Core Inorganic Chemistry (2.0credits) (コア無機化学特論)

Course Type	Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Part-time faculty

●Course Purpose

The purpose of this course is to gain an understanding of the physical concepts that govern chemical structures and chemical reaction mechanisms. The course begins with the basics of group theory, and then moves on to the application of students' understanding of chemical structures and reactions on the basis of perturbation theory . Upon completion of the course, students will be able to (1) configure molecular orbitals of simple molecules, (2) examine the chemical structure of compounds on the basis of their electronic structure, and (3) judge if a given reaction thermally proceeds or not , by using concepts of quantum theory.

●Prerequisite Subjects

Inorganic Chemistry 1, 2, and 3

●Course Topics

1. Group Theory I: point groups, symmetry elements, and symmetry operations2. Group Theory II: character tables 3. Group Theory III: direct product and related mathematical procedures4. Group Theory IV: group orbital and molecular orbital5. Selection rules in electronic transitions6. Normal vibration modes and basics of IR and Raman spectroscopy7. The first- and second-order Jahn-Teller effects and chemical structures8. Adiabaticity of reactions and Symmetry Rules9. The second-order Jahn-Teller effect and the activation energy of reactions10. Ligand fields and spectral terms

●Textbook

Symmetry and Structure (S. F. A. Kettle), Wiley. Other related textbooks will be suggested in the course.

●Additional Reading

●Grade Assessment

Students must obtain a score of 60 or higher to pass the course.Grades : S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

●Notes

●Contacting Faculty

Students can contact their lecturer during office hours after lectures.

Core Organic Chemistry (2.0credits) (コア有機化学特論)

Course Type	Core major courses/Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Jiyoung SHIN Designated Associate Professor

●Course Purpose

The purpose of this course is to learn some important features of basic/advanced organic chemistry. This course will assist the student to understand the intellectual roots of organic chemistry under the specific topics selectively chosen and to develop a knowledge and appreciation of structure, mechanism, reactions, and synthesis in organic chemistry.

●Prerequisite Subjects

Fundamental Chemistry I and II (undergraduate level)

●Course Topics

1. Molecular structures and Chemical Isomers
2. Chemical Reactivity of Organic Compounds
3. Extended Electron Systems and Benzene Derivatives
4. Organic Reactions and The Corresponding Mechanisms: Nucleophilic & Electrophilic Additions, Radical Reactions, Nucleophilic & Electrophilic Substitutions, Eliminations, Acid & Base-Mediated Reactions, and Reactions of Conjugate bases
5. Organic Reaction involving Organometallic Reagents

●Textbook

1. Organic Chemistry (Second edition), Jonathan Clayden, Nick Greeves, and Stuart Warren, Oxford, 2012.
2. Advanced Organic Chemistry (Part B: Reaction and Synthesis, Fifth Edition), Francis A. Carey, Richard J. Sundberg, Springer, 2007.

●Additional Reading

●Grade Assessment

Grades will be based on assessment of reports.
Grades: S": 100-90% , "A": 89-80% , "B": 79-70%, "C": 69-60%, "F": 59-0%.

●Notes

●Contacting Faculty

Students can communicate with their course instructor face-to-face either in the class or in the appointment time. Communication through the e-mail is also available.

Core Physical Chemistry (2.0credits) (コア物理化学特論)

Course Type	Core major courses/Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Peter BUTKO Designated Professor

●Course Purpose

The purpose of this course is to review formerly acquired knowledge in physical chemistry, and apply it to solving problems in chemistry and biochemistry. Solving problems in class and at home is the focus of this course, which aims to prepare students for future, more specialized physical chemistry courses.

