Physical Chemistry on Condensed Matters (2.0credits) (物性物理化学)

Course Type	Basic Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Materials Process Engineering	
Starts 1	Spring Semester ,every other year	
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor

●Course Purpose

In order to control materials synthesis processes, the understanding of the thermodynamical properties including p-V-T relation, viscosity, and thermal conductivity are necessary. The aim of this course is to help students to learn statistical thermodynamics and the chemical engineering thermodynamics, which are necessary to understand control materials synthesis processes.

Upon successfully completion of this course, students should become able to the following things.

1. Students will be able to apply the principles of statistical mechanics to real materials.
2.Students will be able to apply the statistical mechanics of condensed matters to real materials.
3. Students will be able to apply chemical engineering thermodynamics to estimate the properties of real gases.

●Prerequisite Subjects

Physical chemistry

●Course Topics

1. Basics of statistical mechanics
2. Statistical mechanics of condensed matters
3. Advanced thermodynamics of chemical engineering

The contents of the class should be reviewed until next class.

●Textbook

Materials are supplied in the class.

●Additional Reading

Will be introduced in the class.

●Grade Assessment

Grade assessment will be performed based on exams and reports about chemical engineering thermodynamics and statistical physics. Student will earn a credit if they understand and treat principle knowledges and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during lectures. Questions are also accepted by e-mail after lectures.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Physical Chemistry on Interface (2.0credits) (表面物理化学)

Course Type	Basic Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Materials Process Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

The purpose of this lecture is to systematically understand the functions and properties of surfaces in physical chemistry. The basic surface formation process and mechanism will be outlined mainly for solid surfaces. In addition, the functional characteristics of the surface of solids and their evaluation methods will be introduced based on specific examples.

●Prerequisite Subjects

Physical Chemistry, Material Physics, Material Physical Chemistry, Material Process Engineering 2

●Course Topics

1. Overview of basic matters
2. Structures of the surface
3. Electronic structures of the surface
4. Dynamics of the surface
5. Reaction of the surface
6. Evaluation methods of the surface
7. Chemistry of the metal surface
8. Chemistry of the semiconductor surface
9. Chemistry of the oxide surface

●Textbook

Reference materials will be distributed in the lecture.

●Additional Reading

For instance:
Experimental Chemistry Course <24> "Surface / Interface" by The Chemical Society of Japan

●Grade Assessment

The degree of achievement will be assessed through reports and a final exam.
Record more than or equal to 60/100 is qualified.

●Notes

No requirement for taking this class.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Solidification and Crystal Growth (2.0credits) (凝固・結晶成長)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course introduces the basic of crystal growth to students taking this course. At the end of the course, participants are expected to explain the essential concepts of crystal growth: driving force of crystal growth, nucleation and growth mechanism.

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Outline of crystal growth2. Driving force of crystal growth3. Nucleation4. Growth mechanism

●Textbook

Kesshou wa ikiteiru

●Additional Reading

Principle of solidification

●Grade Assessment

Your overall grade in the class will be decided based on the following:Class attendance and attitude in class: 50%Presentation: 50%To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mailujihara(at)nagoya-u.jp

Numerical Analysis (2.0credits) (数値解析)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	MATSUOKA Tatsurou Associate Professor	Tomoyuki YAJIMA Assistant Professor	Part-time Faculty

●Course Purpose

Numerical computation has become one of the indispensable tools in modern science and technology development.
The purpose of this lecture is to learn the methodology by numerical calculation through some concrete examples.
The goal is to learn the methodology of system design, control, and data analysis, to actively utilize numerical calculations, and to acquire applied skills that can solve problems efficiently.

●Prerequisite Subjects

Course Prerequisites
There are no particular prerequisites for this course.

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

If you have any questions, please contact the following instructors by e-mail.
Tatsuro MATSUOKA: matsuoka.tatsuro@material.nagoya-u.ac.jp
Akihisa ICHIKI: ichiki@chem.material.nagoya-u.ac.jp
Tomoyuki YAJIMA: yajima.tomoyuki@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1A (2.0credits) (先端プロセス工学セミナー１A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 1A (2.0credits) (先端プロセス工学セミナー１A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

e-mail
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1A (2.0credits) (先端プロセス工学セミナー１A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1A (2.0credits) (先端プロセス工学セミナー１A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

The textbook and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors take question also outside the lecture times.

kawajiri_at_nagoya-u.jp
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Seminars on Advanced Process Engineering 1B (2.0credits) (先端プロセス工学セミナー１B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 1B (2.0credits) (先端プロセス工学セミナー１B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1B (2.0credits) (先端プロセス工学セミナー１B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1B (2.0credits) (先端プロセス工学セミナー１B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will also take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

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Seminars on Advanced Process Engineering 1C (2.0credits) (先端プロセス工学セミナー１C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 1C (2.0credits) (先端プロセス工学セミナー１C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1C (2.0credits) (先端プロセス工学セミナー１C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1C (2.0credits) (先端プロセス工学セミナー１C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will also take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

Replace "_at_" by "@"

Seminars on Advanced Process Engineering 1D (2.0credits) (先端プロセス工学セミナー１D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 1D (2.0credits) (先端プロセス工学セミナー１D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1D (2.0credits) (先端プロセス工学セミナー１D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 1D (2.0credits) (先端プロセス工学セミナー１D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modelingwill be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar.

kawajiri_at_nagoya-u.jp

Replace "_at_" by "@"

