Fundamentals of Moleuclar and Macromolecular Chemistry (2.0credits) (有機・高分子化学基礎論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
Starts 1	1 Spring Semester	1 Spring Semester	1 Spring Semester
Lecturer	Eiji YASHIMA Professor	MasamiKAMIGAITO Professor	Kazuaki ISHIHARA Professor
	Takashi OOI Professor	Hiroshi SHINOKUBO Professor	MakotoYAMASHITA Professor
	Atsushi TAKANO Associate Professor	Yukikazu Takeoka Associate Professor	UYANIK Muhammet Associate Professor
	Tomoyuki IKAI Associate Professor	Kosuke OMATSU Designated Associate Professor	Atsushi NORO Lecturer
	Mineto UCHIYAMA Lecturer		

●Course Purpose

We study fundamental topics related to organic chemistry and macromolecular chemistry including organic material chemistry, organoelement Chemistry, organic reactions, catalysis in organic synthesis, physical chemistry of polymers, organic chemistry of macromolecules, macromolecular assembly systems, and supramolecular polymer chemistry. The purpose of this lecture is to understand fundamental topic in organic and macromolecular chemistry for learning advanced chemistry, and to gain applied, comprehensive, bird's-eye view skills.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Fundamentals of Physical Chemistry (2.0credits) (物理化学基礎論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
Starts 1	Spring Semester ,every other year	Spring Semester ,every other year	Spring Semester ,every other year
Lecturer	Atsushi Satsuma Professor	Tsukasa TORIMOTO Professor	Koichi KIKUTA Professor
	Jun KUMAGAI Associate Professor	TatsuyaKAMEYAMA Associate Professor	Kyoichi SAWABE Lecturer

●Course Purpose

This lecture aims to be a researcher/engineer who can create and drive the next generation of "engineering and technology", and combines expertise as well as comprehensiveness with an international perspective. In the lectures, we will improve our basic knowledge in physical chemistry. The course is aimed to understand the principle and to attain the applicability of thermodynamics, chemical reaction kinetics, quantum chemistry, etc. which are necessary in various fields as the basis of Physical Chemistry.

●Prerequisite Subjects

Thermodynamics, quantum chemistry, chemical kinetics, structural chemistry, electrochemistry, catalysis/surface chemistry, inorganic and physical chemistry exercises, photochemistry, radiation chemistry, polymer physical chemistry

●Course Topics

This is an omnibus-style class including the following contents in the field of graduate-level physical chemistry related to thermodynamics, chemical reactions, and quantum mechanics.
1. Mechanism and surface of catalytic reaction, various catalysts
2. Industrial use of catalysts
3. Basics of statistical mechanics
4. Molecular Dynamics Method II
5. Quantum chemical calculations
6. Basics of Electrochemistry and Photoelectrochemistry
7. Design and application of nanomaterials
8 Light absorption and emission by organic molecules
9 Characteristics and mechanism of photochemical reaction
10. Photochemical reaction and material chemistry
Prepare for the next class and understand the meaning of technical terms.

●Textbook

In case of necessity, printed handouts will be distributed in each lecture.

●Additional Reading

Textbooks and papers are designated for each week.

●Grade Assessment

Credits will be awarded to those students who score 60 or more based on the evaluation of academic achievements. The academic achievement is evaluated by examination, report, quiz or by their combination. A correct understanding of the basic concepts and terms related to physical chemistry is the criterion for passing.

●Notes

No special requirement.
Classes will be conducted both face-to-face and remotely.
Ask questions to the teacher via NUCT message.

●Contacting Faculty

Do not hesitate to ask any questions during the class, or to have an appointment with each lecturer by e-mail.
satsuma@chembio.nagoya-u.ac.jp(Satsuma)
torimoto@chembio.nagoya-u.ac.jp(Torimoto)
kik@chembio.nagoya-u.ac.jp(Kikuta)
w.shinoda@chembio.nagoya-u.ac.jpShinoda
kumagai@chembio.nagoya-u.ac.jpKumagai
sawabe@chembio.nagoya-u.ac.jpSawabe

Fundamentals of Solide State Chemistry (2.0credits) (固体化学基礎論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
Starts 1	Spring Semester ,every other year	Spring Semester ,every other year	Spring Semester ,every other year
Lecturer	Ryoutarou MATSUDA Professor	Chikara OHTUKI Professor	OSADA Minoru Professor
	NAKANISHI Kazuki Professor	KOBAYASHI Makoto Associate Professor	Joji HASEGAWA Designated Associate Professor
	SEN Susan Designated Associate Professor	Hiroaki IGUCHI Associate Professor	

●Course Purpose

The purpose of this course is to understand important contents of solid-state chemistry including inorganic chemistry, coordination chemistry, structural chemistry, inorganic material chemistry, and crystallography, in order to acquire the ability to develop new materials and substances that support a sustainable society.

In this course, the cutting-edge researchers will provide basic to the latest topics on energy-related materials, inorganic-organic hybrid materials, nanostructured materials, and biomaterials so that students will deepen understanding of these areas.

By the end of this course, students will be able to design new materials with a flexible idea, taking a bird's-eye view of the functions that solid materials manifest.

●Prerequisite Subjects

Fundamental Chemistry I, Fundamental Chemistry II, Inorganic Chemistry 1 with Exercises, Inorganic Chemistry 2 with Exercises, Chemistry of Inorganic Reaction (Inorganic Chemistry 3), and Inorganic Material Chemistry (Inorganic Chemistry 4), Analytical Chemistry 1 with Exercises, Analytical Chemistry 2 with Exercises, Analytical Chemistry 3, Physical Chemistry 1 with Exercises (Chemical Kinetics with Exercises), Physical Chemistry 2 with Exercises (Thermodynamics 1 with Exercises), Physical Chemistry 3 with Exercises (Quantum Chemistry 1 with Exercises), Physical Chemistry 4 with Exercises (Thermodynamics 2 with Exercises), Physical Chemistry 5 with Exercises (Quantum Chemistry 2 with Exercises), Physical Chemistry 6 (Energy and Theoretical Chemistry)

●Course Topics

Each faculty will give lectures in the omnibus style on solid-state chemistry, including inorganic chemistry, complex chemistry, structural chemistry, inorganic material chemistry, and crystallography. The topics include followings.

1. Energy-related (storage, conversion, etc.) materials
2. Inorganic-organic materials
3. Nanostructured materials
4. Nanoparticles
5. Biomaterials
6. Porous materials

Examinations or reports will be assigned after the classes.
References such as scientific papers will be provided in the classes for further reading.

●Textbook

Textbooks are not designated. Prints are distributed when necessary.

●Additional Reading

A. R. West: Solid State Chemistry, WILEY
William D. Callister Jr.: Materials Science and Engineering, Wiley

●Grade Assessment

Students should understand important contents of solid-state chemistry. The evaluation is performed by examinations and reports. Credits will be awarded to those students who score 60 or more.
Grades are as follows:
<Enrollees after 2020>
A+: 100-95, A: 94-80, B: 79-70, C: 69-65, C-: 64-60, F: 59-0.
<Enrollees before 2019>
S: 100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

●Notes

In 2022, on-site lecture will be given.

●Contacting Faculty

Questions outside the hours are accepted in the lecture room or teachers' room after the class. Otherwise, contact the professors by e-mail in advance.

Prof. Ryotaro Matsuda (ryotaro.matsuda[at]chembio.nagoya-u.ac.jp)
Prof. Chikara Ohtsuki (ohtsuki[at]chembio.nagoya-u.ac.jp)
Prof. Minoru Osada (mosada[at]imass.nagoya-u.ac.jp)
Prof. Kazuki Nakanishi (dknakanishi[at]imass.nagoya-u.ac.jp)
Assoc. Prof. George Hasegawa (h-george[at]imass.nagoya-u.ac.jp)
Assoc. Prof. Hiroaki Iguchi (hiroaki.iguchi[at]chembio.nagoya-u.ac.jp)
Assoc. Prof. Makoto Kobayashi (mkoba[at]imass.nagoya-u.ac.jp)

Fundamentals of Biomolecular Chemistry (2.0credits) (分子生命化学基礎論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
Starts 1	Spring Semester ,every other year	Spring Semester ,every other year	Spring Semester ,every other year
Lecturer	Yoshinobu BABA Professor	Takao YASUI Associate Professor	Hiroshi MURAKAMI Professor
	HAYASHI Gosuke Associate Professor	Hiroyuki ASANUMA Professor	Hiromu KASHIDA Associate Professor
	Yukiko KAMIYA Associate Professor		

●Course Purpose

This course aims to help students acquire an understanding of basic knowledge and application about nanobio analytical chemistry, chemical biotechnology, and supramolecular biochemistry. This course introduces methodology relating to measurements and evaluation of substances from various points of view.

