. [Students enrolled in 2019 or later] Grades are expressed in five categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70 to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing,and D is considered failing .
Textbook/ Reference Books	"Introduction to Measurement Engineering", Shigeo Minami, Ichiro Kimura, Tsutomu Araki, Kodansha Scientific
Requirements	[Prerequisite Courses] None in particular [Other] Please complete the contents of the preparation and review items below.
Notes on course enrollment	Nothing in particular.
Preparation and review	Assigning tasks
Office Hours	Instructions will be given in class.

Course Name	Special Lecture of Human Interface			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Tanaka		First year	Electronics and Information Science	2 hours

Class Outline	The purpose of this lecture is to broaden the scope of research activities and knowledge as an engineer by providing a comprehensive understanding of hardware and software, focusing on image input/output devices as man-machine interfaces, and by acquiring basic technologies for an advanced information society.
Lesson Plan	1st The concept of man-machine interface 2nd History of Image Engineering 3rd Image Input Device (1) Camera 4th Image Input Devices (2) Scanners, Fingerprint Sensors, Photomultiplier Tubes 5th Image Input Device (3) Electronic Circuit Structure 6th Television Digital Broadcasting System 7th Display Device (1) LCD 8th Display Devices (2) EL, PDP, CRT 9th printer 10th Optics required for image engineering 11th Image processing (color and brightness processing) 12th Image processing (geometric transformation processing) 13th Pattern Recognition 14th 3D images, computer graphics, virtual reality 15th Future outlook
Class Format	[Active learning] Presentations, discussions [Use of information devices] Used for presentations [Feedback to students regarding submission of work, etc.] Provided as needed
Achieving Goals	Understand how imaging equipment and image processing work, and be able to make various proposals for research and development.
Evaluation Method	Evaluation will take into account both the lecture content and the results of the exercises (presentations). Emphasis will be placed on presentations based on the lecture content. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the student's attitude towards the lectures during class, and the results of quizzes and reports given as appropriate, with 100% of the points allocated to the regular grades.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing.

	[Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	The following textbooks will be used in class: Tanaka Kenichi: "Image Media Engineering for Beginners", Kindai Kagakusha, (2025). Other literature will be introduced or materials distributed during class as appropriate and necessary.
Requirements	There are no particular restrictions.
Notes on course enrollment	The lectures cover a wide range of topics, including hardware and software, and as this is essential knowledge in any fi eld inour highly information-oriented society, preparation and review are particularly important.
Preparation and review	From the second class onwards, it will be assumed that you have understood the content from the previous class. Please donot leave any areas that you do not fully understand, but review them thoroughly. As appropriate, reference materials for preparation will be provided in class. Please read through the material before the nextclass and understand the content you will be learning.
Office Hours	First semester: Tuesday 3rd period, second semester: Wednesday 5th period

Course Name	Image Processing System			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Kenichi Tanaka		First year	Electronics and Information Science	2 hours

Class Outline	The purpose of this lecture is to broaden the range of practical knowledge for mathematical analysis from the perspective of system engineering and signal processing, which are the foundations of hardware and software, focusing on image input/output devices.
Lesson Plan	1st Overview of Signal Processing (Multimedia Signal Processing) 2nd Mathematical preparation (Laplace transform) 3rd Mathematical Preparation (Fourier Transform) 4th Signal Processing System 5th Transfer function of the system 6th Signal Frequency Analysis 7th Sampling Theorem 8th Fast Fourier Transform 9th Window Function 10th Electronic circuit analysis required for signal processing 11th Analog Filter 12th Digital Filter 13th Application to image engineering (geometric transformation, tone conversion) 14th Application to image engineering (fi ltering) 15th Application to image engineering (Fourier transform)
Class Format	Lectures (colloquium format) [Active learning] Presentations, discussions [Use of information devices] Used for presentations [Feedback to students regarding submission of deliverables, etc.] To be implemented as necessary
Achieving Goals	Understand the basics of digital signal processing, which is necessary for mathematical analysis of signals and analysis and identifi cation of systems.
Evaluation Method	Evaluation will take into account both the lecture content and the results of the exercises (presentations). Emphasis will be placed on presentations based on the lecture content. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on the student's attitude towards the lectures during class, and the results of quizzes and reports given as appropriate, with 100% of the points allocated to the regular grades.
Evaluation criteria	Scores are calculated out of 100, with a score of 60 or above considered a pass. Grades will be given as follows: 90 or above will be an "S", 80 or above will be an "A", 70 or above but less than 80 will be a"B", 60 or above but less than 70 will be a "C", and less than 60

	will be a "D". However, if a student is absent for more than one-third of the classes without notifying a valid reason, they will be deemed tohave failed regardless of their score.
Textbook/ Reference Books	The following textbooks will be used in the class: Kenichi Tanaka: "Digital Signal Processing for Beginners" (Kindai Kagakusha) , and other literature will be introduced or materials distributed during class as appropriate and necessary.
Requirements	Although there are no particular restrictions, we recommend that you review mathematics such as calculus, linear algebra, Laplace transforms, and Fourier transforms before attending classes.
Notes on course enrollment	This is essential knowledge in any fi eld, at least within the fi elds of electrical and electronic engineering and information science, so preparation and review are especially important.
Preparation and review	From the second class onwards, it will be assumed that you have understood the content from the previous class. Please donot leave any areas that you do not fully understand, but review them thoroughly. Items that you should prepare in advance will be indicated during class as appropriate. Please read through the material before the next class and understand the content you will be learning.
Office Hours	First semester: Tuesday 3rd period, second semester: Wednesday 3rd period