Seminars on Materials Creation Engineering 1A (2.0credits) (物質創製工学セミナー１A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Spring Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1A (2.0credits) (物質創製工学セミナー１A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	1 Spring Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Understand the basics by text on engineering for nano-spintronics and magnetic materials and read the latest research papers to develop knowledge on the following issues.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination and presentation.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1A (2.0credits) (物質創製工学セミナー１A)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Spring Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1B (2.0credits) (物質創製工学セミナー１B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Autumn Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1B (2.0credits) (物質創製工学セミナー１B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Understand the basics by text on engineering for nano-spintronics and magnetic materials and read the latest research papers to develop knowledge on the following issues.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1B (2.0credits) (物質創製工学セミナー１B)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1C (2.0credits) (物質創製工学セミナー１C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Spring Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1C (2.0credits) (物質創製工学セミナー１C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	2 Spring Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Understand the basics by text on engineering for nano-spintronics and magnetic materials and read the latest research papers to develop knowledge on the following issues.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1C (2.0credits) (物質創製工学セミナー１C)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Spring Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1D (2.0credits) (物質創製工学セミナー１D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Autumn Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1D (2.0credits) (物質創製工学セミナー１D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	2 Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Understand the basics by text on engineering for nano-spintronics and magnetic materials and read the latest research papers to develop knowledge on the following issues.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 1D (2.0credits) (物質創製工学セミナー１D)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

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

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

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

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

●Notes

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

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

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

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

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

●Notes

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

Advanced Information Engineering of Processes (2.0credits) (先端プロセス情報工学)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Materials Process Engineering	
Starts 1	1 Spring Semester	
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor

●Course Purpose

Students will learn modeling, simulation and optimization from data of engineering systems. Particular focus will be placed on statistics (including Bayesian), parameter estimation, optimization, design of experiment, and machine learning techniques. Application examples includes modeling of engineering systems, design, and operation. Homework assignments will involve a modest amount of programming in the language of student's choice.Those who have completed this course should have backgrounds on advanced modeling, simulation, optimization, and data analysis techniques, and be able to apply such techniques to processes.All lectures will be given in English.

●Prerequisite Subjects

Undergraduate-level calculus, linear algebra, and statistics

●Course Topics

1. Fundamental concepts: matrices and vector operations, sets, and convexity.
2. Optimization
3. Statistics for chemical process modeling
4. Modeling and parameter estimation from data
5. Design of experiment
6. Regression and classification
7. Statistical test
8. Causality analysis

Approximately 5 homework sets will be given along with the lectures.

●Textbook

Lecture materials will be posted on NUCT.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Grades will be determined only based on homework assignments (approximately 5 sets in total). Students who have total points of 60% and above will pass this course.

●Notes

Lectures will be given both in face-to-face and on-demand videos. Videos will be posted on NUCT.Questions should be posted either on Forums or Messages on NUCT. No prerequisites.

●Contacting Faculty

1. Students are encouraged to ask questions during lectures. The lecturers will answer questions as much as possible as long as lecture progress is ensured.
2. Students are encouraged to post question on "Forums" on NUCT.
3. Students are encouraged to ask questions during office hours every week.

Prof. Kawajiri: kawajiri_at_nagoya-u.jp
Prof. Fujiwara: fujiwara.koichi_at_hps.material.nagoya-u.ac.jp
Replace "_at_" by "@" in the above email addresses.

Processes on Functional Materials (2.0credits) (機能材料プロセス)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Materials Process Engineering
Starts 1	Spring Semester ,every other year
Lecturer	Noritaka Usami Professor Yasuyoshi KUROKAWA Associate Professor

●Course Purpose

Fabrication of semiconductor devices such as solar cells requires various advanced processing. In this course, various processing including crystal growth (bulk and thin film crystals), formation of nanostructures, and doping technologies are introduced. Fundamental principles of various solar cells as wells as advanced research topics are introduced by putting emphasis on relationship with various processing.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Formation of nanostructures3. Doping technologies4Crystalline silicon solar cells 5. Thin film solar cells 6. Organic thin film, dye-sensitized, and perovskite solar cells 7. Novel concepts 8. Transparent conductive thin film9. Device simulation* Please read the handouts before a lecture.

●Textbook

Handouts will be given.

●Additional Reading

Materials Concepts for Solar Cells, Imperial College Press Photovoltaics, Fundamemtals, Technology and Practice, Wiley

●Grade Assessment

Based on small examinations & reports.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Classes will be conducted in combination with face-to-face and remote (on-demand type). Remote-type classes are conducted at NUCT. Please check NUCT to obtain the details.

●Contacting Faculty

At end of lecture or e-mailusa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jp

Multiple Processes of Materials (2.0credits) (材料複合プロセス)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Materials Process Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor

●Course Purpose

We will understand the basic manufacturing process of various composite materials, mainly metal matrix composite materials, and acquire knowledge about interfacial phenomena between different types of materials. In addition, we will understand the basics of analysis and analysis for evaluating materials.

●Prerequisite Subjects

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

●Course Topics

1. Production method of composite material by liquid phase process 2. Production method of composite material by solid phase process 3. Various secondary processing methods for composite materials 4. Basics and applications of material analysis using electron microscopy and X-ray diffraction 5. Basics of interface geometry using crystallography

●Textbook

Handouts will be distributed at every sections in this lecture.

●Additional Reading

[1] An Introduction to Metal Matrix Composites : T. W. Clyne & P. J.Withers (Cambridge University Press)[2] Phase Transformations in Metals and Alloys 3rd edition , David A. Porter, Kenneth E. Easterling and Mohamed Y. Sherif, CRC Press (2009).

●Grade Assessment

Reports, presentationRecord more than or equal to C grade is qualified

●Notes

Obtaining credit in "strength of materials" is preferred.The class will be conducted both face-to-face and remotely (on-demand).