●Prerequisite Subjects

Basic Physical Chemistry, Quantum Chemistry

●Course Topics

I. EQUILIBRIUM THERMODYNAMICS
1 Review of fundamental concepts and the three laws
2 Pure substances and simple mixtures
3 Chemical equilibrium

II. QUANTUM THEORY
5 Principles: the Schrodinger equation, the Born interpretation, the postulates
6 Techniques and applications: a particle in the box; vibration and rotation in 2D & 3D
7 Atomic structure and spectra: from hydrogenic atoms to complex atoms
8 Molecular structure: the Born-Oppenheimer approximation; valence-bond theory; molecular orbital theory; the Huckel approximation for polyatomic systems
9 Molecular symmetry
10 Molecular spectroscopy

III. STATISTICAL THERMODYNAMICS
12 Review of the concepts: the distribution of molecular states; the internal energy and the entropy; the canonical partition function
13 Applications: the molecular partition function; mean energies; molecular interactions in liquids; equilibrium constants

●Textbook

P. Atkins and J de Paula: Atkins' Physical Chemistry, 9th Ed., Oxford University Press, 2009

●Additional Reading

●Grade Assessment

Two exams: 100 points each
Final exam (comprehensive): 200
Homework: 100
TOTAL: 500
Grades: "S": 100-90% (450 or more points), "A": 89-80% (449-400 pts), "B": 79-70% (399-350 pts), "C": 69-60% (349-300 pts), "F": 59-0% (below 300 pts).Up to 50 extra (bonus) points can be earned for active class participation.

Students must obtain a score of 60% or higher to pass the course.

●Notes

●Contacting Faculty

Students can communicate with their lecturer face-to-face during lecture or office hours and via e-mail.

Prof. Peter BUTKO
Office: RCMS 104
Email: pbutko@chem.nagoya-u.ac.jp

Core Biochemistry (2.0credits) (コア生物化学特論)

Course Type	Core major courses/Basic Courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The aim of this course is to gain an understanding of basic principles as well as the latest topics in various fields of life science, including biochemistry, molecular biology, cell biology, genetics, biophysics, structural biology, and bioinformatics.

●Prerequisite Subjects

●Course Topics

1. Protein folding2. Antibody diversity3. Bioimaging4. Genomics and database5. Introductory bioinformatics6. Cell signaling: receptors, G-proteins, and protein kinases7. Control of gene expression

●Textbook

Reference books: Molecular Biology of the Cell (Alberts et al.), 5th Edition, Garland Science; Biochemistry (Voet and Voet), 3rd Edition, Wiley.

●Additional Reading

●Grade Assessment

Evaluation of ReportsGrade "S": 100-90% , "A": 89-80% , "B": 79-70%, "C": 69-60%, "F": 59-0%.

●Notes

●Contacting Faculty

In communicate with the instructor by face-to-face in the lecture or in the office hour, and by e-mail.

Chemistry Seminar 1A (2.0credits) (化学系セミナー１Ａ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes from various literatures.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on recent relevant literatures

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 1B (2.0credits) (化学系セミナー１Ｂ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 1C (2.0credits) (化学系セミナー１Ｃ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	2 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on recent relevant literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 1D (2.0credits) (化学系セミナー１Ｄ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	2 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Advanced Inorganic Chemistry (2.0credits) (アドバンス無機化学特論)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The course consists of a series of lectures on chemical reactions, and microstructure and property control of inorganic and related materials (especially advanced nanostructured-materials) based on solid state chemistry and nanotechnology.

●Prerequisite Subjects

Inorganic Chemistry 1, Inorganic Chemistry 2, Inorganic Chemistry 3, Chemistry of Inorganic Materials 1, Chemistry of Inorganic Materials 2

●Course Topics

1. Introduction
2. Solid oxide fuel cells: Materials, processing and applications
3. Advanced ferroic materials: Processing, characterization and applications
4. Oxide electronics: Film growth, characterization and device applications
5. Novel nanocarbon materials: Characteristics and applications
6. Nanoporous materials: Structures and functions
7. Bioceramics: Ceramics in medicine, biology and biomimetics
8. Composites materials for reconstruction of biological tissues

●Textbook

Prints are distributed when necessary.

●Additional Reading

[1] “Nanostructures and Nanomaterials: Synthesis, Properties, and Applications (2nd Edition)”, Guozhong Cao and Ying Wang, World Scientific, 2010.
[2] “Ceramic Materials: Science and Engineering (1st Edition)”, C. Barry Carter, M. Grant Norton, Springer, 2007.
[3] “Solid State Chemistry: An Introduction (3rd Edition)”, Lasley E. Smart, Elaine A. Moore, Taylor and Francis, 2005.