Course Name	Seminar on Human Information Science			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Choi Ji-young		First year	Electronics and Information Science	2 hours

Class Outline	Learn about design methods to identify various problems in our daily lives and classify, analyze, and organize phenomena. Understand the power of human-centered design and design that is benefi cial to society.
Lesson Plan	1st guidance 2nd Human-centered information design 3rd Information Visualization 4th Humans and Design 5th Information and Design 6th Society and Design 7th Organization and Design 8th Design Process 9th Design Ideas 10th Scenario Method 11th Research Methodology 12th Analysis and organization 13th Transmission of information 14th Design Evaluation 15th Presentation
Class Format	Lectures [Active learning] None [Use of information devices] Yes Details will be explained in class. [Feedback to students regarding submission of work, etc.] Assignments will be explained in the next class. [Form of implementation in the event that face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Understand design concepts and acquire problem-solving, ideation, and design proposal skills.
Evaluation Method	Comprehensive evaluation based on lectures, assignments, reports, and exam participation. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular points such as attendance at lectures and reports, with 100% of the total points allocated.
Evaluation criteria	Students will be evaluated on a total of 100 points, with 20 points for lecture attitude, questions, and opinions, 30 points forassignments and reports, 20 points for presentations, and

	30 points for exams. [Students enrolled before 2018] Grades will be expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades will be expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Reference literature will be introduced or materials will be distributed during class.
Requirements	Nothing in particular
Notes on course enrollment	Nothing in particular
Preparation and review	Reorganize your handouts and handwritten notes.
Office Hours	Wednesday 2nd period

Course Name	Environmental Planning & Design			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Yukari Yamada		First year	Environmental Planning	2 hours

Class Outline	This course focuses on the characteristics of various materials essential for understanding architecture and the surrounding historical environment, while providing an understanding of architecture and cities, and fostering a foundation in environmentaldesign. Materials covered include a wide range of materials, including architecture itself, architectural drawings, old maps, archaeological materials, pictorial materials, and folk materials. While learning these materials comprehensively and based on actual research, students will consider environmental design, a method of passing on history and culture, such as the preservation and restoration of historical buildings, the formation of townscapes, and urban development. Field trips deepen understanding of all materials, so in the second half of the lectures, students will actually go out and practice the trip.
Lesson Plan	1st Guidance - Architecture and Materials (No preparation is required. Organize your notes and summarize anything you don't understand.) 2nd Architecture and architectural drawings (No preparation is required. Organize your notes and summarize anything you don't understand.) 3rd Archaeological materials, architecture, and cities (No preparation is required. Organize your notes and summarize anything you don't understand.) 4th Pictorial materials and architecture/cities (No preparation is required. Organize your notes and summarize anything you don't understand.) 5th Historical documents and architecture/cities (No preparation is required. Organize your notes and summarize anything you don't understand.) 6th Folklore materials, architecture, and cities (No preparation is required. Organize your notes and summarize anything you don't understand.) 7th Old maps and architecture/cities (No preparation is required. Organize your notes and summarize anything you don't understand.) 8th On-site visit to historical buildings - Japanese architecture (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 9th Historical Buildings - Western Architecture (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 10th Historical Buildings - Chinese Architecture (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 11th Field trip to traditional Japanese townscape (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 12th Field trip to the townscape – the townscape of the foreign settlement (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 13th Field trip to the townscape - Tojin-yashiki townscape (Research the building you will be visiting in advance. Organize the key points of the building you visited in a notebook and summarize anything you don't understand.) 14th Summary for the presentation (Research the content of your presentation in advance. Organize the key points of the buildings you visited in a notebook and summarize anything you don't understand.)

	15th Presentation (Create presentation slides)
Class Format	Lectures [Active Learning] Yes. Students will present (report) materials and literature research in accordance with the seminar progress plan, and also answer questions. [Use of Information Technology] None in particular. [Feedback to students regarding submission of work, etc.] Students will be instructed on research perspectives and how to deepen their knowledge when reporting materials and literature content. [Educational Method] Students will not only be given explanations of technical terms, but will also learn through concrete examples in a systematicway so that they can build up their own knowledge. [Form of Classes When Face-to-Face Lessons Cannot Be Held Due to Special Circumstances] We plan to use the conferencing system software "Zoom" based on Google Classroom.
Achieving Goals	・Acquire the ability to read materials necessary to understand architecture and the environment. ・Actualize visits to buildings and townscapes and develop information obtained from materials.
Evaluation Method	- Amount and content of speech during lectures - Submission of a mini-report - Final report to be completed separately from the 15 lectures Based on the above, 30% of the regular marks will be based on the report results during lectures, and 70% will be based onthe fi nal report.
Evaluation criteria	Grades are expressed in fi ve types: S, A, B, C, and D, where S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points,C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing. Please refer to the rubric for details.
Textbook/ Reference Books	Printouts will be distributed as needed.
Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram.
Notes on course enrollment	Attendance of more than 70% is assumed.
Preparation and review	At the end of each lecture, the content of the next lecture will be announced, so please prepare by looking through related books and websites (about 2 hours). Preparation may sometimes involve fi eld research. After the lecture, please review the content of that lecture and summarize it on your own (about 2 hours).
Office Hours	Instructions will be given during the lecture.