●Prerequisite Subjects

basic class of department of biomolecular engineering

●Course Topics

1. Nanobio analytical chemistry
2. Chemical biotechnology
3. Supuramolecular biochemistry

●Textbook

no textbook, handouts as necessary

●Additional Reading

●Grade Assessment

Your overall grade in the class will be decided based on the following:
- Attendance: 30%
- Report: 70%

●Notes

●Contacting Faculty

You may contact the teacher after his/her lecture.
Otherwise you may contact us by email.

Fundamentals of Biosystem Engineering (2.0credits) (生命システム工学基礎論)

Course Type	Basic Courses		
Division at course	Master's Course		
Class Format	Lecture		
Course Name	Molecular and Macromolecular Chemistry	Materials Chemistry	Biomolecular Engineering
Starts 1	Spring Semester ,every other year	Spring Semester ,every other year	Spring Semester ,every other year
Lecturer	KIYONAKA Shigeki Professor	Hiroyuki HONDA Professor	Kazunori SHIMIZU Associate Professor
	Katsutoshi HORI Professor	Atuo SUZUKI Associate Professor	HajimeNAKATANI Lecturer

●Course Purpose

The purpose of this course is to analyze recent topics in Biosystems engineering fields from the basic and applied aspects and to discuss future developments from a engineer's standpoint.
By learning this lecture, the goal is to be able to:
1. Learn and explain recent topics in basics and applications in the field of biosystems engineering.
2. Give an opinion on the future development of this field based on sufficient awareness of the current situation.

●Prerequisite Subjects

Biochemistry with exercises 1-4, Biochemistry 5.
Fundamentals of Chemical Engineering.
Bioreaction Engineering.
Biological data science and engineering.

●Course Topics

1. Topics in drug development and regenerative medicine.
2. Topics in microbiology and applied microbiology.
3. Topics in chemical biology fields.

●Textbook

Text book will be introduced in the class.

●Additional Reading

Biochemistry, D. Voet & J. G. Voet, 4th Edition.
Biochemsiry, J.M. Berg, L. Stryer, J.L. Tymoczko & G.L. Gatto, 8th Edition.

●Grade Assessment

The score will be evaluated by presentation, report and discussion.

●Notes

●Contacting Faculty

Contact with the faculties at the class room or by email.
Shimizu: shimizu(at)chembio.nagoya-u.ac.jp
Nakatani: nakatanih(at)chembio.nagoya-u.ac.jp
Kiyonaka: kiyonaka(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 1A (2.0credits) (有機化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Alkylation of enolates and other carbon nucleophiles
2. Reaction of carbon nucleophiles with carbonyl compounds
3. Functional group interconversion by substitution including protection and deprotection

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Alkylation of enolates and other carbon nucleophiles
2. Reaction of carbon nucleophiles with carbonyl compounds
3. Functional group interconversion by substitution including protection and deprotection

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 1A (2.0credits) (有機化学セミナー 1A)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	1 Spring Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers related to the cutting-edge molecular catalysis in organic synthesis, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read the scientific papers in the field of organic molecular catalysis, and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion.

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 1A (2.0credits) (有機化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compounds]We recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the class.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom or their offices.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 1A (2.0credits) (有機化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will study how to do research and methods for research, and learn the latest research topics to understand tendency of the related researches. The purpose is understanding all the field of synthetic organic chemistry and reaction chemistry toward gaining knowledge and ability to propose new research projects.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 1B (2.0credits) (有機化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Electrophilic additions to carbon-carbon multiple bonds
2. Reduction of carbon-carbon multiple bonds, carbonyl groups, and other functional groups
3. Concerted cycloaddtions, unimolecular rearrangements, and thermal eliminations

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Alkylation of enolates and other carbon nucleophiles
2. Reaction of carbon nucleophiles with carbonyl compounds
3. Functional group interconversion by substitution including protection and deprotection

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 1B (2.0credits) (有機化学セミナー 1B)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	1 Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers organic molecular catalysis, synthetic chemistry, and photocatalysis, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read the scientific papers in the field oforganic molecular catalysis, synthetic chemistry, and photocatalysis, and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 1B (2.0credits) (有機化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 1B (2.0credits) (有機化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will study how to do research and methods for research, and learn the latest research topics to understand tendency of the related researches. The purpose is understanding all the field of synthetic organic chemistry and reaction chemistry toward gaining knowledge and ability to propose new research projects.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 1C (2.0credits) (有機化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Organometalic compounds of Group I and II Metals
2. reactions Involving Transition Metals
3. Carbon-carbon bond-forming reactions of compounds of boron, silicon, and tin

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Organometalic compounds of Group I and II Metals
2. reactions Involving Transition Metals
3. Carbon-carbon bond-forming reactions of compounds of boron, silicon, and tin

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 1C (2.0credits) (有機化学セミナー 1C)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	2 Spring Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, including supramolecular chemistry and structural chemistry of organic molecules, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read the scientific papers in the field of supramolecular chemistry and structural chemistry of organic molecules, and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 1C (2.0credits) (有機化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 1C (2.0credits) (有機化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will study how to do research and methods for research, and learn the latest research topics to understand tendency of the related researches. The purpose is understanding all the field of synthetic organic chemistry and reaction chemistry toward gaining knowledge and ability to propose new research projects.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 1D (2.0credits) (有機化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Reaction involving carbocations, carbenes, and radicals as reactive intermediates
2. Aromatic substitution reactions
3. Oxidations

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Reaction involving carbocations, carbenes, and radicals as reactive intermediates
2. Aromatic substitution reactions
3. Oxidations

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 1D (2.0credits) (有機化学セミナー 1D)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	2 Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, including theoretical chemistry and biochemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read the scientific papers in the field of theoretical chemistry and biochemistry, and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 1D (2.0credits) (有機化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 1D (2.0credits) (有機化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will study how to do research and methods for research, and learn the latest research topics to understand tendency of the related researches. The purpose is understanding all the field of synthetic organic chemistry and reaction chemistry toward gaining knowledge and ability to propose new research projects.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1A (2.0credits) (高分子化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 1A (2.0credits) (高分子化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of soft materials and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes. Use English as occasionally needed to enhance the above skills, both in Japan and abroad.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1A (2.0credits) (高分子化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design, functions, and control mechanisms of the transformation of organic substances to organic materials and polymers through the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, participants are expected to explain how to synthesize polymers from monomers with their structures and discuss the stereochemistry of the polymers.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be requested to orally present each topic related to their main-subjects during their master theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation, attendance to discussion and attitude in class: 100%

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 1A (2.0credits) (高分子化学セミナー 1A)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1B (2.0credits) (高分子化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the lecture.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 1B (2.0credits) (高分子化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer materials and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes. Use English as occasionally needed to enhance the above skills, both in Japan and abroad.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1B (2.0credits) (高分子化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design, functions, and control mechanisms of the transformation of organic substances to organic materials and polymers through the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, participants are expected to explain the relationships between the structures of polymers and stereochemistry/physical properties and the relationships between the structures of polymers and their functions.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be requested to orally present each topic related to their main-subjects during their master theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation, attendance to discussion and attitude in class: 100%

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 1B (2.0credits) (高分子化学セミナー 1B)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1C (2.0credits) (高分子化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions. By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers. Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.Contact addressTakano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jpNoro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 1C (2.0credits) (高分子化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes. Use English as occasionally needed to enhance the above skills, both in Japan and abroad.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1C (2.0credits) (高分子化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design, functions, and control mechanisms of the transformation of organic substances to organic materials and polymers through the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, participants are expected to explain the relationships between the structures/stereochemistry of polymers and supramolecules and their physical properties and functions and also describe the research trend and problems in specific topics related to their main-subjects during their master theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be requested to orally present each topic related to their main-subjects during their master theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation, attendance to discussion and attitude in class: 100%

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 1C (2.0credits) (高分子化学セミナー 1C)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1D (2.0credits) (高分子化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 1D (2.0credits) (高分子化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes. Use English as occasionally needed to enhance the above skills, both in Japan and abroad.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.5. Use English as occasionally needed to enhance the above skills, both in Japan and abroad.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 1D (2.0credits) (高分子化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design, functions, and control mechanisms of the transformation of organic substances to organic materials and polymers through the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, participants are expected to explain the research purpose, trend and challenges for the future in specific topics related to their main-subjects during their master theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be requested to orally present each topic related to their main-subjects during their master theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation, attendance to discussion and attitude in class: 100%

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 1D (2.0credits) (高分子化学セミナー 1D)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

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.

