Calculus 1

Undergraduate / Graduate	Undergraduate	**Registration Code**	0061311
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I（1st year, Fall Semester) / Mon / 3（13:00～14:30）		
Instructor	RICHARD Serge		

●Goals of the Course【Standardized across all programs】
The field of mathematics that describes and analyzes quantitative changes is analysis, and its central method is calculus. It is an essential research method in natural sciences, but in recent years it has also been widely applied to social sciences. The goal of this course is to understand the basics of one-variable functions (differentiation and integration) during the first half of this year-round course. In particular, it is important to understand the essence of limits, and to be able to handle freely elementary functions such as the logarithmic function and trigonometric functions.

●Objectives of the Course
The aim of the first half of this one-year course is to provide a solid understanding of functions of one real variable. The students will become familiar with the various tools necessary for the analysis of such functions and for their applications.

●Course Contents or Plan
1. Limits and continuity: Basic properties of limits of sequences and functions, continuous functions and their basic properties, maxima and minima, asymptotic properties of functions.
2. Differentiation: Basic properties of the derivative and its interpretation, mean value theorem, higher derivatives, Taylor series.
3. Integration: Riemann integral and its properties, improper integrals, the fundamental theorem of calculus.

●Course Prerequisites and Related Courses
Some basic knowledge on calculus from high school is assumed, including differentiation and integration of polynomial functions. Students are encouraged to attend the related Math Tutorial Ia.

●Course Evaluation Method and Criteria
The final grade will be determined by quizzes (30%), the midterm (30%) and a final exam (40%). The grading scale will be A+, A, B, C, C-, F. Students need to notify the course withdrawal to the instructor when they have no intention of finishing the course during the semester.

●Study Load (Self-directed Learning Outside Course Hours)
Students are expected to read their notes, and to be familiar with the content of the previous lecture of Calculus I before attending the next lecture.

●How to Respond to Questions
By email.

●Notice for students
Check the website mentioned below for updated information. The lectures will be provided in a classroom and/or on Zoom depending on the situation.

Textbook	Free reference books and lecture notes will be available on the website of the course.
Reference Book	Free reference books will be available on the website of the course.
Reference website	http://www.math.nagoya-u.ac.jp/~richard/fall2022.html

Fundamentals of Earth Science I

Undergraduate / Graduate	Undergraduate	**Registration Code**	0061411
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I (1st year, Fall Semester) / Mon / 4 (14:45～16:15)		
Instructor	HUMBLET Marc Andre		

●Goals of the Course【Standardized across all programs】
The goal of this course is to understand the characteristics of our planet Earth and to provide an overview of Earth and planetary science. To this end, the origin of the Earth and of the Solar System, the minerals and rocks that make up the Earth, the processes shaping the landscape, and major events in the history of life will be explained to deepen the understanding of the Earth. Research methods used in Earth and planetary science will also be introduced.

●Objectives of the Course
The study of planet Earth embraces a wide range of topics, from the formation of rocks to the evolution of life, from continental drift to the study of earthquakes and volcanoes. In this course, fundamental concepts of earth science will be covered. Students will be introduced to plate tectonics, the fundamental theory underlying the geological processes which have shaped the environment in which we live and continue to modify the landscape, from the slow, progressive uplift of mountains to violent earthquakes and volcanic eruptions. Students will learn how the Earth recycles matter and how minerals and rocks form and are transformed; how the age of rocks and geological events can be determined, which is central to earth science; how the Earth's geography has changed and how life has evolved during Earth's 4.5-billion-year history. Besides providing a basic and up-to-date knowledge of essential concepts of earth science, the aim of this course is to stimulate the interest and curiosity of students for the study of planet Earth and provoke questions, comments, and discussions about issues related to earth science.

●Course Content or Plan
1. Earth Sciences: an introduction
2. The solar system
3. Plate tectonics
4. Minerals: rock's elementary building blocks
5. Rocks and rock cycle I: igneous rocks
6. Rocks and rock cycle II: sedimentary rocks
7. Rocks and rock cycle III: metamorphic rocks
8. The age of rocks
9. Earth history I: paleogeography
10. Earth history II: origin and evolution of life

●Course Prerequisites and Related Courses
There is no prerequisite for this course.
Related course: Fundamentals of Earth Science II

●Course Evaluation Method and Criteria
Online quizzes: 60%
Written essay: 30%
Oral presentation: 10%

Students who enrolled in 2020 will be graded using the six-step A+, A, B, C, C-, and F grade evaluation system (A+: 100-95%, A: 94-80%, B: 79-70%, C: 69-65%, C-: 64-60%, F: 59 % or less).