Course Name	Sensing System			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Masanori Sato		First year	Electronics and Information Science	2 hours

Class Outline	In this course, we will learn the basic concepts and representative algorithms of probabilistic robotics. Using mobile robots asa subject, we will use probability as a tool while actually programming introductory algorithms such as self-localization, mapgeneration, dynamic programming, and reinforcement learning.
Lesson Plan	1st Guidance and preparation 2nd Fundamentals of probability and statistics (frequency distribution and probability distribution) 3rd Fundamentals of Probability and Statistics (Bayes' Theorem) 4th Fundamentals of Probability and Statistics (Multidimensional Gaussian Distribution) 5th Modeling autonomous robots (robot movement) 6th Modeling an autonomous robot (robot observation) 7th Uncertainty model (uncertainty in robot movement) 8th Uncertainty model (uncertainty in robot observations) 9th Self-localization using particle fi lters 10th Self-localization using Kalman fi lter 11th SLAM with particle filters 12th SLAM using Kalman filter 13th Markov decision processes 14th Reinforcement learning 15th summary
Class Format	Lectures [Active learning] Yes [Use of information devices] Programming reference materials may be distributed in PDF format. Details will be explained in class. [Feedback to students regarding submission of work, etc.] When returning assignments, additional explanations may be provided. [Teaching method] After explaining the key points, a discussion will be held to check understanding. [Form when face-to-face classes cannot be held due to special circumstances] We plan to use the conference system software "meet" and "zoom" based on Google Classroom.
Achieving Goals	Students will gain an understanding of the fundamentals of probability and statistics and be able to program. Using a mobile robot as an example, students will learn about uncertainty modeling, particle fi lters, self-localization using Kalman fi lters, SLAM, and more.
Evaluation Method	The evaluation will be based on 60% of the regular points based on the student's attitude towards class, quizzes and reportsgiven as appropriate along the way, and 40% of the regular points based on the fi nal report. Details will be explained in the fi rst class.

	[Evaluation method when in-person regular exams cannot be held due to special circumstances] The evaluation will be based on 100% of the regular points based on the student's attitude towards class, quizzes and reports given as appropriate along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Reference book "Detailed Explanation of Probabilistic Robotics" by Ryuichi Ueda (Kodansha)
Requirements	[Prerequisite Courses] None in particular. [Other] Please review the contents of the prerequisite courses before the start of classes. Please carry out the preparation and review items below. Attendance of more than 2/3 of the lecture hours is required.
Notes on course enrollment	Nothing in particular.
Preparation and review	At the end of each lecture, a brief explanation of the content of the next lecture will be given, so please prepare in advance. Spend the same amount of time as the class to reorganize the handouts and your own notes. Also, rework the assignments given during the lecture.
Office Hours	Instructions will be given in class. Please also refer to information posted on notices and in the AA system.

Course Name	Theory of Strength of Thin-Walled Structures I			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Hiroshi Furuno		First year	Production Technology	2 hours

Class Outline	In this course, you will learn the basic theory of strength analysis methods for thin plate structures, which are used in a variety of structures. Here, we will explain the basics of elastic mechanics, plate bending theory, and large defl ection theory. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] Furuno Laboratory, Kuroda Laboratory, Matsuoka Laboratory, Fujita Laboratory, Okada Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Explanation of course requirements, introductory training [Preparation] Read the syllabus and rubric before the fi rst lecture (10 minutes). [Review] Review the key points of the lecture using the notes you took during the lecture to deepen your understanding (1 hour). 2nd Fundamentals of Elastic Mechanics (Stress Balance Equation) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 3rd Fundamentals of Elastic Mechanics (Compatibility Conditions for Strain Components) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 4th Fundamentals of Elastic Mechanics (Stress-Strain Relationship in Elastic Materials) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 5th Fundamentals of Elastic Mechanics (Summary of Basic Equations) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 6th Plate bending theory (pure bending of a plate) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 7th Plate bending theory (diff erential equation for plate defl ection) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 8th Plate bending theory (each peripheral condition) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 9th Theory of Plate Bending (Strain Energy Due to Plate Bending) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 10th Bending Theory of Plates (Bending of Rectangular Plates Simply Supported All Around – Navier's Solution) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to

	deepen your understanding(1 hour). 11th Theory of Plate Bending (Bending of a Rectangular Plate Simply Supported All Around – Uniformly Distributed Load) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 12th Plate Bending Theory (Bending of a Rectangular Plate Simply Supported All Around – Under HydrostaticPressure) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 13th Theory of large defl ection of fl at plates (distortion in the central plane) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 14th Large Defl ection Theory of Plates (Diff erential Equation of Large Defl ection) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 15th Theory of large defl ections of plates (combination of bending and in-plane stresses in plates for general cases) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour).
Class Format	Seminar format [active learning] available. From the second lecture onwards, students will stand at the podium and explain the content theyhave prepared and mechanical considerations. [Use of information devices] None. [Feedback to students regarding submission of work, etc.] For reports submitted in the seminar, supplementary explanations will be provided for any areas where mistakes or lack of understanding are suspected, and students may be asked to resubmit the report if necessary.
Achieving Goals	Understand the basic theory of strength analysis methods for thin plate structures.
Evaluation Method	Evaluation will be based on the content of seminar presentations and reports, as well as a fi nal exam held separately from the 15 classes.
Evaluation criteria	[Students entering in 2019 or later] Grades will be expressed in fi ve levels: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Handouts distributed. [Reference books] ・Thin Plate Structural Mechanics; Sekiya Takeshi et al. (Kyoritsu Publishing) ・Thin-Walled Beam Structural Analysis; Fujitani Yoshinobu (Baifukan) ・Vibration Analysis by Matrix Method; EC Pestel et al., translated by Kagawa Yukio
Requirements	[Prerequisite Courses] None in particular. Understanding of mechanics of materials.
Notes on course enrollment	Do not be late or absent. If you are absent more than three times, it will be diffi cult to obtain credits, and if you are absent more than fi ve times, youwill not receive credits.