Structural Chemistry of Organic Compounds (2.0credits) (構造有機化学)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Hiroshi SHINOKUBO Professor

●Course Purpose
This lecture aims to understand the structural and electronic properties and reactivity of important organic molecules. Reactive intermediates and conjugated electronic systems are important topics in this lecture.

●Prerequisite Subjects
Organic Chemistry

●Course Topics
1. Introduction
2. Interaction among molecules
3. Aromatic compounds
4. Nonplanar aromatic molecules
5. Möbius aromaticity
6. Stable radicals

We recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the class.

●Grade Assessment
Grading will be decied based on the quality of submitted reports. The subjects of the reports will be specified in the class.

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties on-line.
Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp
Miyake: Eng. Bld#1, room 837, 4566, miyake(at)chembio.nagoya-u.ac.jp

Please replace (at) with @.

Organometallic Chemistry (2.0credits) (有機金属化学)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Autumn Semester ,every other year
Lecturer	MakotoYAMASHITA Professor

●Course Purpose

Organometallic compounds are closely related to our society through their function as a catalyst. In this course, we will learn the basic (bonding property, structural features, and elementary reactions of organometallic compounds including main group and transition metal compounds) and advanced (catalytic function and factors to control selectivity) chemistry of organometallic compounds. After the mid-term exam for the basic and advanced chemistry described above, we will learn the topics related to organometallic chemistry from the latest research papers to know application of organometallic compounds in the cutting-edge research. From this study, we should consider the placement of the introduced paper in the wide range of chemistry and understand the relationship between the principles of organometallic chemistry and the latest research. As a final goal, we should write a report for research proposal as the next step of the latest research papers.
Purpose of the course: understanding the structures, properties, and catalytic functions of organometallic compounds, and gaining an ability of making a research proposal by utilizing the knowledge obtained in this course

●Prerequisite Subjects

(undergraduate study, old syllabus) Elements of Organic Chemistry, Organic chemistry I-IV, Organic Chemistry Exercises 1&2, Structural Organic Chemistry, Elements of Inorganic Chemistry, Inorganic Chemistry A, Inorganic and Physical Chemistry Exercises 1&2
(undergraduate study, new syllabus) Organic Chemistry 1-4 with Exercises, Organic Chemistry 5, Structural Organic Chemistry, Inorganic Chemistry 1&2 with Exercises

●Course Topics

(1) Introduction to Organometallic Chemistry, (2) Features of metal-carbon bonds, (3) Characters of ligands, (4) Reactions of organometallic compounds, (5) Catalytic function of organometallic chemistry, (6) Metal-catalyzed carbon-carbon bond formation, (7) Mid-term exam, (8) Reading the research article of organometallic chemistry and writing a research proposal

●Textbook

In each class, handouts will be distributed.

●Additional Reading

Robert H. Crabtree, "The Organometallic Chemistry of the Transition Metals, 6th Edition", Wiley, 2014. ISBN: 9781118138076
John F. Hartwig, "Organotransition Metal Chemistry: From Bonding to Catalysis", Univ. Science Books, 2009, ISBN: 9781891389535

●Grade Assessment

Quiz in the class (20%), mid-term exam (30%), and research proposal (50%), totally 100 points, over 60 points are required to earn credit, In the case of you will not submit the research proposal, the grading will be "absence".

●Notes

●Contacting Faculty

You can ask questions just after the class and you can visit the room of the lecturer
Contact information: room number, phone, e-mail
Yamashita: Room 1029 (No.1 building), 052-789-3335, makoto@oec.chembio.nagoya-u.ac.jp
Ito: Room 1031 (No.1 building), 052-789-3336, jito@oec.chembio.nagoya-u.ac.jp

Chemistry of Organic Reaction (2.0credits) (有機反応化学)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	Spring Semester ,every other year	
Lecturer	Kosuke OMATSU Designated Associate Professor	Takashi OOI Professor

●Course Purpose

The purpose of the first half of the class is to learn about the representative methods for the mechanistic investigations of organic reactions. The purpose of the later half of the class is to learn about the acidity of organic molecules and to acquire the ability to understand and predict the selectivity of organic transformations, especially the reactions of enolates.Achievement target1. Evaluate and discuss the validity of mechanistic investigations.2. Propose experimental methods for elucidating the mechanism of new reactions.3. Understand and logically explain the selectivity of the reactions of enolates.4. Propose new catalytic reactions.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Basic mechanistic study: Learn about representative methods for mechanistic investigations.2. Experimental approach to elucidate the reaction mechanisms: Understand the theories of analytical experiments and kinetic experiments.3. Acidity of organic compounds: Learn about the methods to estimate pKa values and acidity of various compounds.4. Selectivity of organic reactions: Learning focusing on regio- and/or stereoselective reactions of enolates.Reports to evaluate for understanding and application skills are imposed at the middle and the end of the class.

●Textbook

●Additional Reading

J.Fuhrhop, G.Penzlin;Organic Synthesis; VCH,Weinheim,1994

●Grade Assessment

Grades will be based on the assessment of two reports. Credits will be awarded to those students who score 60 or more.

●Notes

●Contacting Faculty

Catalysis in Organic Synthesis (2.0credits) (触媒有機合成学)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	Autumn Semester ,every other year	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Catalytic synthesis is an important means for synthesizing chemical compounds efficiently in organic chemistry. The purpose of this class is to understand the basics of catalytic organic synthesis in organic chemistry through learning of multi-step synthesis.
In this class, students will have the basic knowledge of catalysis at the end of the class, such as synthesis/reverse synthesis, functional group conversion, skeletal rearrangement, cascade reaction, asymmetric synthesis, and the selection of protecting groups.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.

●Course Topics

1. Basics of catalytic reactions
2. Basics of synthesis / retrosynthesis
3. Functional group transformation
4. Skeletal rearrangement reaction
5. Cascade reactions
6. Asymmetric synthesis
7. Protecting groups

●Textbook

In each class, handouts will be distributed.

●Additional Reading

Carey & Sundberg, Advanced Organic Chemistry: Part B: Reaction and Synthesis. Springer, 2007.
Additional reference books or prints will be introduced in the class.

●Grade Assessment

Grades will be based on the active participation in class and report.
Credits will be awarded to those students who score 60 or more.

●Notes

No classes are required to take this class.

●Contacting Faculty

Eng. Build. 1, Room 724 (Muhammet Uyanik).

Organic Chemistry of Macromolecules (2.0credits) (機能高分子化学)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	Autumn Semester ,every other year	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn mechanisms and advanced topics of precision polymer synthesis such as living and stereospecific polymerization in radical, anionic, cationic, and coordination polymerizations. Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to creating new functional polymer materials.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Molecular Assembly Chemistry (2.0credits) (高分子組織化学)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Yukikazu Takeoka Associate Professor

●Course Purpose

The role of soft materials in engineering and technology related to materials is becoming increasingly important. Soft materials such as polymers, liquid crystals, gels, and molecular films exhibit strong synergistic effects, making it possible to construct an extremely attractive material system for both basic and practical use. The purpose of this lecture is to cultivate applied skills related to material creation technology based on both the basic concept of soft materials and specialized fields. By learning this lecture, the goal is to be able to:Understand basic chemistry and physics related to molecular organization.Understand the behavior and organization of molecules and macromolecular aggregates.Obtain ide knowledge of structure/characteristics, kinetics, functions (mainly optical and photoresponsive functions)Understand the relationship between the latest research trends and everyday phenomena and technologies.

●Prerequisite Subjects

Organic chemistry, physical chemistry, polymer synthetic chemistry, polymer physical chemistry, interface science, photochemistry, etc.

●Course Topics

1. Introduction to polymer-assembly chemistry2. Basics of intermolecular force and surface chemistry3. Micelle4. Molecular thin film (bilayer structure, self-assembled film, Langmuir-Blodgett film) and its function5. Liquid crystal materials, liquid crystal devices (thermotropic liquid crystal, lyotropic liquid crystal, etc.) and their functions6. Gel materials and functions7. Formation and function of supramolecular structure and polymer structure8. Particle accumulation and functions9. Other

●Textbook

Textbooks are not specified because of their extensive content. Distribute appropriate prints.

●Additional Reading

Takahiro Seki, Molecular Orientation Control (The Chemical Society of Japan, Key Points in Chemistry Series 33), Kyoritsu Publishing (2019)

●Grade Assessment

Evaluation will be based on the submission of a reaction paper (quiz) that is conducted every time and the final report.The following evaluation is made based on the total score.100 to 95 points: A +, 94 to 80 points: A, 79 to 70 points: B, 69 to 65 points: C, 64 to 60 points: C-, 59 points or less: F

●Notes

Please study the basics of macromolecules.