Students who enrolled in 2019 or before will be graded following the five-step S-A-B-C-F grade evaluation system (S: 90-100%, A: 80-89%, B: 70-79%, C:60-69%, F: 59-0%).

A student will be given an "Absent" grade if he or she submits a Course Withdrawal Request by the 15th of November. This deadline does not apply to students who drop the class part-way through for an exceptional reason (e.g., illness, accident). Also, NUPACE students should check the deadline set by the NUPACE program for course withdrawal.

●Study Load (Self-directed Learning Outside Course Hours)
Students should acquire a good understanding of the course content to be able to answer the questions of the quizzes.

Students are also required to write a review paper on a subject of their choice related to the course content, and therefore need to search for information related to this subject and to summarize that information in a clear, organized, and concise manner. Preparation time is also needed for the final short presentation that each student gives at the end of the semester about the subject of their review paper.

●How to Respond to Questions

Live lectures will be organized (in class or online or both), and students are strongly encouraged to ask questions during the lectures. Students can also contact me by e-mail or meet me in person in my office. NUCT will be used as another way of communication, to share files and send messages.

Textbook	There is no required textbook for this course. Please refer to the recommended reading below for an additional source of information.
Reference Book	Title: Understanding Earth Authors: John Grotzinger & Thomas H. Jordan Publisher: W. H. Freeman Issue year: 2014 (7th edition) ISBN: 978-1464138744
Reference website for this Course	

Special Mathematics Lecture（Mathematics for machine learning）
＊Optional subject

Undergraduate / Graduate	Undergraduate	**Registration Code**	0061621
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	Fall Semester / Mon / 6 (18:15～19:45)		
Instructor	BACHMANN Henrik		

●Goals of the Course
Machine learning became a popular and really broad field in recent years. Machine learning algorithms are used in a wide variety of applications, such as email filtering, computer vision, medicine, language translation, computer games, economic, etc. The goal of this course is to give a brief introduction into machine learning with a focus on the mathematics and algorithms used in machine learning. It is targeted at any (international and Japanese) student at Nagoya University who has interest in machine learning and who wants to see some practical application of mathematics taught in the basic math classes.

●Objectives of the Course
In this course, we will consider various specific algorithms used in machine learning. For each algorithm we will study the mathematics used in this algorithm and try to implement the algorithm in python. The plan is to encourage group work among the students so that students with different background knowledge can help out each other. For the programming part we will use Google Colab. It can be seen as a bridge between the basic math classes and the engineering/computer science classes.

●Course Contents or Plan
Introduction to programming in Python, overview of machine learning, minimax algorithm, linear & logistic Regression, Generative Learning algorithms: Naive Bayes, Support vector machines, Reinforcement Learning: Q-Learning, Unsupervised learning: k-means clustering, Neural networks.

●Course Prerequisites and Related Courses
Background knowledge in programming in Python (e.g. Data Science Exercise B) is helpful, but also students without programming background can use this class to start learning programing. The course will start with a basic introduction to Python. It is expected that the students have basic knowledge in Linear Algebra and Calculus (e.g. Linear Algebra I, Calculus I). Knowledge in Calculus II can be helpful at some points, but is not necessary to understand most parts of the course.

●Course Evaluation Method and Criteria
The final grade will be based on written homework and programming tasks.

●Study Load (Self-directed Learning Outside Course Hours)
Depending on the background knowledge in programming some students might need to learn Python outside of the lecture. We will offer an additional Tutorial organized by TAs for this.

●How to Respond to Questions
By email and/or by a discord server which will be used for the class.

●Notice for students
You will get updated information on the course homepage: https://www.henrikbachmann.com/mml2022.html

●Message from the Instructor
Any student interested in this subject is welcome. Japanese students who want to attend a lecture in English are highly welcomed and there will be Japanese TAs to help if there are any language problems.