Preparation and review	[Preparation] Prepare for each lesson by using handouts and reference books, and present the content in class. [Review] Review the content and exercises taught in each lesson to deepen your understanding.
Office Hours	Please visit the lab. We will assist you if we have free time. Please also refer to the notices and information in the AAA system.

Course Name	Theory of Strength of Thin-Walled Structures Ⅱ			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Hiroshi Furuno		First year	Production Technology	2 hours

Class Outline	This course will fi rst teach strength analysis methods using shear bending torsion theory for thin plate structures used in a variety of structures. It will also teach eigenvalue analysis methods for strength, buckling, and vibration using the energy method, which is often used in actual structural design. Finally, it will introduce optimal design methods for thin plate structures using these analysis methods, with actual examples. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] Furuno Laboratory, Honda Laboratory, Matsuoka Laboratory, Fujita Laboratory, Okada Laboratory . Please also refer to the curriculum map.
Lesson Plan	1st Shear-bending-torsion theory (bending of a beam in two directions) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 2nd Shear bending torsion theory (Saint Venant Torsion theory) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 3rd Shear bending-torsion theory (bending-torsion theory for thin plate cross-section beams) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 4th Shear-bending-torsion theory (bending and torsion of thin-section beams) [Preparation] Read the text, develop mathematical formulas, and consider their mechanical meaning (4 hours). [Review] Review the key points of the lecture using notes taken during the lecture to deepen your understanding(1 hour). 5th Energy method for yield strength analysis of beam-columns [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 6th Eigenvalue analysis of beam-column buckling using the energy method [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 7th Energy method for natural frequency analysis of beam-column structures [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 8th How to provide additional conditions using Lagrange's undetermined multiplier method in the energy method. [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 9th Eigenvalue analysis method for buckling of thin stiff ened panels [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 10th Effect of stiff eners on the buckling strength of thin stiff ened panels [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour).

	11th Natural frequency analysis method for thin stiff ened panels in contact with water [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 12th Effect of stiff eners on the natural frequencies of thin stiff ened panels in contact with water [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 13th Beam shape optimization problem [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 14th Nonlinear optimization problems with inequality constraints and genetic algorithms [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour). 15th Optimal design example of thin plate structure (hull structure) [Preparation] No particular preparation is necessary. [Review] Using the notes you took during the lecture, review the main points of the lecture and strive to deepen your understanding (more than one hour).
Class Format	Seminar format [active learning] available. Up until the fourth lecture, students will stand at the podium and explain the content they have prepared and mechanical considerations. [Use of information devices] None. [Feedback to students regarding submission of work, etc.] For reports submitted in the seminar, additional explanations will be provided for any areas where mistakes or lack of understanding are suspected, and students may be asked to resubmit the report if necessary.
Achieving Goals	Understand the eigenvalue analysis method for strength, buckling and vibration of thin plate structures and the method of optimal design.
Evaluation Method	Evaluation will be based on the content of seminar presentations and reports, as well as a fi nal exam held separately from the 15 classes.
Evaluation criteria	[Students entering in 2019 or later] Grades will be expressed in fi ve levels: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is failing.
Textbook/ Reference Books	[Textbook] Handouts will be distributed.
Requirements	[Prerequisite course] It is recommended that you take Special Lecture on Thin Plate Structure I.
Notes on course enrollment	Do not be late or absent. If you are absent more than three times, it will be diffi cult to obtain credits, and if you are absent more than fi ve times, youwill not receive credits.
Preparation and review	[Preparation] Prepare for each lesson by using handouts and reference books, and present the content in class. [Review] Review the content and exercises taught in each lesson to deepen your understanding.
Office Hours	Please visit the lab. We will assist you if we have free time. Please also refer to the notices and information in the AAA system.