●Contacting Faculty

We accept questions and communications.Takahiro Sekiphone: 4668, E-mail: tseki@chembio.nagoya-u.ac.jp Yukikazu Takeokaphone: 4670, E-mail: ytakeoka@chembio.nagoya-u.ac.jp

Supramolecular and Polymer Chemistry (2.0credits) (超分子・高分子化学)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Lecture	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	Autumn Semester ,every other year	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this class is to learn static and dynamic aspects on structures and stereochemistry of supramolecules and macromolecules, in particular, helical polymers and supramolecules from the view point of their synthesis, structures, reactivity, and functions.

●Prerequisite Subjects

Organic Chemistry 1 and 2, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

1. Principles of polymer chemistry-1: Chain polymerization and coordination polymerization 2. Principles of polymer chemistry-2: Chain polymerization and stereoregularity of polymers 3. Stereochemistry of polymers and chirality 4. Asymmetric polymerization 5. Helial structures of synthetic and biological polymers 6. Synthesis, structures, functions and applications of helical polymers-1 7. Synthesis, structures, functions and applications of helical polymers-2 8. Synthesis, structures, functions and applications of helical polymers-3 9. Principles of supramolecular chemistry-1 10. Principles of supramolecular chemistry-2 11. Synthesis, structures, and functions of supramolecules-1 12. Synthesis, structures, and functions of supramolecules-2 13. Control of chirality of supramolecules and application-1 14. Control of chirality of supramolecules and application-2 15. Summary

●Textbook

Print text and reference

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)Basic Organic Stereochemistry. E. L. Eliel, S. H. Wilen, M. P. Doyle; Wiley Inter-Science)Supramolecular Helical Systems: Helical Assemblies of Small Molecules, Foldamers, and Polymers with Chiral Amplification and Their Functions, E. Yashima, N. Ousaka, D. Taura, K. Shimomura, T. Ikai, and K. Maeda, Chem. Rev., 116, 13752-13990 (2016)

●Grade Assessment

Your overall grade in the class will be decided based on the following: Attendance to discussion and attitude in class: 50%Reports: 50%

●Notes

●Contacting Faculty

During a break after lecture.

Practical Analytical Methods in Organic　Chemistry (2.0credits) (有機分析化学)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	1 Autumn Semester
Lecturer	MakotoYAMASHITA Professor

●Course Purpose

In the modern organic chemistry, it is common to determine the structure of the novel compounds with many analytical methods. Therefore, it is very important to know the principle of each measurement and what kind of information will be available with each measurement. In this course, we will learn popular measurements in organic chemistry among many analytical methods, and will build up the ability to achieve the structural characterization of organic molecules by ourselves.Purpose of the course: UV-vis spectroscopy: understanding principle, Lambert-Beer law, dyes and their interactionsIR spectroscopy: understanding principle, characteristic absorptions of each functional groups, reading spectrumNMR spectroscopy: understanding principle, vector model, relaxation, chemical shift, gyromagnetic ratio, NMR active nuclei, spin-spin coupling, coupling constants, multiplicity, dynamic motion of molecules, decoupling, multinuclear NMR, 1H and 13C NMR, reading spectrummass spectroscopy: understanding principle, ionization, molecular ion, fragmentation, isotopic ratio, reading spectrumX-ray crystallographic analysis: understanding principle, method to read crystallographic data

●Prerequisite Subjects

Organic Chemistry 1-4 with Exercises, Organic Chemistry 5, Structural Organic Chemistry, Inorganic Chemistry 1 with Exercises, Analytical Chemistry 2 with Exercises, Analytical Chemistry 3

●Course Topics

(1) UV-vis spectroscopy(2) IR spectroscopy(3)-(9) NMR spectroscopy(10)-(11) MS spectroscopy(12)-(14) X-ray crystallographic analysis(15) term-end exam

●Textbook

●Additional Reading

Harald Gunther, "NMR Spectroscopy: Basic Principles, Concepts and Applications in Chemistry", Wiley-VCH, 2013. ISBN: 9783527330003

●Grade Assessment

Quiz in the class (20%) and term-end exam (80%, you can take all handout in the classes to this test), totally 100 points, over 60 points are required to earn credit, In the case of you will not submit the research proposal, the grading will be "absence".Requirement: All participants should understand the principle, features, relationship between measurement conditions and observable data, and should be able to analyze the structures of organic compounds based on several different measurements.

●Notes

●Contacting Faculty

You can ask questions just after the class, visit the room of the lecturer, and send email to the lecturer.Contact information: Prof. Makoto Yamashita: Room 1029 (No.1 building), 052-789-3335, makoto@oec.chembio.nagoya-u.ac.jp

Advanced Molecular Chemistry I (1.0credits) (有機化学特論 Ⅰ)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Part-time Faculty

●Course Purpose

We study advanced topics related to organic chemistry from the front-line researchers, expand and deepen our knowledge, and cultivate the creativity. We integrate the knowledge and acquire ability to apply them to our researches as well as to see individual researches from a bird's-eye view.

●Prerequisite Subjects

Organic Chemistry, Structural Organic Chemistry, Fundamentals of Molecular and Macromolecular Chemistry

●Course Topics

Advance topics related to organic chemistry

●Textbook

NA

●Additional Reading

TBA

●Grade Assessment

Attendance and paper

●Notes

●Contacting Faculty

Advanced Macromolcular Chemistry I (1.0credits) (高分子化学特論 I)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Part-time Faculty

●Course Purpose

We study advanced topics related to macromolecular and polymer chemistry from the front-line researchers, expand and deepen our knowledge, and cultivate the creativity. We integrate the knowledge and acquire ability to apply them to our researches as well as to see individual researches from a bird's-eye view.

●Prerequisite Subjects

Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, Physical Chemitry of Macromolecules, Fundamentals of Molecular and Macromolecular Chemistry

●Course Topics

Advanced topics related to macromolecular and polymer chemistry

●Textbook

NA

●Additional Reading

TBA

●Grade Assessment

Attendance and paper

●Notes

●Contacting Faculty

Advanced Molecular Chemistry II (1.0credits) (有機化学特論 II)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Part-time Faculty

●Course Purpose

We study advanced topics related to organic chemistry from the front-line researchers, expand and deepen our knowledge, and cultivate the creativity. We integrate the knowledge and acquire ability to apply them to our researches as well as to see individual researches from a bird's-eye view.

●Prerequisite Subjects

Organic Chemistry, Structural Organic Chemistry, Fundamentals of Molecular and Macromolecular Chemistry

●Course Topics

Advance topics related to organic chemistry

●Textbook

NA

●Additional Reading

TBA

●Grade Assessment

Attendance and paper

●Notes

●Contacting Faculty

Advanced Macromolcular Chemistry II (1.0credits) (高分子化学特論 II)

Course Type	Specialized Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Molecular and Macromolecular Chemistry
Starts 1	Spring Semester ,every other year
Lecturer	Part-time Faculty

●Course Purpose

We study advanced topics related to macromolecular and polymer chemistry from the front-line researchers, expand and deepen our knowledge, and cultivate the creativity. We integrate the knowledge and acquire ability to apply them to our researches as well as to see individual researches from a bird's-eye view.

●Prerequisite Subjects

Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, Physical Chemitry of Macromolecules, Fundamentals of Molecular and Macromolecular Chemistry

●Course Topics

Advanced topics related to macromolecular and polymer chemistry

●Textbook

Print text and reference.

●Additional Reading

Will be announced during the class.

●Grade Assessment

Attendance and report.

●Notes

●Contacting Faculty

Questions will be accepted during the lecture and after the lecture.

Advanced Experiments and Exercises in Molecular Chemistry I (4.0credits) (有機化学特別実験及び演習Ⅰ)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Engineering simulation on catalysis in organic synthesis by experiments and excercises

Goal achievement
1. Experiments and exercises of process chemistry
2. Experiments and exercises of green chemistry
3. Report and oral examination

●Prerequisite Subjects

Organic Chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Experiments and exercises of process chemistry
2. Experiments and exercises of green chemistry
3. Report and Oral examination

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (50 points) and oral examination (50 points). Pass mark: 60 points

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Molecular Chemistry I (4.0credits) (有機化学特別実験及び演習Ⅰ)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	1 Spring and Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this course, students will conduct experiments on organic synthesis and organic molecular catalysis in order to learn advanced techniques for scientific research in the field of organic chemistry. In addition, learn about the theories and methods for the analysis and evaluation of experimental results.Achievement target1. Perform advanced experimental operations for organic synthesis.2. Analyze the experimental results appropriately by using spectroscopy such as NMR.3. Synthesize a variety of organic compounds.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Experimental research: First-year graduates will conduct scientific research related to the main themes of the laboratory: "ionic molecular catalysts", "radical catalysts", "development of new reactions", and "bioactive molecules". When planning an experiment, students have to check the properties of compounds by MSDS in advance. The procedure of the experimental operation should be summarized briefly. Check the plan at the beginning of each class.2. Result report: Attend the research report meeting that is held once every two weeks. In the meeting, students will not only explain the contents of the experiments, but also explain the purpose of each experiment and the considerations on the results in an easy-to-understand manner.