●Contacting Faculty

Face-to-face discussions after class or exchanging e-mails through web.kobashi.makoto[at]material.nagoya-u.ac.jp

ed Experiments and Exercises on Advanced Process Engineering 1 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	1 Spring and Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of fundamental crystal growth, with growth technique and fundamental evaluation technique andtheir basis. It also enhances the development of students' skill in carrying out a crystal growth experimentBy the end of the course, students should be able to do the following: Perform crystal growth experiments. Perform crystal evaluation. Perform crystal growth simulation.

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Consideration of research topic and planning2. Study of Basic knowledge in experimental technique3. Experiment and evaluation4. Discussion 5. Re-Planning Each student make a report of his research topic.

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

ed Experiments and Exercises on Advanced Process Engineering 1 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	1 Spring and Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

In this course, students deepen their understanding of basic learning in various fields related to materials functions and processings by conducting experiments and exercises with the advice and guidance of the laboratory supervisor.
Through this lecture, students can acquire the ability to find and solve problems on their own.

●Prerequisite Subjects

Subjects of department of material process engineering major

●Course Topics

1. Set the theme and formulate an experiment plan 2. Exercises on theory and experimental methods 3. Implementation of experiments and analysis of experimental results 4. Discussion of experimental results, discussion with supervisor 5. Modify the experimental design

Before the discussion, be sure to conduct experiments yourself, arrange the results, and make a clear image about issues.

●Textbook

will be introduced in the class

●Additional Reading

will be introduced in the class

●Grade Assessment

Evaluation of experiments and exercises by supervisors, reports, oral presentations

The evaluation of the experiment and the exercise must be A or higher to get acredt.

●Notes

Course Requirements
No course requirements are required.
In principle, this course will be conducted in the laboratory. The method of conducting this course will be communicated to students via e-mail.

●Contacting Faculty

Guidance is provided directly through individual and group meetings.
kobashi.makoto[at]material.nagoya-u.ac.jp

ed Experiments and Exercises on Advanced Process Engineering 1 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	1 Spring and Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

In this experiment and practice, students perform laboratory experimental works concerning the advanced process engineering to learn knowledge on materials process engineering. In addition, students will learn the ability to plan their own research topic by themselves.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to learn experimental skills concerning materials process engineering.
2. Students should be able to make experimental plans concerning materials process engineering.

●Prerequisite Subjects

Experimental lessons, graduation thesis and lectures on reaction engineering, materials engineering and physical chemistry.

●Course Topics

1. Setting the theme of experiments and planning of experiments.
2. Exercises of the theoretical background and the experimental techniques.
3. Executing experiments according to the plan.
4. Analysis of the experimental results and discussion with faculties.

The material should be prepared in advance.

●Textbook

Will be introduced in the experiments.

●Additional Reading

Will be introduced in the experiments.

●Grade Assessment

Grade assessment will be performed based on the reports on experiments and discussion. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during experiments.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

ed Experiments and Exercises on Advanced Process Engineering 1 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	1 Spring and Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Exercises and experiments of process systems engineering including analysis, design, control, and modeling will be carried out.
The goals are as follows:
1. To use theoretical methods concerning process systems engineering for solving engineering problems
2. To understand models used in the domain of process systems engineering and represent such systems using those models

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Planning and optimization of process systems

Students should read the references and textbooks in advance.

●Textbook

Not specified

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

This course will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions during the exercises and experiments. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp
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ed Experiments and Exercises on Advanced Process Engineering 2 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	2 Spring and Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of fundamental crystal growth, with growth technique and fundamental evaluation technique andtheir basis. It also enhances the development of students' skill in carrying out a crystal growth experimentBy the end of the course, students should be able to do the following: Perform crystal growth experiments. Perform crystal evaluation. Perform crystal growth simulation.

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Consideration of research topic and planning2. Study of Basic knowledge in experimental technique3. Experiment and evaluation4. Discussion 5. Re-Planning Each student make a report of his research topic.

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

ed Experiments and Exercises on Advanced Process Engineering 2 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	2 Spring and Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

In this course, students deepen their understanding of basic learning in various fields related to materials functions and processings by conducting experiments and exercises with the advice and guidance of the laboratory supervisor. Through this lecture, students can acquire the ability to find and solve problems on their own.

●Prerequisite Subjects

Subjects of department of material process engineering major

●Course Topics

1. Set the theme and formulate an experiment plan 2. Exercises on theory and experimental methods 3. Implementation of experiments and analysis of experimental results 4. Discussion of experimental results, discussion with supervisor 5. Modify the experimental design

Before the discussion, be sure to conduct experiments yourself, arrange the results, and make a clear image about issues.

●Textbook

will be introduced in the class

●Additional Reading

will be introduced in the class

●Grade Assessment

Evaluation of experiments and exercises by supervisors, reports, oral presentations

The evaluation of the experiment and the exercise must be A or higher to get acredt.

●Notes

Course Requirements
No course requirements are required.
In principle, this course will be conducted in the laboratory. The method of conducting this course will be communicated to students via e-mail.

●Contacting Faculty

Guidance is provided directly through individual and group meetings.
kobashi.makoto[at]material.nagoya-u.ac.jp

ed Experiments and Exercises on Advanced Process Engineering 2 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	2 Spring and Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

In this experiment and practice, students perform laboratory experimental works concerning the advanced process engineering to learn knowledge on materials process engineering. In addition, students will learn the ability to plan their own research topic by themselves.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to learn experimental skills concerning materials process engineering.
2. Students should be able to make experimental plans concerning materials process engineering.

●Prerequisite Subjects

Experimental lessons, graduation thesis and lectures on reaction engineering, materials engineering and physical chemistry.