Textbook	A list of free online sources and books will be provided during the lectures. But we will also create lecture notes together during the course.
Reference Book	None
Reference website for this Course	https://www.henrikbachmann.com/mml2022.html

Fundamentals of Physics I

Undergraduate / Graduate	Undergraduate	**Registration Code**	0062211
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I (1st year, Fall Semester) / Tue / 2 (10:30～12:00)		
Instructor	SHIGEMORI Masaki		

●Goals of the Course【Standardized across all programs】
This is the first of three lecture courses (Fundamentals of Physics I–III) designed to cover the basic classical physics to provide a firm foundation for learning science and engineering, and is offered to undergraduate students in their first year. This course introduces the concepts and laws of classical mechanics. Specifically, the lecture covers various concepts such as Newton's second law, force, work, kinetic and potential energy, conservation of energy, center of mass and linear momentum. Basic physical and mathematical concepts such as velocity, acceleration, vectors, differentiation and integration are also reviewed.

●Objectives of the Course
Kinematics: Understand how to describe motion using position, velocity and acceleration vectors.
Dynamics: Understand Newton's laws and learn how to solve dynamical problems using free-body diagrams.
Understand basic notions such as work, energy, momentum, and conservation of energy and momentum.

●Course Contents or Plan
The topics include kinematics, vectors, force and motion, energy, work and momentum, and are based on the following chapters in the textbook:
- Chapter 2: Motion Along a Straight Line
- Chapter 3: Vectors
- Chapter 4: Motion in Two and Three Dimensions
- Chapter 5: Force and Motion I
- Chapter 6: Force and Motion II
- Chapter 7: Kinetic Energy and Work
- Chapter 8: Potential Energy and Conservation of Energy
- Chapter 9: Center of Mass and Linear Momentum

Some examples of problem solving will be discussed in lectures, but the companion course, Fundamental Physics Tutorial Ia, is designed to develop students' problem-solving skills.

●Course Prerequisites and Related Courses
Students without a good background in high school physics and basic calculus are advised to review those materials as soon as possible and would be expected to spend more time and effort for the course. This must be considered when deciding your course load. Students are expected to participate actively in class activities throughout the course.

●Course Evaluation Method and Criteria
Class attendance is required. Absentees must give a valid reason (e.g. doctor's certificate). Students who withdraw from this course must notify the instructor in charge in a written form (email, NUCT, etc.)
Class attendance: 5%, Assignments: 25%, Exams (midterm and final): 70%.

●Study Load (Self-directed Learning Outside Course Hours)
Online-quizzes and homework (a few hours)

●How to Respond to Questions
Online Q&A and email

●Notice for students
Concurrent registration of Fundamental Physics Tutorial Ia is strongly advised because it is necessary for mastering the content of the lectures.

Textbook	**Fundamentals of Physics** Extended 11th Edition International Student Version with **WileyPLUS Set** (John Wiley & Sons, 2018 ISBN: 978-1119460138)
Reference Book	Feynman Lectures On Physics (Vol.1) by Richard P. Feynman (Pearson PTR)

Fundamentals of Biology Ⅰ

Undergraduate / Graduate	Undergraduate	**Registration Code**	0063315
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I（1st year, Fall Semester) / Wed / 3（13:00～14:30）		
Instructor	CARTAGENA Joyce Abad		

●Goals of the Course【Standardized across all programs】

Cells are not only the basic unit of living organisms, but also the smallest unit capable of self-renewal. In this course, we aim to deepen our understanding of the basic mechanisms of biological phenomena by studying the structure and functions of cells and their organelles. This course is designed to introduce the key concepts of biology and to provide the foundation for specialized courses. Furthermore, this course aims to encourage students to think like scientists and develop scientific reasoning and literacy skills.

●Objectives of the Course

This course will provide the basic knowledge in the different fields of Biology such as: Cell Biology, Genetics, Molecular Biology, Microbiology, Evolutionary Biology and Biodiversity, and Plant Biology. After taking this course, the students are expected to be able to easily proceed to the more advanced Biology courses in their curriculum.

●Course Contents or Plan

1. Cell Biology
   Lecture 1: Cell Structure and Function
2. Genetics and Molecular Biology
   Lecture 2: Cell Division and Sexual Reproduction
   Lecture 3: Genetics (Mendel's Experiments and Heredity, Modern Understandings of Inheritance)
   Lecture 4: DNA Structure and Function
   Lecture 5: Gene Expression
   Lecture 6: Biotechnology and Genomics
3. Evolution
   Lecture 7: Evolutionary Processes
4. Biological Diversity
   Lecture 8: Microbiology
   Lecture 9: The Evolution of Plant and Fungal Diversity
   Lecture 10: The Evolution of Vertebrate and Invertebrate Diversity
5. Plant Biology
   Lecture 11: Plant Structure and Function

●Course Prerequisites and Related Courses

A background in basic Biology from high school is not absolutely required but is ideal.