●Textbook

No special textbook. Documents will be distributed on requirements.

●Additional Reading

Carey, Sundberg, Advanced Organic Chemistry, 4th edition, Kluwer Academic/Plenum, 2001.

●Grade Assessment

Based on the quality of experiments, reports, and discussion in the meeting.

●Notes

●Contacting Faculty

Directly contact faculties.

Advanced Experiments and Exercises in Molecular Chemistry I (4.0credits) (有機化学特別実験及び演習Ⅰ)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students to gain a deeper knowledge of structural organic chemistry through presentations and discussions.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Advanced Experiments and Exercises in Molecular Chemistry I (4.0credits) (有機化学特別実験及び演習Ⅰ)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

As basic concept for organic chemistry, students will learn organic reactions, plan for new synthetic pathway, and do experimental works. Especially, research areas of organic synthesis, organometallic chemistry, main group element chemistry, and catalysis will be focused.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Molecular Chemistry II (4.0credits) (有機化学特別実験及び演習 II)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Engineering simulation on catalysis in organic synthesis by experiments and excercises

Goal achievement
1. Experiments and exercises of advanced process chemistry
2. Experiments and exercises of advanced green chemistry
3. Report and oral examination

●Prerequisite Subjects

Organic Chemistry
Catalysis in Organic Synthesis

●Course Topics

1. Experiments and exercises of advanced process chemistry
2. Experiments and exercises of advanced green chemistry
3. Report and Oral examination

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (50 points) and oral examination (50 points). Pass mark: 60 points

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Molecular Chemistry II (4.0credits) (有機化学特別実験及び演習II)

Course Type	Specialized Courses		
Division at course	Master's Course		
Class Format	Experiment and Exercise		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	2 Spring and Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this course, students will conduct experiments on organic synthesis and organic molecular catalysis in order to learn advanced techniques for scientific research in the field of organic chemistry. In addition, learn about the theories and methods for the analysis and evaluation of experimental results.Achievement target1. Perform advanced experimental operations for organic synthesis.2. Analyze the experimental results appropriately by using spectroscopy such as NMR.3. Synthesize a variety of organic compounds.

●Prerequisite Subjects

Organic Chemistry 1-5, Experiments in Organic Chemistry, Structural Organic Chemistry, Organic Reactions.

●Course Topics

1. Experimental research: Students will conduct scientific research related to the main themes of the laboratory: "ionic molecular catalysts", "radical catalysts", "development of new reactions", and "bioactive molecules". When planning an experiment, students have to check the properties of compounds by MSDS in advance. The procedure of the experimental operation should be summarized briefly. Check the plan at the beginning of each class.2. Result report: Attend the research report meeting that is held once every two weeks. In the meeting, students will not only explain the contents of the experiments, but also explain the purpose of each experiment and the considerations on the results in an easy-to-understand manner.

●Textbook

No special textbook. Documents will be distributed on requirement.

●Additional Reading

Carey, Sundberg, Advanced Organic Chemistry, 4th edition, Kluwer Academic/Plenum, 2001.

●Grade Assessment

Based on the quality of experiments, reports, and discussion in the meeting.

●Notes

●Contacting Faculty

Directly contact faculties.

Advanced Experiments and Exercises in Molecular Chemistry II (4.0credits) (有機化学特別実験及び演習 II)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students to gain a deeper knowledge of structural organic chemistry through presentations and discussions.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Advanced Experiments and Exercises in Molecular Chemistry II (4.0credits) (有機化学特別実験及び演習 II)

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

As basic concept for organic chemistry, students will learn organic reactions, plan for new synthetic pathway, and do experimental works. Especially, research areas of organic synthesis, organometallic chemistry, main group element chemistry, and catalysis will be focused.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Macromolecular Chemistry I (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is to learn the basic knowledge on polymer physical chemistry and to cultivate the ability to apply the knowledge by reading the representative textbooks related with physical properties of polymers or the recent reviews related with physical properties and structures of polymers as well as making presentations with discussions. The course is also aimed for students to experience the recent research circumstances by conducting the experiments. By completing the course, students will learn how to approach, proceed, and summarize researches on polymer physical chemistry.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers. In addition, in order to confirm whether students have proceeded their own researches appropriately, students make presentations on their research results which will be discussed through questions and answers Read carefully the literature in advance and make sufficient preparations for presentations. Experiments should be conducted in a planned manner and prepare the documents for research presentations thoroughly.

●Textbook

Polymer Chemistry 2nd Ed, Paul C. Hiemenz and Timothy P. Lodge (CRC Press)ISBN: 1-57444-779-3

●Additional Reading

Appropriate references will be given in the lecture.

●Grade Assessment

Research materials and/or presentations

●Notes

●Contacting Faculty

Questions before/after the experiment and exercise will be accepted in the instructors' room.Contact adress:Takano: ext.4604, e-mail atakano@chembio.nagoya-u.ac.jp Noro: ext.4587, e-mail noro@chembio.nagoya-u.ac.jp

Advanced Experiments and Exercises in Macromolecular Chemistry I (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The aim is to increase practical skills and problem-solving skills necessary for engaging in engineering and technology of materials based on polymer chemistry.Through experimentation and practical training on light control of soft materials such as thin films and liquid crystals, etc., it is possible to acquire advanced experimental techniques and acquire research, design, and practical skills.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Experiment2. Practice3. Acquisition of expertise and abilities including safety4. Practical English acquisition

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Macromolecular Chemistry I (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design and synthesis of functional organic and polymer materials and control of their structures and functions through the related literature and papers and a series of laboratory experiments. At the end of this seminar, participants are expected to explain the basic synthetic schemes of organic compounds and polymers along with their syntheses in laboratory and structural analyses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be required to prepare synthetic schemes of organic compounds and polymers which direct to their main-subjects during their master theses and also required to do laboratory experiments according to the synthetic schemes and write monthly reports which will be presented orally every month.

●Textbook

Will be introduced in the class.

●Additional Reading

Will be introduced based on the progress of the experiments.

●Grade Assessment

Will be evaluated based on the monthly reports and the quality of the students' experimental performance in the laboratory (100%).

●Notes

●Contacting Faculty

Questions will be accepted during the class.

Advanced Experiments and Exercises in Macromolecular Chemistry I (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring and Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn experiments and exercises related to precision polymer synthesis. Upon taking this course, you aim to get right skills and thinkings on precision polymer synthesis and then abilities to apply them to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

dvanced Experiments and Exercises in Macromolecular Chemistry II (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is to learn the basic knowledge on polymer physical chemistry and to cultivate the ability to apply the knowledge by reading the representative textbooks related with physical properties of polymers or the recent reviews related with physical properties and structures of polymers as well as making presentations with discussions. The course is also aimed for students to experience the recent research circumstances by conducting the experiments. By completing the course, students will learn how to approach, proceed, and summarize researches on polymer physical chemistry.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers. In addition, in order to confirm whether students have proceeded their own researches appropriately, students make presentations on their research results which will be discussed through questions and answers Read carefully the literature in advance and make sufficient preparations for presentations. Experiments should be conducted in a planned manner and prepare the documents for research presentations thoroughly.

●Textbook

Polymer Chemistry 2nd Ed, Paul C. Hiemenz and Timothy P. Lodge (CRC Press)ISBN: 1-57444-779-3

●Additional Reading

Appropriate references will be given if necessary.

●Grade Assessment

Research materials and/or presentations

●Notes

●Contacting Faculty

Questions before/after the experiment and exercise will be accepted in the instructors' room.Contact adress:Takano: ext.4604, e-mail atakano@chembio.nagoya-u.ac.jp Noro: ext.4587, e-mail noro@chembio.nagoya-u.ac.jp

Advanced Experiments and Exercises in Macromolecular Chemistry II (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The aim is to increase practical skills and problem-solving skills necessary for engaging in engineering and technology of materials based on polymer chemistry. Through experimentation and practical training on light control of soft materials such as polymer films and liquid crystals, etc., it is possible to acquire advanced experimental techniques and acquire research, design, and practical skills.