●Course Topics

1. Setting the theme of experiments and planning of experiments.
2. Exercises of the theoretical background and the experimental techniques.
3. Executing experiments according to the plan.
4. Analysis of the experimental results and discussion with faculties.

The material should be prepared in advance.

●Textbook

Will be introduced in the experiments.

●Additional Reading

Will be introduced in the experiments.

●Grade Assessment

Grade assessment will be performed based on the reports on experiments and discussion. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during experiments.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

ed Experiments and Exercises on Advanced Process Engineering 2 (2.0credits) (先端プロセス工学特別実験及び

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Materials Process Engineering		
Starts 1	2 Spring and Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Exercises and experiments of process systems engineering including analysis, design, control, and modeling will be carried out.
The goals are as follows:
1. To use theoretical methods concerning process systems engineering for solving engineering problems
2. To understand models used in the domain of process systems engineering and represent such systems using those models

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Planning and optimization of process systems

Students should read the references and textbooks in advance.

●Textbook

N/A

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

This course will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions during the exercises and experiments. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp
Replace "_at_" by "@"

nced Experiments and Exercises on Materials Creation Engineering 1 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses			
Division at course	Master's Course			
Class Format	Experiment and Exercise			
Course Name	Materials Process Engineering			
Starts 1	1 Spring and Autumn Semester			
Lecturer	Noritaka Usami Professor	Yasuyoshi KUROKAWA Associate Professor	Kazuhiro GOTO Assistant Professor	

●Course Purpose

There are three purposes in this course. 1. To design an experimental plan of each research theme related with material engineering for energy and environment.2. To proceed with experiments based on that design.3. To learn the way of analysis methods and simulations to discuss experimental results through practical exercises.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentations about experimental plans and results, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

nced Experiments and Exercises on Materials Creation Engineering 1 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Materials Process Engineering	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

By conducting experiments and exercises with the advice and guidance of a supervisor, students will deepen their understanding of basic studies in various fields related to the functions of materials and the creation process, as well as cultivate their engineering skills.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Examinations or reports at the term end.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

nced Experiments and Exercises on Materials Creation Engineering 1 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Materials Process Engineering
Starts 1	1 Spring and Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

The purpose of this course is to provide a fundamental understanding of analytical chemistry principles and to demonstrate how these principles are applicable. Students will acquire fundamental tools and skills in chemical qualitative and quantitative procedures that can be applied in a variety of fields during this course.At the end of the course, the students are expected to:• Understand the fundamental concepts of photocatalysis.• Identify and describe the steps that are included in the preparation of a photocatalyst.• Be familiar with the techniques used in photocatalysis, such as XRD, DRS, SEM.• Understand the fundamental analytical techniques.• Master the skills to choose and apply appropriate analysis techniques.• Develop the critical thinking skills necessary for solving experimental problems.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The preparation of photocatalytic materialsThe loading of cocatalysts The performance tests for photocatalytic reactions: water splitting and carbon dioxide reductionThe analysis of the physicochemical properties of photocatalytic materialsThe quantification of gas and liquid products

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on the total points earned for experimental results and participation. The course components are scored as followed:Experimental results (50%)Class participation (50%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

nced Experiments and Exercises on Materials Creation Engineering 2 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses			
Division at course	Master's Course			
Class Format	Experiment and Exercise			
Course Name	Materials Process Engineering			
Starts 1	2 Spring and Autumn Semester			
Lecturer	Noritaka Usami Professor	Yasuyoshi KUROKAWA Associate Professor	Kazuhiro GOTO Assistant Professor	

●Course Purpose

There are three purposes in this course. 1. To design an experimental plan of each research theme related with material engineering for energy and environment.2. To proceed with experiments based on that design.3. To learn the way of analysis methods and simulations to discuss experimental results through practical exercises.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentations about experimental plans and results, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

nced Experiments and Exercises on Materials Creation Engineering 2 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Materials Process Engineering	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

By conducting experiments and exercises with the advice and guidance of a supervisor, students will deepen their understanding of basic studies in various fields related to the functions of materials and the creation process, as well as cultivate their engineering skills.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry

●Course Topics

Development of high-efficiency energy materials based on magnetic materials
Exploration of relation between spin and heat in magnetic materials
Development of a new nano-superstructure by precise crystal growth technology
Energy conversion through spin currents
Development of functional materials for next-generation magnetic recording materials and spintronics devices

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation.
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

nced Experiments and Exercises on Materials Creation Engineering 2 (2.0credits) (物質創製工学特別実験及び演

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Experiment and Exercise
Course Name	Materials Process Engineering
Starts 1	2 Spring and Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

The purpose of this course is to provide a fundamental understanding of analytical chemistry principles and to demonstrate how these principles are applicable. Students will acquire fundamental tools and skills in chemical qualitative and quantitative procedures that can be applied in a variety of fields during this course.At the end of the course, the students are expected to:• Understand the fundamental concepts of photocatalysis.• Identify and describe the steps that are included in the preparation of a photocatalyst.• Be familiar with the techniques used in photocatalysis, such as XRD, DRS, SEM.• Understand the fundamental analytical techniques.• Master the skills to choose and apply appropriate analysis techniques.• Develop the critical thinking skills necessary for solving experimental problems.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The preparation of photocatalytic materialsThe loading of cocatalysts The performance tests for photocatalytic reactions: water splitting and carbon dioxide reductionThe analysis of the physicochemical properties of photocatalytic materialsThe quantification of gas and liquid products

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on the total points earned for experimental results and participation. The course components are scored as followed:Experimental results (50%)Class participation (50%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

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

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

requisiteness.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

requisiteness.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

requisiteness.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

requisiteness.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

requisiteness.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

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

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

The following viewpoint will be focused

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

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

●Textbook

Not specified, but distributed handouts if necessary.