Course Name	Information Society			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Shinichi Kamohara		First year	Environmental Planning	2 hours

Class Outline	In order to build a sustainable society for the future, discussions will need to be held with the participation of a wide rangeof actors, including individual citizens, and a balance will need to be considered between the environmental, economic, and social aspects. This course will consider methods for presenting materials and information in forums (workshops, etc.) where awide range of actors participate, as well as methods for using information technology to acquire indicators of sustainability insociety and people's awareness.
Lesson Plan	1st Discussion and evaluation using information technology 2nd Information sharing in discussions 3rd Use of Visualized Information in Discussions 4th Information classifi cation by clustering 5th Fundamentals of Information Classifi cation with SOM 6th Information classifi cation (information selection) using SOM 7th Information classifi cation using SOM (survey) 8th Information classifi cation (analysis) using SOM 9th Information classifi cation using SOM (discussion) 10th Basics of future projection tools (global warming countermeasure tools) 11th Use of future projection tools (data collection for surveyed prefectures) 12th Use of future projection tools (use of economic indicators) 13th Use of future projection tools (considering global warming countermeasures) 14th Use of future projection tools (development of roadmaps) 15th Use of future projection tools (summary)
Class Format	Lectures [Active Learning] Students will facilitate each other. [Use of Information Devices] Students will access Google Classroom using their smartphones or laptops to provide materials and write refl ections at the end of class. Please bring an accessible information device. [Feedback to students regarding submission of work , etc.] Students will receive feedback individually or as a group depending on the content. Lectures and Seminars [Forms for when face-to-face classes cannot be held due to special circumstances] Google Classroom and the conference systems "meet" and "zoom" will be used.
Achieving Goals	Students will gain experience and techniques on what social information is available and how it can be utilized.
Evaluation Method	Students will be evaluated based on two reports submitted during the lecture period. Students will be evaluated based on their ability to analyze and visualize social information, and a score of 60 or above will be considered a pass.

Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Materials will be distributed.
Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram.
Notes on course enrollment	Nothing in particular.
Preparation and review	An outline of the next class will be provided at the end of each class, so please prepare in advance by using handouts and searching for information, and gather the necessary information before attending class. You will need to allow yourself about 20 hours of self-study time to complete the assignments.
Office Hours	I'll accept it whenever I have time.

Course Name	Structure and Function of Human Body			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Masakatsu Motomura		First year	Electronics and Information Science	2 hours

Class Outline	In recent years, research fi elds that combine medicine and engineering have been attracting attention, coupled with the trend toward improving quality of life (QOL). This lecture aims to uncover the seeds of engineering by providing comprehensive knowledge of life phenomena in order to understand the needs of medical care.
Lesson Plan	1st Structure of each tissue in the human body (structure) Structure of each tissue in the human body (tissue) 2nd Anatomy and physiological functions of organ systems (overview) 3rd Anatomy and physiological functions of organ systems (skeleton and muscles) 4th Anatomy and physiological functions of organ systems (respiratory system) 5th Anatomy and physiological functions of organ systems (including the circulatory system and body fl uids) 6th Anatomy and physiological functions of organ systems (including the digestive system, metabolism, andnutrition) 7th Anatomy and physiological functions of organ systems (urinary system) 8th Anatomy and physiological functions of organ systems (endocrine system) 9th Anatomy and physiological functions of organ systems (reproductive organs) 10th Anatomy and physiological functions of organ systems (peripheral nerves) 11th Anatomy and physiological functions of organ systems (central nervous system) 12th Anatomy and physiological functions of organ systems (sensory organs) 13th Anatomy and physiological functions of organ systems (body temperature and defense mechanisms) 14th Anatomy and physiological functions of organ systems (internal organs) 15th Anatomy and physiological functions of organ systems (other)
Class Format	Lectures [Active learning] Yes, seminar format, with students discussing as appropriate. [Use of information devices] None in particular (however, supplementary materials will be distributed). [Feedback to students regarding submission of work, etc.] Supplementary explanations will be provided when returning assignments. [Educational method] Lectures will be given on each topic, followed by discussions . [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, with the conference system software ”Zoom” or ”Meet” being used.
Achieving Goals	The objective is to understand medical needs, acquire comprehensive knowledge of life phenomena, and unearth the seeds of engineering.
Evaluation Method	Evaluation will be based on attendance and reports. [Evaluation method when face-to-face regular exams cannot be held due to special

	circumstances] Evaluation will be based on attendance during class and regular reports submitted as appropriate, with 100% of the points allocated to the class.
Evaluation criteria	Students will be evaluated based on attendance (50 points) and report (50 points), for a total of 100 points. [Students enrolled before 2018] A score of 60 or above is considered a pass. Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or below. Excellent, Good, and Pass are considered a pass, and Fail is considered a fail. [Students enrolled in 2019 or later] A score of 60 or above is considered a pass. Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points,A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or below. S, A, B, and C are considered a pass, and D is considered a fail.
Textbook/ Reference Books	Nothing in particular.
Requirements	Nothing in particular.
Notes on course enrollment	Nothing in particular.
Preparation and review	Preparation: Research the content of each lesson in your textbook, etc., and prepare for class. (Approximately 1 hour) Review: Organize your textbook and class notes, and review the practice problems you learned in class to deepen your understanding. (Approximately 1 hour)
Office Hours	Thursday 5th period

Course Name	Medical informatics			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Makoto Shimojima		First year	Electronics and Information Science	2 hours