●Prerequisite Subjects

●Course Topics

1. Experiment2. Practice3. Acquisition of expertise and abilities including safety4. Practical English acquisition

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Advanced Experiments and Exercises in Macromolecular Chemistry II (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this course is to learn the design and synthesis of functional organic and polymer materials and control of their structures and functions through the related literature and papers and a series of laboratory experiments. At the end of this seminar, participants are expected to explain the synthetic schemes of desired organic compounds and polymers and their mechanisms along with their syntheses in laboratory and structural analyses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry and Synthetic Polymer Chemistry

●Course Topics

Participants will be required to prepare synthetic schemes of organic compounds and polymers which direct to their main-subjects during their master theses and also required to do laboratory experiments according to the synthetic schemes and write monthly reports which will be presented orally every month.

●Textbook

Will be introduced in the class.

●Additional Reading

Will be introduced based on the progress of the experiments.

●Grade Assessment

Will be evaluated based on the monthly reports and the quality of the students’ experimental performance in the laboratory (100%).

●Notes

●Contacting Faculty

Questions will be accepted during the class.

dvanced Experiments and Exercises in Macromolecular Chemistry II (4.0credits) (高分子化学特別実験及び演習 I

Course Type	Specialized Courses	
Division at course	Master's Course	
Class Format	Experiment and Exercise	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring and Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn experiments and exercises related to precision polymer synthesis. Upon taking this course, you aim to get right skills and thinkings on precision polymer synthesis and then abilities to apply them to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

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.

Laboratory Visit 1 U2 (2.0credits) (研究室ローテーション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
	Chemical Systems Engineering	Department of Energy Engineering	Department of Applied Energy
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

Up to 20 days research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U3 (3.0credits) (研究室ローテーション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
	Chemical Systems Engineering	Department of Energy Engineering	Department of Applied Energy
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

21 days or more and 40 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U4 (4.0credits) (研究室ローテーション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
	Chemical Systems Engineering	Department of Energy Engineering	Department of Applied Energy
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

41 days or more and 60 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U6 (6.0credits) (研究室ローテーション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
	Chemical Systems Engineering	Department of Energy Engineering	Department of Applied Energy
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

61 days or more and 80 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U8 (8.0credits) (研究室ローテーション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
	Chemical Systems Engineering	Department of Energy Engineering	Department of Applied Energy
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty		

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

81 days or more research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

Submission of the report after each class is mandatory.

●Textbook

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

●Additional Reading

Original lecture notes will be provided at each class.

●Grade Assessment

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

●Notes

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

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

●Contacting Faculty

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

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

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	Molecular and Macromolecular Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	Associated Faculty

●Course Purpose

The objective of this lecture is that students become a researcher/engineer who can create and drive the next generation of "engineering and technology", and combines expertise as well as comprehensiveness with an international perspective. As an internship, he/she will perform employment experience related to his/her major and future career for a certain period of time. Under the supervising of the receiving company, we learn the experience in the necessity of learning socially-accepted idea and learn how academics are related. Besides, we confirm the mental attitude for going to society and cultivate the ability of creation with knowledge and wisdom learned at universities and graduate schools.

●Prerequisite Subjects

Chemistry, Physics, Biology, your major subjects

●Course Topics

The content varies depending on the situation of each receiving company. As an example, there are the following contents. 1. Safety education 2. Visit factory/laboratory 3. Understanding the background of the research purpose at factories/laboratories 4. Experiments, simulations, etc. on specific themes 5. Meeting on reviewing research progress 6. Meeting on accomplishment report on own themes

●Textbook

Whether textbook is needed or not depending on the situation of each hosting company.

●Additional Reading

Whether reference is needed or not depending on the situation of each hosting company.

●Grade Assessment

Attendance record and reports, and pass 60 points or more out of 100

●Notes

●Contacting Faculty

Please contact the internship instructor or your supervisor.

International Cooperative Research Project U2 (2.0credits) (国際共同研究 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
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The purpose of this international project is to develop young researchers who have comprehensive and international abilities and can play an active role internationally.

Through this project, students will be able to
1) make an original research plan and perform it.
2) communicate and discuss with other foreign researchers in English fluently.
3) enhance their research and presentation skills.

●Prerequisite Subjects

Basic engineering classes, English, Technical English

●Course Topics

Experience R & D at overseas research institutes as follows.
1) Set a research theme and make a research plan based on discussions with overseas supervisors and conduct research.
2) Present your research results in English at your place of stay and discuss.
3) After returning to Japan, report the contents of research activities to the supervisor and receive comprehensive evaluation.

●Textbook

Will be designated by the supervisor in the visiting university (or research group).

●Additional Reading

Will be designated by the supervisor in the visiting university (or research group).

●Grade Assessment

Receive the evaluation of the instructor in your stay regarding the theme setting, research ability, and discussion method at the joint research destination. After returning to Japan, submit and present a report to the supervisor of the University. If the above results are comprehensively evaluated and it is deemed that sufficient research achievement ability has been acquired, the credits will be awarded.

●Notes

TBA; Contact with your supervisor and mentor.

●Contacting Faculty

Ask to the supervisors in Nagoya university and visiting research group.

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

●Course Purpose

The purpose of this international project is to develop young researchers who have comprehensive and international abilities and can play an active role internationally.Through this project, students will be able to1) make an original research plan and perform it.2) communicate and discuss with other foreign researchers in English fluently.3) enhance their research and presentation skills.

●Prerequisite Subjects

Basic engineering classes, English, Technical English

●Course Topics

Experience R & D at overseas research institutes as follows.1) Set a research theme and make a research plan based on discussions with overseas supervisors and conduct research.2) Present your research results in English at your place of stay and discuss.3) After returning to Japan, report the contents of research activities to the supervisor and receive comprehensive evaluation.

●Textbook

Will be designated by the supervisor in the visiting university (or research group).

●Additional Reading

Will be designated by the supervisor in the visiting university (or research group).

●Grade Assessment

Receive the evaluation of the instructor in your stay regarding the theme setting, research ability, and discussion method at the joint research destination. After returning to Japan, submit and present a report to the supervisor of the University. If the above results are comprehensively evaluated and it is deemed that sufficient research achievement ability has been acquired, the credits will be awarded.

●Notes

TBA; Contact with your supervisor and mentor.

●Contacting Faculty

Ask to the supervisors in Nagoya university and visiting research group.

International Cooperative Research Project U4 (4.0credits) (国際共同研究 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
Starts 1	1 Spring and Autumn Semester	1 Spring and Autumn Semester	1 Spring and Autumn Semester
Lecturer	Associated Faculty	Associated Faculty	Associated Faculty

●Course Purpose

The purpose of this international project is to develop young researchers who have comprehensive and international abilities and can play an active role internationally.

Through this project, students will be able to
1) make an original research plan and perform it.
2) communicate and discuss with other foreign researchers in English fluently.
3) enhance their research and presentation skills.

●Prerequisite Subjects

Basic engineering classes, English, Technical English

●Course Topics

Experience R & D at overseas research institutes as follows.
1) Set a research theme and make a research plan based on discussions with overseas supervisors and conduct research.
2) Present your research results in English at your place of stay and discuss.
3) After returning to Japan, report the contents of research activities to the supervisor and receive comprehensive evaluation.

●Textbook

Will be designated by the supervisor in the visiting university (or research group).

●Additional Reading

Will be designated by the supervisor in the visiting university (or research group).

●Grade Assessment

Receive the evaluation of the instructor in your stay regarding the theme setting, research ability, and discussion method at the joint research destination. After returning to Japan, submit and present a report to the supervisor of the University. If the above results are comprehensively evaluated and it is deemed that sufficient research achievement ability has been acquired, the credits will be awarded.

●Notes

TBA; Contact with your supervisor and mentor.

●Contacting Faculty

Ask to the supervisors in Nagoya university and visiting research group.

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

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

●Course Purpose

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

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

●Prerequisite Subjects

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

●Course Topics

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

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

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

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

●Notes

No particular requirement.

●Contacting Faculty

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

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

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

●Course Purpose

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

●Prerequisite Subjects

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

●Course Topics

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

●Textbook

Original lecture note will be provided.

●Additional Reading

It will be announced in the class if necessary.

●Grade Assessment

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

●Notes

No particular requirement.

●Contacting Faculty

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

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook
Will be designated by each supervisor.

●Additional Reading
Will be designated by each supervisor.

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

●Notes
No conditions for taking the course.

●Contacting Faculty
Supervisor of visiting university basically takes care.

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

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

●Textbook

Will be designated by each supervisor.

●Additional Reading

Will be designated by each supervisor.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

Supervisor of visiting university basically takes care.

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

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

●Course Purpose

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

●Prerequisite Subjects

Basic engineering subjects, English, Technical English

●Course Topics

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

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

Written report and evaluation by the professors.

●Notes

No conditions for taking the course.