●Additional Reading

It will be appointed if necessary.

●Grade Assessment

Reports (80%) and interview (20%)

●Notes

Not needed

●Contacting Faculty

At lecture time

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

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

●Course Purpose

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

●Prerequisite Subjects

Knowledge of the subject areas.

●Course Topics

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

●Textbook

Distribute as appropriate.

●Additional Reading

Distribute as appropriate.

●Grade Assessment

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

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

●Notes

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

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

●Contacting Faculty

Arranging the schedules by e-mail and etc.

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

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

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

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

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

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

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

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

(7) Individual presentations I
(8) Individual presentations

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

●Textbook

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

●Additional Reading

1The Japan Times
2:

●Grade Assessment

Individual presentation: 50%
Active class participation: 50%

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

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

●Notes

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

●Contacting Faculty

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

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

A. Lectures

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

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

●Textbook
Handout delivered in each lecture

●Additional Reading
Introduced in the lectures

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

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

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

ysakai@mech.nagoya-u.ac.jp

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

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

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

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

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

●Course Topics

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

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

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

●Textbook
Distribute materials as appropriate.

●Additional Reading

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

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

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

●Contacting Faculty
the break after the lecture.

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

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

●Course Purpose

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

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

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

●Prerequisite Subjects

●Course Topics

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

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

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

●Textbook

●Additional Reading

●Grade Assessment

●Notes

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

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

●Contacting Faculty

Internship A (1.0credits) (学外実習Ａ)

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

●Course Purpose
Students will be dispatched to research and development departments of university-outside research organization such as cooperating companies etc. and engaged in research and development work on prescribed themes for a predetermined period to learn how to set up and solve technical problems at companies and other sites.With this experience, they acquire practical and broad insight, comprehensive ability, imagination and adaptability to the real world.

●Prerequisite Subjects
Each subject studied in Department of Materials Science and Engineering and also in Department of Materials Process Engineering

●Course Topics
Students' research contents are negotiated by agreement with the companies etc.

●Textbook
Textbooks are not specified, but materials will be distributed as needed for training.

●Additional Reading
Specified as needed during the training

●Grade Assessment
The achievement is evaluation by corporate leaders, oral presentations of research results, and reports

●Notes
No course requirements will be imposed.

●Contacting Faculty
Academic advisors and persons in charge of hosting companies etc.

Internship B (1.0credits) (学外実習Ｂ)

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

●Course Purpose

Students will be dispatched to research and development departments of university-outside research organization such as cooperating companies etc. and engaged in research and development work on prescribed themes for a predetermined period to learn how to set up and solve technical problems at companies and other sites.With this experience, they acquire practical and broad insight, comprehensive ability, imagination and adaptability to the real world.

●Prerequisite Subjects

Each subject studied in Department of Materials Science and Engineering and also in Department of Materials Process Engineering

●Course Topics

Students' research contents are negotiated by agreement with the companies etc.

●Textbook

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

●Additional Reading

Specified as needed during the training

●Grade Assessment

The achievement is evaluation by corporate leaders, oral presentations of research results, and reports.

●Notes

No course requirements will be imposed.

●Contacting Faculty

Academic advisors and persons in charge of hosting companies etc.

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

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

●Course Purpose

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

●Prerequisite Subjects

Basic mathematics, Basic physics

●Course Topics

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

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

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

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

●Textbook

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

●Additional Reading

Recommended readings will be give during lectures as necessary.

●Grade Assessment

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

●Notes

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

●Contacting Faculty

Inquire contact method from the lecturer after the lecture

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

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

●Course Purpose

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

●Prerequisite Subjects

Not required

●Course Topics

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

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

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

●Textbook

Materials are provided at classes.

●Additional Reading

Introduced according to the process of the lecture.

●Grade Assessment

Evaluated by reports.

●Notes

Not required.

●Contacting Faculty

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

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

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

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

●Course Purpose

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

●Prerequisite Subjects

Advanced super-interdisciplinary mobility innovation I

●Course Topics

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

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

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

●Textbook

Materials are provided at classes.

●Additional Reading

Introduced according to the process of the lecture.

●Grade Assessment

Evaluated by reports.

●Notes

Not required.

●Contacting Faculty

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

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

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

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

●Notes

No particular requirement.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

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

●Notes

No particular requirement.

●Contacting Faculty

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

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook
Will be designated by each supervisor.

●Additional Reading
Will be designated by each supervisor.

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

●Notes
No conditions for taking the course.

●Contacting Faculty
Supervisor of visiting university basically takes care.

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

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

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

Written report and evaluation by the professors.

●Notes

No conditions for taking the course.

●Contacting Faculty

In the class and E-mail.

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

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

●Course Purpose

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

●Prerequisite Subjects

English, Technical English, Japanese

●Course Topics

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

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

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

Seminars on Advanced Process Engineering 2A (2.0credits) (先端プロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 2A (2.0credits) (先端プロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2A (2.0credits) (先端プロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2A (2.0credits) (先端プロセス工学セミナー2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Spring Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

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Seminars on Advanced Process Engineering 2B (2.0credits) (先端プロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 2B (2.0credits) (先端プロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2B (2.0credits) (先端プロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2B (2.0credits) (先端プロセス工学セミナー2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	1 Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

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Seminars on Advanced Process Engineering 2C (2.0credits) (先端プロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 2C (2.0credits) (先端プロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.
kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2C (2.0credits) (先端プロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2C (2.0credits) (先端プロセス工学セミナー2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Spring Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar.

kawajiri_at_nagoya-u.jp

Replace "_at_" by "@"

Seminars on Advanced Process Engineering 2D (2.0credits) (先端プロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 2D (2.0credits) (先端プロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2D (2.0credits) (先端プロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

Upon successfully completion of this seminar, students should become able to the following things.