●Course Evaluation Method and Criteria

Attendance and class participation 30%
Assignments (including group presentation) 30%
Examinations (midterm and final) 40%

●Study Load (Self-directed Learning Outside Course Hours)

Students are expected to read and understand one to three chapters (depending on topic) of the textbook every week, and come to class prepared for discussion. In order to assess students' understanding, assignments will be given after every lecture.

●How to Respond to Questions

Communication with the instructor and teaching assistant outside of class hours will be via NUCT or email.

●Notice for students

1. Course format
   a. Lectures and discussion sessions (synchronous)
   Lectures will be given either face-to-face or online (through Zoom) every Wednesday from 1:00-2:30 PM (JST), depending on the university guidelines regarding the pandemic situation in Nagoya. If majority of the students will not be able to attend face-to-face classes, online Zoom classes will be adopted. The detailed schedule will be announced on

the first day of class.

b. COIL class with NCSU (North Carolina State University)
COIL stands for Collaborative Online International Learning, an educational method that uses ICT to interact with overseas universities online. There are two methods: synchronous (using Zoom), and asynchronous (using Slack and Google Drive for file sharing and collaboration). COIL Zoom classes are tentatively set on October 27, 2022 (9:00 PM JST) and December 1, 2022 (10:00 PM JST). A group presentation will be the final requirement for this COIL class.

2. Course webpage
NUCT (Nagoya University Collaboration and Course Tools; https://ct.nagoya-u.ac.jp/portal) is an online system that will be used for this course. PowerPoint slides, recorded lectures, other learning materials (such as videos, websites, etc.) and home works will be accessible through this page.

3. Attendance
In case of emergency or absence from class, students should notify the instructor as soon as possible by email.

4. Make-up & repeat exams
Make-up exams may be given on condition that the student can provide acceptable reasons for his/her absence.
Students who fail to get a passing score at the end of the semester will be eligible for a repeat exam, given that the total score reaches at least 40%.

5. Academic honesty and original work
Cheating and copying (including plagiarism) will not be tolerated in this class. If caught cheating, students will receive necessary penalties, including getting an **F** in all registered courses for the semester. All submissions (assignments, exams and reports) will be checked using iThenticate.

6. Course withdrawal
Students who wish to withdraw from the course will have to inform the instructor by November 16, 2022.

7. Teaching assistant
Mr. Abriel Bulasag is a PhD student and will be joining the course as a TA. He can be contacted via NUCT messaging or by email (asbulasag@up.edu.ph).

●**Message from the Instructor**
Students are highly encouraged to regularly check NUCT for important announcements from the instructor. Do not hesitate to contact the instructor for any inquiries.

Textbook	Biology 2e (2020) OpenStax, Rice University Digital Version ISBN-13 978-1-947172-52-4 https://openstax.org/details/books/biology-2e (Free online textbook)
Reference Book	Jane B. Reece, Martha R. Taylor, Eric J. Simon, Jean L. Dickey. 2019. Campbell Biology: Concepts & Connections, 9th Ed. Pearson (Global Edition) *or older edition
Reference website for this Course	

Comparative Studies of Cultures

Undergraduate / Graduate	Undergraduate	**Registration Code**	0063411
Course Category	Basic Courses in Humanities and Social Sciences	**Credits**	2.0
Term (Semester) / Day / Period	Fall Semester / Wed / 4（14:45～16:15）		
Instructor	MCGEE Dylan		

●Goals of the Course【Standardized across all programs】
In today's world, conflicts and disputes based on differences in cultural backgrounds are becoming more and more serious. Living in such a world, we need to be willing to recognize the diversity of cultures. However, if we emphasize cultural diversity too much and "otherize" other cultures as if they were the stories of people in another world, we may lose our empathy as human beings, which may ultimately lead to a lack of understanding and indifference toward other cultures. The purpose of this course is to learn universal knowledge and perspectives on human beings and culture by focusing on not only the diversity of cultures but also the commonalities among them through the process of comparing them with each other.

●Objectives of the Course
As a liberal arts course in the humanities, this course is designed to introduce students to theories and methods currently used in cultural studies, while fostering critical inquiry and understanding of other cultures. Students in this class will develop basic academic skills like critical reading and analytic writing, while also enhancing communication skills through group discussion and presentation.