●Contacting Faculty

In the class and E-mail.

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

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

●Course Purpose

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

●Prerequisite Subjects

English, Technical English, Japanese

●Course Topics

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

●Textbook

Will be designated by the lecturer.

●Additional Reading

Will be designated by the lecturer.

●Grade Assessment

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

●Notes

No conditions for taking the course.

●Contacting Faculty

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

Seminar on Molecular Chemistry 2A (2.0credits) (有機化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Multistep Syntheses

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis
Organic Chemistry Seminar 1A-D

●Course Topics

1. Multistep Syntheses

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required

●Contacting Faculty

Seminar on Molecular Chemistry 2A (2.0credits) (有機化学セミナー 2A)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	1 Spring Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read cutting-edge scientific papers and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 2A (2.0credits) (有機化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 2A (2.0credits) (有機化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will find appropriate papers from latest journals to gain knowledge and new problems which relate to the Ph.D. study of the students for making research proposals and training skills for researches.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 2B (2.0credits) (有機化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Design of acid-base salt catalysts

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis
Organic Chemistry Seminar 1A-D

●Course Topics

1. Design of acid-base salt catalysts

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 2B (2.0credits) (有機化学セミナー 2B)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	1 Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read cutting-edge scientific papers and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 2B (2.0credits) (有機化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 2B (2.0credits) (有機化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will find appropriate papers from latest journals to gain knowledge and new problems which relate to the Ph.D. study of the students for making research proposals and training skills for researches.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 2C (2.0credits) (有機化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Design of non-conjugate acid-base catalysts

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis
Organic Chemistry Seminar 1A-D

●Course Topics

1. Design of non-conjugate acid-base catalysts

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 2C (2.0credits) (有機化学セミナー 2C)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	2 Spring Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read cutting-edge scientific papers and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 2C (2.0credits) (有機化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 2C (2.0credits) (有機化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will find appropriate papers from latest journals to gain knowledge and new problems which relate to the Ph.D. study of the students for making research proposals and training skills for researches.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 2D (2.0credits) (有機化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Design of conjugate acid-base catalysts

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis
Organic Chemistry Seminar 1A-D

●Course Topics

1. Design of conjugate acid-base catalysts

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 2D (2.0credits) (有機化学セミナー 2D)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	2 Autumn Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read cutting-edge scientific papers and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 2D (2.0credits) (有機化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 2D (2.0credits) (有機化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will find appropriate papers from latest journals to gain knowledge and new problems which relate to the Ph.D. study of the students for making research proposals and training skills for researches.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Molecular Chemistry 2E (2.0credits) (有機化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	Kazuaki ISHIHARA Professor	UYANIK Muhammet Associate Professor

●Course Purpose

Advanced Seminar of cutting-edge catalysis in organic synthesis using texts and scientific papers

Goal achievement
1. Design of supramolecular acid-base catalysts

●Prerequisite Subjects

Organic chemistry
Catalysis in Organic Synthesis
Organic Chemistry Seminar 1A-D

●Course Topics

1. Design of supramolecular acid-base catalysts

●Textbook

●Additional Reading

Advanced Organic Chemistry Part B: Reactions and Synthesis Fifth Edition, Francis A. Carey, Richard J. Sandberg, Springer

The Organic Chemistry of Biological Pathways, John E. McMurry, Tadhg P. Begley, Roberts and Company Publishers

●Grade Assessment

Report (30 points), presentation (30 points), and discussion (40 points). Pass mark: 60 points

Prepare for each seminar, and review after the seminar. In addition, you will be required to submit several report assignments, so solve them and submit them.

●Notes

No registration requirements are required.

●Contacting Faculty

Seminar on Molecular Chemistry 2E (2.0credits) (有機化学セミナー 2E)

Course Type	Specialized Courses		
Division at course	Doctor's Course		
Class Format	Seminar		
Course Name	Molecular and Macromolecular Chemistry		
Starts 1	3 Spring Semester		
Lecturer	Takashi OOI Professor	Kosuke OMATSU Designated Associate Professor	Yoshitaka ARAMAKI Assistant Professor

●Course Purpose

In this seminar, students will read scientific papers in the various field of chemistry, and will give presentations to explain about these papers. In addition, students will answer the questions from professors and other students.Achievement target1. Read cutting-edge scientific papers and understand the novelty and importance of these papers.2. Explain about these papers in an easy-to-understand manner.3. Logically discuss about the experimental results described in the papers.

●Prerequisite Subjects

Organic Chemistry (1-5) with Exercises.The students are recommended to have background knowledge in fundamentals of organic chemistry.

●Course Topics

1. Presentation: Students will read 12 papers in this seminar and give the presentations.2. Presentation and discussion: In 15 minutes, give the presentation and answer the questions on the contents of one paper.To attend the seminar, the following preparations are required.3. Literature search: To understand the details of selected papers, students will search and read the related papers.4. Preparation of the documents: Using ChemDraw and PowerPoint, students will prepare the documents for presentations (softwares are available in the laboratory).

●Textbook

No special textbook. Documents will be distributed before the seminar.

●Additional Reading

C. Bittner, A. S. Busemann, U. Griesbach, F. Haunert, W-R. Krahnert, A. Modi, J. Olschimke, P. L. Steck, Organic Synthesis Workbook II, WILEY-VCH, 2001.

●Grade Assessment

Based on the quality of oral presentation and discussion

●Notes

●Contacting Faculty

Directly contact faculties.

Seminar on Molecular Chemistry 2E (2.0credits) (有機化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	Hiroshi SHINOKUBO Professor	Norihito FUKUI Lecturer

●Course Purpose
This course aims to help students acquire an understanding of the fundamental principles of structural organic chemistry and synthetic chemistry.

●Prerequisite Subjects
Synthetic organic chemistry, organometallic chemistry, structural organic chemistry, and all fundamental chemistry

●Course Topics
1. Synthesis and properties of pi-congugated molecules2. Aromaticity and strucrures of organic compounds3. Reactivity of organometallic compoundsWe recommend to read the corresponding sections of the textbook before the lecture.

●Textbook

●Additional Reading
Reference books will be introduced in the seminar.

●Grade Assessment
Grading will be decided based on the quality of the presentation (50%). discussions (30%), and participation (20%).

●Notes
Basic knowledge of organic chemistry is required.

●Contacting Faculty
You can contact the faculties in the classroom, their offices, or on-line.Shinokubo: Eng. Bld#1, room 821, ex5113, hshino(at)chembio.nagoya-u.ac.jp

Seminar on Molecular Chemistry 2E (2.0credits) (有機化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	MakotoYAMASHITA Professor	NAKANO Ryo Assistant Professor

●Course Purpose

Students will find appropriate papers from latest journals to gain knowledge and new problems which relate to the Ph.D. study of the students for making research proposals and training skills for researches.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2A (2.0credits) (高分子化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 2A (2.0credits) (高分子化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Use English as needed to enhance the above skills, both in Japan and abroad.5. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2A (2.0credits) (高分子化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this seminar is to learn the advanced organic and polymer materials based on the design, synthesis, structures and functions of organic compounds and polymers through text books and the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, students are expected to understand the methodology of the developments of organic and polymer materials and explain research purpose, trend and challenges for the future in specific topics related to their main-subjects during their Ph. D. theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry, Synthetic Polymer Chemistry and Physical Polymer Chemistry

●Course Topics

Participants will be requested to orally present each topic related to their main-subjects during their Ph. D. theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Polymer Chemistry 5ed. (S. Murahashi, T. Kodaka, M. Kamachi, and H. Norisue; Kyoritsu Syuppan)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation (60%), attendance to discussion and attitude (40%) in class.

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 2A (2.0credits) (高分子化学セミナー 2A)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Spring Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2B (2.0credits) (高分子化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 2B (2.0credits) (高分子化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Use English as needed to enhance the above skills, both in Japan and abroad.5. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2B (2.0credits) (高分子化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this seminar is to learn the advanced organic and polymer materials based on the design, synthesis, structures and functions of organic compounds and polymers through text books and the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, students are expected to understand the methodology of the developments of organic and polymer materials and relationships between the structures/stereochemistry of chiral organic compounds, supramolecules and polymers and their functions, and further explain research purpose, trend and challenges for the future in specific topics related to their main-subjects during their Ph. D. theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry, Synthetic Polymer Chemistry and Physical Polymer Chemistry

●Course Topics

Students will be requested to orally present each topic related to their main-subjects during their Ph. D. theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Basic Organic Stereochemistry. E. L. Eliel, S. H. Wilen, M. P. Doyle; Wiley Inter-Science)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation (60%), attendance to discussion and attitude (40%) in class.