1. Students should be able to perform the experiments and bibliographic survey concerning materials process engineering.
2. Students should be able to present and discuss their research results concerning materials process engineering.
3. Students should be able to find research topic by themselves concerning materials process engineering.

●Prerequisite Subjects

Reaction engineering, materials engineering, physical chemistry

●Course Topics

1. Seminar on reaction engineering concerning materials synthesis process
2. Seminar on properties of materials concerning materials synthesis process

The material for oral presentation should be prepared in advance.

●Textbook

Will be introduced in the seminar.

●Additional Reading

Will be introduced in the seminar.

●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2D (2.0credits) (先端プロセス工学セミナー2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	2 Autumn Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

Advanced techniques in process systems engineering including analysis, design, control, and modeling will be lectured and discussed.
The goals are as follows:
1. To apply theoretical methods concerning process systems engineering to specific problems
2. To understand and discuss models used in domain of process systems engineering

●Prerequisite Subjects

Systems Control, Advanced Process Information Engineering

●Course Topics

1.Modeling and simulation of process systems
2.Design and control of process systems
3.Application of systems theory to process systems

Students should read the references and textbooks in advance.

●Textbook

Textbooks and references will be chosen by students.

●Additional Reading

Gelman, A., et al. Bayesian Data Analysis, Chapman & Hall/CRC, 2013
Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
Edger, T.F. and Himmelblau, D.M., Optimization of Chemical Processes, McGraw-Hill, 2001
Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors.No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

Replace "_at_" by "@"

Seminars on Advanced Process Engineering 2E (2.0credits) (先端プロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	3 Spring Semester		
Lecturer	Toru UJIHARA Professor	MihoTAGAWA Associate Professor	Syunta HARADA Associate Professor

●Course Purpose

This course deals with the basis of crystal growth of various functional materials andthe crystal growth techniques. It also enhances the development of students' skill in carrying out a chemical experiment.By the end of the course, students should be able to do the following: Use various crystal growth techniques Use various crystal growth evaluation methods

●Prerequisite Subjects

Physical Chemistry 1, Physical Chemistry 2, Crystal Physics, Heat Transfer and Diffusion

●Course Topics

1. Solution growth2. Melt growth3. Vapor growth4. Crystal growth equipment5, Crystal evaluation

●Textbook

Crystal growth for beginners(World Scientific Publishing) etc.

●Additional Reading

Some papers suitable for each student's research topic

●Grade Assessment

Your final grade will be calculated according to the following process: a fraction of in-class contribution 50% and usual performance score 50%.To pass, students must earn at least 60 points out of 100.

●Notes

●Contacting Faculty

E-mail

Seminars on Advanced Process Engineering 2E (2.0credits) (先端プロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	3 Spring Semester		
Lecturer	Makoto KOBASHI Professor	Naoki TAKATA Associate Professor	Asuka SUZUKI Assistant Professor

●Course Purpose

Students will learn systematically the study of achieving high strength and high functionality by controlling the micro-mesoscale structure of materials. Specifically, students will learn the process of controlling the crystal structure and precipitates, and controlling the structure of composite materials in which microparticles, fibers and network structures are dispersed. Similarly, learn how to control the mesoscale structure of porous materials. Formulate and understand the relationship between material properties / material functions and micro / mesoscale structures. Research related literature and understand trends in research and development related to master's thesis.

●Prerequisite Subjects

Strength of materials, Metallic materials

●Course Topics

1. Use of mesoscale structure in nature 2. Mesoscale structure and properties of materials 3. Mesoscale structure and function of the material 4. mesoscale structure control process of materials; 5. dissimilar material joining, Metal crystal and structure control

●Textbook

The documents to be reported will be selected appropriately according to the research content of each master's thesis.

●Additional Reading

Introduced in the lecture

●Grade Assessment

Comprehensive evaluation of oral presentations, questions and answers, participation in discussions, and preparation of report materials.

●Notes

Simultaneous interactive lectures by Zoom will be conducted.

●Contacting Faculty

Students can ask questions by e-mail.kobashi.makoto[at]material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2E (2.0credits) (先端プロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	3 Spring Semester		
Lecturer	Seiichi TAKAMI Professor	MATSUOKA Tatsurou Associate Professor	Tsuyoshi YAMAGUCHI Assistant Professor
	Seiji Yamashita Assistant Professor		

●Course Purpose

The aim of this seminar is to help students to understand the recent topics concerning material process engineering. Through the course, the students also learn the ability to present and discuss their research results.

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●Additional Reading

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●Grade Assessment

Grade assessment will be performed based on oral presentation and discussion during seminar. Student will earn a credit if they understand and treat principle knowledges of materials process engineering and grade will be determined by the degree of understanding.

●Notes

No requirements for taking this class.

●Contacting Faculty

Questions are accepted during seminar.

E-mail : takami.seiichi@material.nagoya-u.ac.jp

Seminars on Advanced Process Engineering 2E (2.0credits) (先端プロセス工学セミナー2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Materials Process Engineering		
Starts 1	3 Spring Semester		
Lecturer	Yoshiaki KAWAJIRI Professor	FUJIWARA Koichi Associate Professor	Tomoyuki YAJIMA Assistant Professor
	Junpei FUJIKI Designated Lecturer		

●Course Purpose

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●Course Topics

1.Modeling and simulation of process systems
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3.Application of systems theory to process systems

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●Textbook

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Hoff, P. A First Course in Bayesian Statistical Methods, Springer, 2009
Biegler, L. T., Nonlinear Programming: Concepts, Algorithms and Applications to Chemical Engineering, SIAM, 2010
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Bard, Y., Nonlinear Parameter Estimation, Academic Press, 1973
Kincaid, D. and Cheney,W., Numerical Analysis, American Mathematical Society, 2002
Nocedal, J. and S. Wright, Numerical Optimization, Springer, 1999
Boyd, S. and Vandenberghe, L. Convex Optimization, Cambridge University Press, 2004
Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2008

●Grade Assessment

Students will be evaluated on the basis of oral presentations, questions, and discussions. The maximum grade is 100 points and the passing grade is 60 points or higher.