●Grade Assessment

Reports and examination
Students must obtain a score of 60 or higher to pass the course.
Grades: S: 100-90, A: 89-80, B: 79-70, C: 69-60, F: 59-0.

●Notes

●Contacting Faculty

Lecturers hold office hours after lectures.

Advanced Organic Chemistry (2.0credits) (アドバンス有機化学特論)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn important topics in advanced organic chemistry and organic synthesis.

●Prerequisite Subjects

Organic Chemistry 1-5, Core Organic Chemistry

●Course Topics

1. Organocatalysts for Green Chemistry2. Chiral Catalysts for Enantioselective Synthesis3. Transition Metal Catalysts for Unreactive Bond Activation4. Synthesis of Optoelectronic Materials5. Synthesis of Natural Products and Biologically Active Compounds

●Textbook

None

●Additional Reading

●Grade Assessment

Grades will be based on reports.Grades: "S": 100-90% , "A": 89-80% , "B": 79-70%, "C": 69-60%, "F": 59-0%.

●Notes

●Contacting Faculty

Students can communicate with their lecturer face-to-face during lecture or office hours, and via e-mail.

Advanced Physical Chemistry (2.0credits) (アドバンス物理化学特論)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

This course is designed as a broad survey of modern topics in physical chemistry through an omnibus form of lectures conducted by Professors, Associate Professors, and Lecturers. The teachers will provide you recent stimulative topics in physical chemistry such as fullerenes, carbon nanotubes, organometallics, nanoparticles, electronic devices, catalysts, solar cells, etc. All the lectures will help you to have your own overview of physical chemistry for understanding the essence of the modern physical chemistry.

●Prerequisite Subjects

The course assumes students have background knowledge of general principles of chemistry, inorganic chemistry, organic chemistry, quantum chemistry, thermodynamics, chemical kinetics and electrochemistry.

●Course Topics

The lecturers will provide you specifics from the cutting-edge topics such as surfaces/interfaces chemistry, science of nanomaterials, electronic band structure, laser chemistry, computer simulation, catalysis chemistry, molecule-based spintronics, solvation theory, etc.

●Textbook

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

●Additional Reading

TBA

●Grade Assessment

Required work consists of homework assignments.
Students must submit reports to each teacher.
Credits will be awarded to those students who score 60 or more.
Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

The teacher in charge of each class will answer student’s questions individually.
Office hours: Monday to Friday, 9:00 to 17:00.
(An appointment must be required by e-mail.)

Advenced Quantum Chemistry (2.0credits) (アドバンス量子化学特論)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Stephan IRLE Professor

●Course Purpose

In complex reaction systems at high temperatures, following the minimum energy pathways on the potential energy surface is not only impossible, but will entirely neglect important entropic effects during the reactions. Quantum chemical molecular dynamics (QM/MD) simulations have recently elucidated the formation as well as erosion mechanisms of nanomaterials such as fullerenes, carbon nanotubes, and graphenes. In this class, all theoretical concepts important for QM/MD simulations will be covered.

●Prerequisite Subjects

●Course Topics

1. Born-Oppenheimer approximation and potential energy surfaces (PESs)
2. Location and characterization of stationary states on the PES
3. Comparison: Molecular mechanics and quantum chemical methods
4. LCAO-MO theory; Hartree-Fock theory
5. Basis sets in quantum chemical calculations
6. The electron correlation problem: static and dynamic electron correlation (CASSCF, and CI and MP2 methods)
7. Density-based methods: Kohn-Sham theory, density functional theory (DFT)
8. Density-Functional Tight-Binding
9. QM/MD simulations: BOMD, CPMD, LvNMD
10. Steered MD, umbrella-sampling, and transition path sampling methods
11. Strengths and weaknesses of MD simulations for the understanding of complex problems

●Textbook

Quantum Chemistry & Spectroscopy (Thomas Engel), 2nd Edition; Prentice Hall; Computer Simulation of Liquids (M. P. Allen and D. J. Tildesley), Oxford University Press Course syllabus

●Additional Reading

●Grade Assessment

Grades will be based on exminations and reports.
Credits will be awarded to those students who score 60 or more.
Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Advanced Polymer Chemistry (2.0credits) (アドバンス高分子化学)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn important topics in advanced polymer science. The course covers cutting-edge polymer research in the synthesis, structures, functions, and properties of polymer, as well as fundamental principles for understanding polymer-based advanced materials science.