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 2B (2.0credits) (高分子化学セミナー 2B)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	1 Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2C (2.0credits) (高分子化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions.

By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers.

Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.
More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.
Contact address
Takano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jp
Noro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 2C (2.0credits) (高分子化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Use English as needed to enhance the above skills, both in Japan and abroad.5. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2C (2.0credits) (高分子化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this seminar is to learn the advanced organic and polymer materials based on the design, synthesis, structures and functions of organic compounds and polymers through text books and the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, students are expected to understand how to synthesize functional organic and polymer materials and also the relationships between the structures/stereochemistry of chiral organic compounds, supramolecules and polymers and their functions, and further explain research purpose, trend and challenges for the future in specific topics related to their main-subjects during their Ph. D. theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry, Synthetic Polymer Chemistry and Physical Polymer Chemistry

●Course Topics

Students will be requested to orally present each topic related to their main-subjects during their Ph. D. theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Basic Organic Stereochemistry. E. L. Eliel, S. H. Wilen, M. P. Doyle; Wiley Inter-Science)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation (60%), attendance to discussion and attitude (40%) in class.

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 2C (2.0credits) (高分子化学セミナー 2C)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Spring Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2D (2.0credits) (高分子化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions. By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers. Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.Contact addressTakano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jpNoro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 2D (2.0credits) (高分子化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Use English as needed to enhance the above skills, both in Japan and abroad.5. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2D (2.0credits) (高分子化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this seminar is to learn the advanced organic and polymer materials based on the design, synthesis, structures and functions of organic compounds and polymers through text books and the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, students are expected to understand and explain the relationships between the structures and stereochemistry of chiral organic compounds, supramolecules and polymers and their functions, and further explain research purpose, trend, problems and challenges for the future in specific topics related to their main-subjects during their Ph. D. theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry, Synthetic Polymer Chemistry and Physical Polymer Chemistry

●Course Topics

Students will be requested to orally present each topic related to their main-subjects during their Ph. D. theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Basic Organic Stereochemistry. E. L. Eliel, S. H. Wilen, M. P. Doyle; Wiley Inter-Science)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation (60%), attendance to discussion and attitude (40%) in class.

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 2D (2.0credits) (高分子化学セミナー 2D)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	2 Autumn Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2E (2.0credits) (高分子化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	Atsushi TAKANO Associate Professor	Atsushi NORO Lecturer

●Course Purpose

The purposes of the course is (1) to find out the trend of researches in the field of polymeric material science, especially polymer physical chemistry and (2) to learn the useful information for development and advance of their own researches by reading the recent literatures related with polymeric material science as well as making presentations with discussions. By completing the course, students will be able to prepare research documents and data on physical polymer science properly. Students will also be able to make effective presentations.

●Prerequisite Subjects

Thermodynamics 1 with Exercises, Thermodynamics 2 with Exercises, Mathematics I and Tutorial, Fundamentals of Polymer Chemistry, Synthetic Polymer Chemistry, and Physical Chemistry of Polymers

●Course Topics

As described in the “Course Purpose”, in order to confirm whether students have read the literature carefully, students make presentations on introduction of the literature contents which will be discussed through questions and answers. Read carefully the literature in advance and make sufficient preparations for presentations.

●Textbook

Appropriate texts will be given in the seminar.

●Additional Reading

Appropriate references will be given in the seminar.

●Grade Assessment

Research materials and/or presentations.More than 60% is required for credits.

●Notes

●Contacting Faculty

Questions before/after the seminar will be accepted in the instructors' room.Contact addressTakano: ext.4604, e-mail:atakano@chembio.nagoya-u.ac.jpNoro: ext.4587, e-mail:noro@apchembio.nagoya-u.ac.jp

Seminar on Macromolecular Chemistry 2E (2.0credits) (高分子化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	Yukikazu Takeoka Associate Professor	Mitsuo HARA Assistant Professor

●Course Purpose

The goal of this seminar is to increase the knowledge and professional skills related to engineering and technology of polymer chemistry and to improve the ability to discuss issues. By learning this seminar, you will be able to acquire the ability to solve problems with self-consciousness in research on synthesis, organization / materialization, property evaluation, and functionalization of functional materials, mainly polymeric substances. In addition, by researching and grasping research trends on various issues and their related fields, it will be possible to direct practical research on issues, find and summarize issues, construct constructive ideas, make presentations, and discuss the themes.

●Prerequisite Subjects

Polymer chemistry, organic chemistry, physical chemistry, interface science, photochemistry, molecular-assembly chemistry, etc.

●Course Topics

1. Explanation of the problem and presentation of the research progress (indoor seminars and conferences)2. discussion3. Acquisition of specialized knowledge and abilities including various practical training and safety4. Use English as needed to enhance the above skills, both in Japan and abroad.5. Not only during the seminar hours, but also the attitude and aggressiveness of ordinary research outside the seminar hours will be evaluated.

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

Seminar on Macromolecular Chemistry 2E (2.0credits) (高分子化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	Eiji YASHIMA Professor	Tomoyuki IKAI Associate Professor

●Course Purpose

The aim of this seminar is to learn the advanced organic and polymer materials based on the design, synthesis, structures and functions of organic compounds and polymers through text books and the recent literature and papers in the fields of organic and polymer chemistry. At the end of this seminar, students are expected to understand and explain the relationships between the structures and stereochemistry of chiral organic compounds, supramolecules and polymers and their functions, and further explain research purpose, trend, and challenges for the future to overcome in specific topics related to their main-subjects during their Ph. D. theses.

●Prerequisite Subjects

Organic Chemistry 1-4, Structural Organic Chemistry, Basic Polymer Chemistry, Synthetic Polymer Chemistry and Physical Polymer Chemistry

●Course Topics

Students will be requested to orally present each topic related to their main-subjects during their Ph. D. theses by reading and summarizing text/papers.

●Textbook

Will be announced at the beginning of a new fiscal year.

●Additional Reading

Basic Organic Stereochemistry. E. L. Eliel, S. H. Wilen, M. P. Doyle; Wiley Inter-Science)

●Grade Assessment

Your overall grade in the seminar will be decided based on the following:Oral presentation (60%), attendance to discussion and attitude (40%) in class.

●Notes

●Contacting Faculty

Questions will be accepted during the seminar.

Seminar on Macromolecular Chemistry 2E (2.0credits) (高分子化学セミナー 2E)

Course Type	Specialized Courses	
Division at course	Doctor's Course	
Class Format	Seminar	
Course Name	Molecular and Macromolecular Chemistry	
Starts 1	3 Spring Semester	
Lecturer	MasamiKAMIGAITO Professor	Mineto UCHIYAMA Lecturer

●Course Purpose

The purpose of this course is to learn most advanced topics of precision polymer synthesis by discussions on recent papers published in top journals.
Upon taking this course, you aim to get advanced knowledge on precision polymer synthesis and then abilities to apply the knowledge to your own research.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

●Notes

●Contacting Faculty

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.

Laboratory Visit 1 U2 (2.0credits) (研究室ローテーション２ U2)

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

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

Up to 20 days research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U3 (3.0credits) (研究室ローテーション２ U3)

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

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

21 days or more and 40 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U4 (4.0credits) (研究室ローテーション２ U4)

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

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

41 days or more and 60 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U6 (6.0credits) (研究室ローテーション２ U6)

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

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

61 days or more and 80 days or less research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

Laboratory Visit 1 U8 (8.0credits) (研究室ローテーション２ U8)

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

●Course Purpose

The aim of this course is to expand the student’s ability as a researcher by conducting a research at a different laboratory and learn different methods and ways of thinking, as well as communicate with other researchers in related fields.By completing the course, the students are expected to acquire various research methods and ways of thinking, and gain the ability to tackle research problems from multiple angles.

●Prerequisite Subjects

Basic and specialized subjects related to the research subject

●Course Topics

Students will conduct research at a different laboratory. The host laboratory will be chosen based on the participant’s research field and interest from other laboratories within the campus, other universities, research institutes and companies. The course consists of the following contents.1. Theme setting and literature review2. Formulating the research plan3. Analyzing the results and discussion4. Presentation of the resultsAfter the class, students should review the analyzing process of the obtained results and investigate related literatures.

●Textbook

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

●Additional Reading

Will be introduced at the host laboratory if necessary

●Grade Assessment

81 days or more research in the host laboratory and submitting a report is a prerequisite. Evaluation will be based on the student's report and the evaluation by the supervisor in the host laboratory. To pass, the students have to demonstrate that they have the capacity to adequately analyze the results and have acquired the basic knowledge to interpret the results. Grading will be decided from P (pass) or NP (not passed).

●Notes

Nothing particularly needed

●Contacting Faculty

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

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.