●Notes

Seminars will be given both in face-to-face and online meetings using Zoom. Questions should be emailed to instructors. No prerequisites.

●Contacting Faculty

Students can ask questions at the seminar. Instructors will take questions outside the lecture times.

kawajiri_at_nagoya-u.jp

Replace "_at_" by "@"

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Spring Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	1 Spring Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Recognize the significance of the thesis, build a methodology by yourself, and train your creativity as a researcher / instructor.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry,
Seminar1A-1D

●Course Topics

This seminar is given on the problems related to the basic and application of engineering for nano-spintronics and magnetic materials. Themes are also selected from time to time for a wide range of general materials engineering to acquire comprehensive studies.

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2A)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Spring Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2B (2.0credits) (物質創製工学セミナー2B)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Autumn Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2B (2.0credits) (物質創製工学セミナー2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	1 Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Recognize the significance of the thesis, build a methodology by yourself, and train your creativity as a researcher / instructor.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry,
Seminar1A-1D

●Course Topics

This seminar is given on the problems related to the basic and application of engineering for nano-spintronics and magnetic materials. Themes are also selected from time to time for a wide range of general materials engineering to acquire comprehensive studies.

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2B (2.0credits) (物質創製工学セミナー2B)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	1 Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2C (2.0credits) (物質創製工学セミナー2C)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Spring Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2C (2.0credits) (物質創製工学セミナー2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	2 Spring Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Recognize the significance of the thesis, build a methodology by yourself, and train your creativity as a researcher / instructor.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry,
Seminar1A-1D

●Course Topics

This seminar is given on the problems related to the basic and application of engineering for nano-spintronics and magnetic materials. Themes are also selected from time to time for a wide range of general materials engineering to acquire comprehensive studies.

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2C (2.0credits) (物質創製工学セミナー2C)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Spring Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

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Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

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Seminars on Materials Creation Engineering 2D (2.0credits) (物質創製工学セミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Autumn Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

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●Course Topics

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●Grade Assessment

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Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	2 Autumn Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

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Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry,
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●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation
Record more than or equal to 60/100 is qualified.

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Seminars on Materials Creation Engineering 2D (2.0credits) (物質創製工学セミナー2D)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	2 Autumn Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

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●Course Topics

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●Textbook

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●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

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●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2E)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	3 Spring Semester
Lecturer	Noritaka Usami Professor, Yasuyoshi KUROKAWA Associate Professor, Kazuhiro GOTO Assistant Professor

●Course Purpose

The purpose of this course is learning basic knowledge to proceed research and catching recent researches through reading publications about materials engineering for energy and environment. In addition, presentation about each research theme is given and discussed.The goal is to be able to:(1) Explain the research theme in relation to previous research and social issues.(2) Draft an experiment plan according to the purpose and collect necessary data.(3) Analyze the data and interpret the results correctly.(4) Describe the research results logically in sentences.(5) Present the research results orally and point out the significance and issues of the research through discussion.

●Prerequisite Subjects

Crystal Physics, Electron Theory in Solids, Quantum Mechanics, Chemical Thermodynamics, Semiconductor Materials

●Course Topics

1. Crystal growth (bulk and thin film crystals)2. Evaluation technique for crystal3. Deposition process of thin films in a vacuum4Evaluation technique for thin films5. Principle of Solar cells and LED6. Fabrication of device struture

●Textbook

Nothing

●Additional Reading

1. Mateials Concepts for Solar Cells, Thomas Dittrich, Imperial College Press 2. Principles of Solar Cells, LEDs and Diodes, Adrian Kitai, Wiley 3. Crystal Growth for Beginners, Ivan V Markov, World Scientific

●Grade Assessment

Based on oral presentation, question & answer, and discussion.

●Notes

No registration requirements are imposed.[Implementation policy of classes related to dealing with new coronavirus infections] Refer to NUCT.

●Contacting Faculty

Questions will be accepted during and after a seminar.usa@material.nagoya-u.ac.jpkurokawa.yasuyoshi@material.nagoya-u.ac.jpgotoh.kazuhiro@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Materials Process Engineering	
Starts 1	3 Spring Semester	
Lecturer	Masaki MIZUGUCHI Professor	Toshio MIYAMACHI Associate Professor

●Course Purpose

Recognize the significance of the thesis, build a methodology by yourself, and train your creativity as a researcher / instructor.

●Prerequisite Subjects

Metallurgy, Physical Chemistry, Electrochemistry, Inorganic Chemistry,
Seminar1A-1D

●Course Topics

This seminar is given on the problems related to the basic and application of engineering for nano-spintronics and magnetic materials. Themes are also selected from time to time for a wide range of general materials engineering to acquire comprehensive studies.

●Textbook

●Additional Reading

●Grade Assessment

Report or oral examination, presentation
Record more than or equal to 60/100 is qualified.

●Notes

No special registration conditions are imposed.