Class Outline	This course provides an overview of medical information measurement methods, specifi cally analyzes and understands biosignals and bioinformation using computers, and touches on communication protocols between medical imaging devices.
Lesson Plan	1st Measurement Technology in Medical Electronics – Measurement Technology for Biosignals 2nd Measurement Technology in Medical Electronics – Measurement Technology for Medical Images 3rd Representation of biological information in computers 4th Signal Processing Basics – Reading Data 5th Signal Processing Basics – Maximum/Minimum, Average 6th Feature Extraction – Variance and Standard Deviation 7th Feature Extraction – Period Measurement 8th Filters and Frequency Analysis – Moving Average 9th Filters and Frequency Analysis – Diff erential Filters 10th Filters and Frequency Analysis – Digital Filter Concepts 11th Approximation and Prediction – Linear Approximation 12th Approximation and Prediction – Interpolation 13th Approximation and Prediction – Probabilistic Search 14th Image handling 15th summary
Class Format	Lectures. [Active learning] Yes. Includes presentations and computer-based exercises. [Use of information technology] Yes. [Feedback to students regarding submission of work, etc.] Google Classroom will be used. [Educational method] Lectures will be conducted in the form of exercises and discussions based on the theme. [Form in case face-to-face classes cannot be held due to special circumstances] Google Classroom will be used as the base, with the conferencing system software ”Zoom/Meet” being used.
Achieving Goals	Acquire the knowledge necessary to apply IT technology to medical purposes.
Evaluation Method	Comprehensive evaluation will be based on lecture reports, discussions, and reports. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given during class, with 100% of the points allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being

	80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Will be introduced during the lecture.
Requirements	Nothing in particular.
Notes on course enrollment	There will be some computer-based exercises. Please bring your own laptop. Necessary software will be introduced during the lecture.
Preparation and review	Take suffi cient time to prepare for the discussion and summarize the discussion.
Office Hours	Lunch break and fi fth period on lecture days.

Course Name	Special exercise in human information processing Ⅰ			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Supervising faculty (Liu Zhen, Makoto Shimojima, Kenichi Tanaka, Masanori Sato, Masaharu Tanaka)		First half of the first year to the second half of the first year	Integrated Systems Engineering	2 hours

Class Outline	1.Research the technologies and methods related to human interfaces required for the design and development of robots. Or, 2.Research the technologies and methods related to information security. [Educational objectives (year of enrollment) corresponding to the degree awarding policy and curriculum implementation policy] For other years, students enrolled in 2009 or earlier should refer to the content posted in 2019, and students enrolled in 2020 or later should refer to the course guide for their year of enrollment. Also, refer to the system diagram.
Lesson Plan	Consult and decide on the relevant techniques and methods to learn for the content of your doctoral thesis.
Class Format	Experiments [Active learning] Each student will practice the assignment. [Use of information devices] None in particular. [Feedback to students regarding submission of work, etc.] As needed. [Educational method] After providing information or lecturing on each topic, a discussion will be held. [Form when face-to-face classes cannot be held due to special circumstances] Based on Google Classroom, we plan to use the conference system software "meet" and "zoom".
Achieving Goals	1.Acquire basic knowledge for doctoral dissertation research, research human interface design methods for robots, and propose new methods, or 2.Acquire basic knowledge and techniques in information security and research related

	theories and methods.
Evaluation Method	Evaluation will be based on 30% of the regular points based on the student's attitude during class, the results of quizzes andreports given as appropriate along the way, and 70% of the fi nal exam. Details will be explained in the fi rst class. [Evaluation method when in-person regular exams cannot be held due to special circumstances] Evaluation will be based on 100% of the regular points based on the student's attitude during class, the results of quizzes and reports given as appropriate along the way.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	Related papers and materials.
Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram. [Other] Review the contents of prerequisite courses before the start of class. Carry out the contents of the preparation and review items below.
Notes on course enrollment	None in particular
Preparation and review	Preparation: Prepare papers and materials that will be used in each seminar. Review: Think carefully about how to solve the problems and issues discussed in the seminar.
Office Hours	Please refer to the bulletin board and the AA system for information.

Course Name	Advanced Engineering of Energy Conversion			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		First year	Electronics and Information Science	2 hours

Class Outline	This course considers types of energy, thermodynamic theory, and the conversion of mechanical energy to electrical energy, as well as thermal and nuclear power generation and renewable energy. Next, students will consider power electronics in terms of AC/DC conversion, DC/DC conversion, and inverters, and will learn about the applications of DC machines, transformers,induction machines, and synchronous machines.
Lesson Plan	1st Thermal Cycles and Entropy 2nd Internal combustion engines, gas turbines 3rd Thermal power generation (steam generators, steam turbines) 4th Nuclear and geothermal power generation 5th Heat pumps, fuel cells 6th Photovoltaic power generation, solar thermal power generation 7th Wind power generation, hydroelectric power generation 8th Biomass power generation, geothermal power generation 9th Ocean energy power generation, cogeneration systems 10th Electricity Load Leveling and Smart Grid 11th AC/DC conversion, DC/DC conversion 12th Inverter, PWM control 13th dc machine 14th Transformers, induction motors 15th synchronous motor
Class Format	Lectures and discussions [Active learning] Yes. Students may be assigned assignments to review the content of the class through literature research. [Use of information devices] Yes. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] Assignments will be explained in the next class. [Educational method] Students will research methods and technologies related to energy conversion themselves, and their understanding will be enhanced by discussing the results of their research during lectures. [Form of implementation when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	1.Learn about the conversion of mechanical energy to electrical energy. 2.Learn about AC/DC conversion, DC/DC conversion, and DC/AC conversion using power