●Course Contents or Plan
This course is a comparative survey of Japanese and Chinese visual storytelling, from the tenth century to the present. We will learn about different forms of visual media over time, technologies of writing, cultures of reception, and the many roles that manuscript/print/digital media has played as an agent of social change. We will also learn various theories and methods for interpreting visual narrative and consider how readers (as consumers and prosumers) have shaped the dynamics of storytelling over time. All required readings for this course will be in English translation, with some additional materials available in Chinese and Japanese. Prior background in East Asian Studies and/or Japanese and Chinese is recommended but not required.

Course content will be organized into fourteen individual modules, each focusing on a particular topic or theme. Note that between now and the start of the semester, the following topics are subject to slight modification:

Module 1: Course Overview
Module 2: Picture Scrolls
Module 3: Medieval/Early Modern Books
Module 4: Medieval/Early Modern Books
Module 5: Early Manga and Manhua
Module 6: Children's Literature
Module 7: Early Animation
Module 8: Interwar and Wartime Magazines
Module 9: Comicbooks (Lianhuanhua and Manga) during the 1970s and 1980s
Module 10: Dojinshi and Fan Fiction
Module 11: 1980s-1990s Video Games
Module 12: Media Mix and Transmedia Storytelling
Module 13: Webtoons and Web Manhua
Module 14: Digital Media and Participatory Culture

●Course Prerequisites and Related Courses
There are no prerequisites to enroll in this course. All are welcome! Some previous background in East Asian humanities and/or proficiency in Japanese would be helpful.

●Course Evaluation Method and Criteria
Assessment in this course will be according to a contract system. At the start of the semester, each student will be given a choice of three different learning tracks, each with a different set of tasks and learning objectives that will culminate in a fixed grade. Upon successfully meeting all the objectives in their chosen track, students will earn the grade they signed up for. Students who choose the General Education Track, for example, will earn a B after completing ten of the fourteen lesson modules and writing a brief paper on an assigned topic. Students on the Research Track, in contrast, will earn an

A+/S after completing all fourteen lesson modules, contributing to online discussion meetings, conducting self-directed research for their final paper, and giving an presentation based on their research topic. Specific details about the assessment schedule for each track can be viewed on the online version of the syllabus, which will be accessible starting on Friday, September 30th (see below for details about how to access the course site before the start of the semester.

●Study Load (Self-directed Learning Outside Course Hours)
In addition to the ninety (90) minutes of time spent in each class meeting, students should expect to spend time outside of class each week reading and writing responses to weekly prompts. Your work load will depend on which learning track you have chosen to join. In general, students on the Discovery track (final grade of B) can expect an average of one hour or less per week, students on the Mastery track (final grade of A) around two hours per week, and students on the Research track (A+/S) around three hours per week. For more details, refer to the guide to learning tracks, which is posted on our CANVAS site.

●How to Respond to Questions
All students are encouraged to post questions and comments about the readings before class (through a textbox on our course site). I read these before class, and direct discussion towards your questions and interests. Students are also welcome to ask questions at any point during our discussion meetings.

●Notice for students
IMPORTANT: I will NOT be using NUCT to teach this class. Our class will be taught on CANVAS and our weekly meetings will be held in person. After you fill out the signup sheet linked below, I will provide you with the password for accessing the CANVAS site. It is your responsibility to write me and request access to CANVAS before the semester starts. If you are considering enrolling, please add your name and address to the following signup sheet page on Google Docs so that I can send you an invitation to the course site:

https://forms.gle/naaQQ4Kx6Xyww1yJ7

Note that I will be opening the course site on Friday, September 29th. That way, you can view the online version of the syllabus, peruse the schedule of course readings, and even get a head start working on some of the lesson modules before the semester starts.

This class will be taught in-person for the duration of the Fall 2022 semester. If you would like to enroll in the class, please make sure that you have no scheduling conflicts with other classes meeting on the same day and time. There will be no special accommodations for students who double-book their schedules. Also, please note that after the semester starts, I will only accept enrollment requests from students who have attended at least one of the first three class meetings. Students should not write mid-semester asking to join the class.

Because this class has been scheduled on a day and time that directly conflicts with my faculty meetings in the Graduate School of Humanities, there will be three or four dates on which I cannot hold class in person. I expect that these dates will be: October 19th, November 16th, December 14th, and January 18th. On these days, I will have a recorded lecture and other materials that students can access on demand. These will substitute for the discussion meetings scheduled on those days. I also plan to block off office hours during those weeks for students who would like to discuss the material in real time.