●Contacting Faculty

Questions are accepted in the lecture.
They can also welcomed by e-mail.
mizuguchi.masaki@material.nagoya-u.ac.jp

Seminars on Materials Creation Engineering 2A (2.0credits) (物質創製工学セミナー2E)

Course Type	Specialized Courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Materials Process Engineering
Starts 1	3 Spring Semester
Lecturer	Oho ken Associate Professor

●Course Purpose

To learn, practice, and critique effective scientific seminar skills as well as the fundamental of artificial photosynthesis and photocatalysis. Students develop presentation skills that will be essential during their entire professional careers. These skills will improve as students respond to critical feedback, and seek to make scientific information understandable to scientists, peers, and the general public.

●Prerequisite Subjects

Semiconductor physics, Inorganic chemistry

●Course Topics

The fundamentals of photocatalysis and artificial photosynthesisThe development of effective photocatalytic materialsThe mechanism underlying photocatalysis for solar energy conversion

●Textbook

Printed handouts will be provided.

●Additional Reading

●Grade Assessment

The final course grade will be based on total points earned for presentation and class participation. The course components are scored as followed:Presentation (60%)Class participation (40%)Total (100%)

●Notes

No requirements for taking this class.The lecture is held face-to-face in a lecture room, as long as this conforms to social distancing requirements. We will review the decision should advise from the university changes. The lecture will be available online to the students who are not in Japan or cannot come to campus. Students can ask questions during and after lectures, as well as via e-mail.

●Contacting Faculty

Any questionnaires are welcome via e-mail: wang.qian@material.nagoya-u.ac.jp

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

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

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

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

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

●Notes

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

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

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

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

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

●Notes

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

●Textbook

Not specified, but distributed handouts if necessary.

●Additional Reading

It will be appointed if necessary.

●Grade Assessment

Reports (80%) and interview (20%)

●Notes

Not needed

●Contacting Faculty

At lecture time

Research Internship2 U2 (2.0credits) (研究インターンシップ２ U2)

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

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

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

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

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

●Additional Reading

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

●Grade Assessment

The credits will be given to the students who have had the working days less than or equal to 20 days in the internship company.

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U3 (3.0credits) (研究インターンシップ２ U3)

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

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

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

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U4 (4.0credits) (研究インターンシップ２ U4)

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

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

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

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U6 (6.0credits) (研究インターンシップ２ U6)

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

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

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

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Research Internship2 U8 (8.0credits) (研究インターンシップ２ U8)

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

●Course Purpose

Research internship is different from conventional internship for a working experience. Staffs in the faculty and instructors in a company cooperate with each other to set up research themes adequate to the doctoral course, and supervise a long-term internship for 1-6 months. This course aims at training of a person who has ability for an advanced research and development in not only a specialized field but also a multidisciplinary field, and a leader capable of making a proper judgment in a research project.

●Prerequisite Subjects

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

●Course Topics

A student applies for a theme for research set up under the cooperation of a company and Nagoya University. Students should attend at the lecture at the university on the duty of confidentiality and the protection of intellectual property rights before starting the internship.

●Textbook

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

●Additional Reading

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

●Grade Assessment

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

●Notes

No specific requirements.

●Contacting Faculty

The questions will be answered by the direct supervisors as needed at the internship.

Teaching and Instruction Exercise 1 (1.0credits) (実験指導体験実習1)

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

●Course Purpose

While attendance is raw, in "the innovation experience project," I stand with a company engineer (DP, Directing Professor) and carry an assistance, DP of the attendance straight instruction by the DP and the role of the interface of the attendance student. In this way, it is intended to let you do experience of the project management.

I aim for planning a researcher, improvement of the nature as the leader, the expansion of the field of vision by a simulated experience of instruction of the attendance life and the business management in the real world.

●Prerequisite Subjects

"Innovation Practice Course" 75 hours(Principle one day a week)

●Course Topics

In "the innovation experience project," I assist the project promotion by the DP.

Help of the understanding of a project theme and contents for the attendance life of various specialisms

I compile an opinion of the attendance life and let you make a purpose, the method of the project clear

Exchange of opinions between the attendance life, instruction, report of the discussion

Communication adjustment that DP and attendance are raw

I assume this a main component.

In addition, correspondence out of the lecture time is necessary when preparations, an investigation to affect project accomplishment are necessary.

●Textbook

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

●Additional Reading

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

●Grade Assessment

I evaluate it through accomplishment, the discussion of the project. If display of leadership, report ability and the leadership is accepted, it is said that I pass.

●Notes

No specific requirements.

●Contacting Faculty

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

Teaching and Instruction Exercise 2 (1.0credits) (実験指導体験実習2)

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

●Course Purpose

The purpose of this course is to provide guidance to semester students for advanced science and engineering experiments at the Venture Business Laboratory. Through this research guidance, students will be able to play a comprehensive role as a researcher / educator and instructor in the field in charge of device process system and device simulation, and will be able to provide research guidance. Useful for practical training as a research leader.

●Prerequisite Subjects

Knowledge of the field in charge selected from the fields of electronic device process system and device simulation.

●Course Topics

In the student experiment, the instructor students provide guidance to attendant students on subject research and original research from the field of electronic device process system and device simulation with the professional teacher. Together with the attendant students, they perform practical use these equipment and software and get the results. They experience the leadership of the research, providing research guidance, report preparation guidance, and presentation guidance.

●Textbook

Required documents is distributed.

●Additional Reading

Required documents is distributed.

●Grade Assessment

Evaluate by compiling experiments / exercises, teaching (70%), and interviewing (30%). Students who understand each device and software and give appropriate guidance are accepted, and their research results and new approaches are highly evaluated. A score of 60 or more out of 100 is a passing score.

●Notes

To have a deep understandinginonefieldfromelectronic device process and device simulation.

●Contacting Faculty

Arranging the schedules by e-mail and etc.