	electronics circuits. 3.Learn about the application of power electronics to speed control of electric motors.
Evaluation Method	Q&A during lectures, reports, and regular exams. [Evaluation method in the event that regular exams cannot be held in person due to special circumstances] The evaluation will be based on the regular points given based on the results of assignments and reports given during class, with100% of the points allocated to the class.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail. Excellent is 80 to 100 points, Good is 70 to 79 points, Pass is 60 to 69 points, and Fail is 59 points or less. Excellent, Good, and Pass are considered passing, and Fail is considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D. S is 90 to 100 points, A is 80 to 89 points, B is 70 to 79 points, C is 60 to 69 points, and D is 59 points or less. S, A, B, and C are considered passing, and D is considered failing. *Please refer to the rubric for details.
Textbook/ Reference Books	Distribute materials as needed.
Requirements	Students with knowledge of energy conversion engineering, power electronics, and electrical equipment are preferred.
Notes on course enrollment	Nothing in particular.
Preparation and review	The lecture theme is global energy trends, so you should deepen your interest in them by reading newspapers, the internet,etc. in advance, and do your homework to obtain information. At the same time, you should spend the same amount of timeas the class time reviewing and reorganizing your notes, including the notes on the board and oral explanations given in class, and solving the examples introduced in class, as well as working on the assignments given in class. You should also try to resolve any questions that arise during this work by asking your teacher in subsequent classes. If you are absent for any reason, ask to see the teacher’s notes from that class and complete your own notes.
Office Hours	We are accepting questions at any time.

Course Name	Mathematical System Theory I			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	First year	2	Choice	
Faculty		Year of Lecture	Major	Class Hours
Haruo Hinata		First year	Electronics and Information Science	2 hours

Class Outline	The most important skills in research are logical thinking and argumentation. This class aims to confi rm and improve these skills. To confi rm and improve these skills, it is essential to confi rm and practice the logical development of explanations (illuminations) for simple propositions. Linear algebra is an ideal subject for this. In this class, we will conduct round-table demonstrations of linear algebraic theorems and practice argumentation of several problems, which students have already learned in their undergraduate studies, and lecture on key points. Through this process, we aim to grasp the current state of students' argumentation skills and improve them. We will also introduce how the basic concepts of linear algebra are an important part of"mathematical science" and "systems theory," which are widely applied in the fi elds of engineering. [Particularly relevant departments, groups, and laboratories specifi ed in the curriculum map] The Department of Electronics and Information Engineering's Department of Instrumentation and Control Engineering (Robotics Engineering Laboratory, Smart Power Laboratory) and Department of Information Systems Engineering (Image Engineering Laboratory), and the Department of Environmental Planning's Department of Social Informatics (Information Systems Laboratory). Please also refer to the curriculum map.
Lesson Plan	1st Linear Space Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 2nd Vectors, independence, and spatial dimensions Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 3rd Linear mapping and its characteristics Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 4th Matrix representation and fundamental matrices Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 5th Matrix characteristics Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 6th Inverse mapping Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 7th inverse matrix Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 8th Solution structure of simultaneous equations Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 9th Inner product spaces Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 10th Orthogonal bases and orthogonal transformations Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson)

	11th Eigenvalues and Eigenvectors Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 12th Matrix diagonalization and matrix powers Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 13th Jordan normal form Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 14th Spectrum Review the content of the lesson (for the same amount of time as the lesson) and prepare for the next lesson (forthe same amount of time as the lesson) 15th summary Review the content of the class (for the same amount of time as the class) and refl ect on the content of the previous classes (for the same amount of time as the class)
Class Format	Lectures [Active Learning] Yes. To ensure that students' argumentation skills are fi rmly established and further improved, students will be assigned practice problems and will explain the answers in front of the class. [Use of Information Devices] None in particular . However, Google Classroom will be used to provide information related to the class content, distribute materials, and submitassignments, so each student will need to prepare an environment where they can use Google Classroom. Details will be explained in class. [Feedback to students regarding the submission of work, etc.] As a general rule, any comments or supplementary explanations regarding the answers to practice problems and their explanations will be given on the spot. [Teaching Method] After explaining the fl ow of argumentation and key points of logical explanations, students will be asked to practice proving various theorems and problems in front of the class. [Form of Instruction when Face-to-Face Lessons Cannot Be Held Due to Special Circumstances] We plan to use Google Classroom and the conferencing systems "meet" and "zoom."
Achieving Goals	The following items are the achievement goals: ・Understand the basics of linear algebra. ・Be able to clearly organize the assumptions (premises), conditions, and conclusions in a proposition. ・Be able to provide logical explanations (proofs). ・Be able to devise explanations that are easy for others to understand.
Evaluation Method	100% attendance is required, and absences or tardiness will result in a signifi cant drop in grade (the maximum grade variesdepending on attendance rate). Students who attend a suffi cient number of classes will be graded according to the followingguidelines: assignments for each class (30%), answers and explanations given in class (30%), and reports outside of class (40%) . However, grades may fl uctuate within a range of ±40 points depending on the student's participation in class.
Evaluation criteria	[Students entering before 2018] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59

	points or less. Excellent, Good, and Pass are considered passing,and Fail is considered failing. [Students entering after 2019] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing. Please refer to the rubric for details.
Textbook/ Reference Books	If necessary, use handouts or undergraduate textbooks.
Requirements	[Prerequisite Courses] None in particular. Be sure to refer to the system diagram.
Notes on course enrollment	This course assumes that students have mastered linear algebra in their undergraduate studies, so students should review the content of that course beforehand. In particular, students who have not yet mastered linear algebra should study it using an appropriate textbook.
Preparation and review	Since the class is centered around a round-table discussion format, advance preparation is essential. Students also need to review not only their own arguments in class, but also those of other students and the instructor’s comments after class to solidify what they have learned. This preparation and review each require at least the same amount of study time as the class itself.
Office Hours	Please also refer to the notices posted in class , the AA system, and Classroom information.