●Prerequisite Subjects

Organic Chemistry, Physical Chemistry, Analytical Chemistry, Polymer Chemistry

●Course Topics

1. Precision Polymer Synthesis2. Living/Controlled Radical Polymerization3. Living Anionic Polymerization4. Living Cationic Polymerization5. Stereospecific Coordination Polymerization6. Synthesis and Structures of Helical Polymers 17. Synthesis and Structures of Helical Polymers 28. Application of Helical Polymers9. Supramolecular Polymers10. Observations of Polymers by Scanning Probe Microscopy11. Characterization and Separation of Polymers12. Mesoscopic Structures of Polymers –Real Space vs Reciprocal Space13. Real Space Observation by Transmission Electron Microscopy14. Reciprocal Space Observation by Various Scattering Methods15. Viscoelastic Properties of Polymers

●Textbook

●Additional Reading

Controlled and Living Polymerizations, A. H. E. Mueller, K .Matyjaszewski, Eds., Wiley-VCH

●Grade Assessment

Students must obtain a score of 60 or higher to pass the course. Grades:S:100-90, A:89-80, B:79-70, C:69-60, F:59-0.

●Notes

●Contacting Faculty

Topics in International Chemistry 1 (1.0credits) (国際化学特論Ⅰ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 2 (1.0credits) (国際化学特論 II)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 3 (1.0credits) (国際化学特論III)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 4 (1.0credits) (国際化学特論IV)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about up-to-date topics in chemistry, in an international atmosphere. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 5 (1.0credits) (国際化学特論Ⅴ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 6 (1.0credits) (国際化学特論VI)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 7 (1.0credits) (国際化学特論VII)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

N/A

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 8 (1.0credits) (国際化学特論Ⅷ)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 9 (1.0credits) (国際化学特論IX)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Experiments and Exercises in Chemistry (2.0credits) (化学系特別実験及び演習)

Course Type	Core major courses/Core disciplinary courses
Division at course	Master's Course
Class Format	Experiment and Practice
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

This course involves exercises and experiments in each research group.

●Prerequisite Subjects

●Course Topics

●Textbook

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

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	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Part-time Faculty

●Course Purpose

In this course, students will improve their ability to summarize research findings in English, submit a paper to an international academic journal, and make an English presentation at an international conference.

●Prerequisite Subjects

Various subjects relating to English

●Course Topics

1. Grammar for writing a scientific paper 2. How to write scientific papers 3. Public speaking before international audiences 4. Self-evaluation: writing effective CVs and job applications 5. E-mail for technical and business purposes

●Textbook

●Additional Reading

Ishida et al., How to Write Scientific English and Make Presentations (in Japanese), Corona Publishing Co. Ltd.

●Grade Assessment

Grades will be based on assessment of presentation quality, active participation in audience discussion, and attendance.

●Notes

●Contacting Faculty

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	Graduate Chemistry
	Graduate Chemistry	Graduate Chemistry	Automotive Engineering
	Automotive Engineering		
Starts 1	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Lecturer	Yukio ISHIDA 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.

●Prerequisite Subjects

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

●Course Topics

A. Lectures1. 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.Fuel and Automobile Catalysts for Environmental Friendly Cars.13.Traffic Flow Characteristics.14.Cars and Roads in Urban Transportation Context.15.Automobile in Aging Society.B. Factory Visits1.Toyota Motors Corp., 2. Mitsubishi Motors Corp., 3. Yokohama Rubber Co. Ltd., 4.Suzuki Museum, 5.Toyota Higashi-Fuji Technical Center, 6. Nissan Technical CenterC. Group Research ProjectSeveral students form one group and each group selects one topic. They investigate and discuss about this topic and make presentations.

●Textbook

None (Handout delivered)

●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.