Course Name	Seminar of Electronic and Information Tech. II A			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Early period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		Second year	Electronics and Information Science	2 hours

Class Outline	In preparation for completing a master's thesis, students will deepen their understanding through discussion and develop specialized knowledge and presentation skills.
Lesson Plan	1st Organizing the tasks after the midterm presentation 2nd Introduction of literature closely related to the research topic (domestic) 3rd Introduction of literature closely related to the research topic (USA) 4th Introduction of literature closely related to the research topic (Europe and other countries) 5th Report on the progress of your research to date 6th Organize the relationship between your research topic and the literature 7th Report the relevance of your research topic to the literature 8th Organizing your own research topic 9th Summary of your research results 10th Presentation and discussion of your own research results 11th Review of research plans based on discussions 12th Review of research plan materials 13th Discussion of the reviewed research plan and its relevance to the literature 14th Summary of discussion results 15th Research progress reports
Class Format	Seminar. Students will be asked to make presentations as appropriate depending on the progress of their research. [Active learning] Yes [Use of information devices] Yes [Educational method] Students will research previous research themselves and discuss the results of their research to position their research and advance it. [Form of the course when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Students will be able to research related technologies and papers in line with their research topic and acquire relevant skills.
Evaluation Method	Evaluation will be based on discussions during lectures, reports, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given during class, with 100% of the marks allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being 80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59

	points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Proceedings of academic conferences and journals related to the research, books related to the research, etc.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Take suffi cient time to prepare for presentations and summarize discussions. At the same time, try to spend the same amount of time as the class itself reorganizing your notes, including the notes on the board and oral explanations given in class, reviewing by solving the examples introduced in class, and working on assignments given in class. Also, be sure to ask your teacher in subsequent classes for any questions that arise during the work you do and resolve them. If you are absent for any reason, ask to see the teacher's notes from that class and complete your own notes.
Office Hours	at any time.

Course Name	Seminar of Electronic and Information Tech. ⅡB			
Course Period	Dividend Year	Number of Units	Compulsory Subject Categories	
Late period	Second year	2	Required	
Faculty		Year of Lecture	Major	Class Hours
Nobumasa Matsui		Second year	Electronics and Information Science	2 hours

Class Outline	In preparation for completing a master's thesis, students will deepen their understanding through discussion and develop specialized knowledge and presentation skills.
Lesson Plan	1st Organizing the tasks after the master's thesis midterm presentation 2nd Organizing literature closely related to the research topic (domestic) 3rd Organizing literature closely related to the research topic (USA) 4th Organizing literature closely related to the research topic (Europe and other countries) 5th Research progress reports 6th Plans for completing the master's thesis 7th Report on the structure of the master's thesis 8th Master's thesis progress report 9th Master's thesis progress report and discussion 10th Discussion of the consistency between the master's thesis topic and results 11th Refl ection of the results of the discussion in the master's thesis 12th Master's thesis evaluation 13th Reviewing the Master's Thesis 14th Discussion of research presentation materials 15th Final discussion towards completing the master's thesis
Class Format	Seminars. [Active learning] Yes. Students will be asked to make presentations as appropriate depending on the progress of their research. [Use of information devices] Yes. [Educational method] Students will research previous research themselves and discuss the results of their research to position their research and promote it. [Form of study when face-to-face classes cannot be held due to special circumstances] We plan to use the conferencing system software "Meet" based on Google Classroom.
Achieving Goals	Students will be able to research related technologies and papers in line with their research topic and acquire relevant skills.
Evaluation Method	Evaluation will be based on discussions during lectures, reports, etc. [Evaluation method when face-to-face regular exams cannot be held due to special circumstances] Evaluation will be based on regular marks based on the results of assignments and reports given during class, with 100% of the marks allocated.
Evaluation criteria	[Students enrolled in 2018 or earlier] Grades are expressed in four categories: Excellent, Good, Pass, and Fail, with Excellent being

	80 to 100 points, Good being 70 to 79 points, Pass being 60 to 69 points, and Fail being 59 points or less. Excellent, Good, and Pass are considered passing,and Fail are considered failing. [Students enrolled in 2019 or later] Grades are expressed in fi ve categories: S, A, B, C, and D, with S being 90 to 100 points, A being 80 to 89 points, B being 70to 79 points, C being 60 to 69 points, and D being 59 points or less. S, A, B, and C are considered passing, and D is considered failing.
Textbook/ Reference Books	Proceedings of academic conferences and journals related to the research, books related to the research, etc.
Requirements	none.
Notes on course enrollment	none.
Preparation and review	Take suffi cient time to prepare for presentations and summarize discussions. At the same time, try to spend the same amount of time as the class itself reorganizing your notes, including the notes on the board and oral explanations given in class, reviewing by solving the examples introduced in class, and working on assignments given in class. Also, be sure to ask your teacher in subsequent classes for any questions that arise during the work you do and resolve them. If you are absent for any reason, ask to see the teacher's notes from that class and complete your own notes.
Office Hours	at any time.