●Notes

●Contacting Faculty

Mainly accepted during each lecture. Other general questions are accepted by Professor Yukio Ishida.
<Contact> TEL: 052-747-6797, Email: ishida@nuem.nagoya-u.ac.jp

Chemistry Seminar 2A (2.0credits) (化学系セミナー2A)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

In this course, students will learn about the research process and technique from literatures.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on the recent literatures

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 2B (2.0credits) (化学系セミナー2B)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	1 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 2C (2.0credits) (化学系セミナー2C)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	2 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 2D (2.0credits) (化学系セミナー2D)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	2 Spring Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Chemistry Seminar 2E (2.0credits) (化学系セミナー2E)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Seminar
Course Name	Graduate Chemistry
Starts 1	3 Autumn Semester
Lecturer	Faculty of Chemistry

●Course Purpose

The purpose of this course is to learn about research processes and techniques from various literature sources.

●Prerequisite Subjects

●Course Topics

Presentation and discussion on topics in recent literature

●Textbook

●Additional Reading

●Grade Assessment

Depends on research groups.Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 10 (1.0credits) (国際化学特論Ｘ)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Starts 2	2 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 11 (1.0credits) (国際化学特論ＸＩ)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Starts 2	2 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

Topics in International Chemistry 12 (1.0credits) (国際化学特論ＸⅡ)

Course Type	Core major courses
Division at course	Doctor's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Spring and Autumn Semester
Starts 2	2 Spring and Autumn Semester
Lecturer	InternationalFaculty

●Course Purpose

The purpose of the course is to learn about the latest international trends in the field of chemistry. Lecturers for this course are professors of chemistry invited from overseas, and they teach courses in their specialties.

●Prerequisite Subjects

●Course Topics

Lecturer names, class dates, and other details will be notified in due course.

●Textbook

None

●Additional Reading

●Grade Assessment

Credits will be awarded to those students who score 60 or more.Grades are as follows: S:100 - 90, A:89 - 80, B:79 - 70, C:69 - 60, F:59 - 0.

●Notes

●Contacting Faculty

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

Course Type	Comprehensive engineering courses
Division at course	Doctor's Course
Class Format	Lecture
Course Name	Graduate Chemistry
Starts 1	1 Autumn Semester
Starts 2	2 Autumn Semester
Lecturer	Part-time Faculty

●Course Purpose

In this course, students will improve their ability to summarize research findings in English, submit a paper to an international academic journal, and make an English presentation at an international conference.

●Prerequisite Subjects

Various subjects relating to English

●Course Topics

1. Grammar for writing a scientific paper 2. How to write scientific papers 3. Public speaking for international audiences 4. Self-evaluation: writing effective CVs and job applications 5. E-mail for technical and business purposes

●Textbook

●Additional Reading

Ishida et al., How to Write Scientific English and Make Presentations (in Japanese), Corona Publishing Co. Ltd.

●Grade Assessment

Grades will be based on assessment of presentation quality, active participation discussions, and attendance.

●Notes

●Contacting Faculty

Course Type	Comprehensive engineering courses		
Division at course	Doctor'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
	Graduate Chemistry	Graduate Chemistry	Automotive Engineering
	Automotive Engineering		
Starts 1	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 the previous term
	1 the previous term	1 the previous term	1 Spring Semester
	1 Spring Semester	1 Spring Semester	1 Spring Semester
	1 Spring Semester		
Lecturer	Yukio ISHIDA 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.

●Prerequisite Subjects

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

●Course Topics

A. Lectures1. 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.Fuel and Automobile Catalysts for Environmental Friendly Cars.13.Traffic Flow Characteristics.14.Cars and Roads in Urban Transportation Context.15.Automobile in Aging Society.B. Factory Visits1.Toyota Motors Corp., 2. Mitsubishi Motors Corp., 3. Yokohama Rubber Co. Ltd., 4.Suzuki Museum, 5.Toyota Higashi-Fuji Technical Center, 6. Nissan Technical CenterC. Group Research ProjectSeveral students form one group and each group selects one topic. They investigate and discuss about this topic and make presentations.

●Textbook

None (Handout delivered)

●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.

●Notes

●Contacting Faculty

Mainly accepted during each lecture. Other general questions are accepted by Professor Yukio Ishida.
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