Required statement about course withdrawal: If you wish to withdraw from this class, please inform me in writing (by e-mail) as early in the semester as possible. If you write me before the ILAS deadlines for roster changes, your name will be removed from the roster. If you write me later than that, then your name will continue to appear on the roster, and you will be given a grade of absent (W or 欠).

Textbook	All course materials will be provided on the first day of class. There is no textbook to purchase.
Reference Book	A list of optional readings and reference materials will be made available on our course site.
Reference website for this Course	

Remedial Mathematics ＊Optional subject

Undergraduate / Graduate	Undergraduate	**Registration Code**	0063415
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I（1st year, Fall Semester) / Wed / 4（14:45～16:15）		
Instructor	RICHARD Serge		

●Goals of the Course【Standardized across all programs】
The field of mathematics that describes and analyzes quantitative changes is analysis, and its central method is calculus. It is an essential research method in natural sciences, but in recent years it has also been widely applied to social sciences. This course is a companion course to Calculus I. Its goal is to provide additional support to students with little or no precalculus knowledge.

●Objectives of the Course
Its objective is to provide enough material to students such that they can master the content of Calculus I and be fully equipped for more advanced courses.

●Course Contents or Plan
The content of this course will depend on the initial level in mathematics of the students attending it. It will mainly consist in a review of high school mathematics and in an additional help for students attending the course Calculus I.

●Course Prerequisites and Related Courses
No prerequisite.

●Course Evaluation Method and Criteria
Your final grade will be determined by your active participation during the lectures. Students need to notify the course withdrawal to the instructor when they have no intention of finishing the course during the semester.

●Study Load (Self-directed Learning Outside Course Hours)
No study load for this course.

●How to Respond to Questions
By email.

●Notice for students
Check the website mentioned below for updated information. The lectures will be provided in a classroom and/or on Zoom depending on the situation.

Textbook	Free textbook will be available on the website of the course.
Reference Book	Free reference books will be available on the website of the course.
Reference website	http://www.math.nagoya-u.ac.jp/~richard/fall2022.html

Special Mathematics Lecture (Groups and their representations)
＊Optional subject

Undergraduate / Graduate	Undergraduate	**Registration Code**	0063621
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	Fall Semester / Wed / 6 (18:15～19:45)		
Instructor	RICHARD Serge		

●Goals of the Course
Group theory plays an important role in many fields, as for example in quantum mechanics or in particle physics. During this one semester course, we shall introduce the main concepts of groups, their representations, and present some classical groups. Lie groups and Lie algebras will also be discussed.

●Objectives of the Course
Get enough knowledge about groups for perceiving their importance in several theories and for recognizing them in numerous applications.

●Course Contents or Plan
This course should cover the following topics: 1) Groups, 2) Linear representations, 3) Lie groups, 4) Semi-simple theory.

●Course Prerequisites and Related Courses
Basic knowledge on calculus and linear algebra, as provided in Calculus I & II and in Linear algebra I & II. Motivated 1st year students can also attend without these prerequisites but after a discussion with the instructor.

●Course Evaluation Method and Criteria
The final grade will be based on the active participation during the lectures and on some written reports. Students will be encouraged to work on applications related to their major during the semester. Students need to notify the course withdrawal to the instructor when they have no intention of finishing the course during the semester.

●Study Load (Self-directed Learning Outside Course Hours)
Students are expected to read their notes, and to be familiar with the content of the previous lectures before each new lecture.

●How to Respond to Questions
By email.

●Notice for students
It is expected that the students will show a certain maturity in studying independently and in choosing some exercises and problems to solve. Study sessions will be organized on a weekly basis.

This course is an optional subject which does not count towards the number of credits required for graduation in any program at Nagoya University.

Textbook	Free textbooks will be provided during the lectures.
Reference Book	Free reference books will be provided during the lectures.
Reference website	http://www.math.nagoya-u.ac.jp/~richard/SMLfall2022.html

Linear Algebra 1

Undergraduate / Graduate	Undergraduate	**Registration Code**	0065315
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I（1st year, Fall Semester) / Fri / 3（13:00～14:30）		
Instructor	BACHMANN Henrik		

●Goals of the Course【Standardized across all programs】
"Linearity" is the most basic concept of quantitative treatment in modern science and is used in all fields. Linear algebra is a method of mathematically dealing with linearity. The goal of this course is to familiarize yourself with the mathematical treatment of matrices and vectors and to understand various concepts in the first half of the year-round lecture. In particular, we emphasize geometric understanding by coordinate geometry, familiarity with solving simultaneous linear equations, and understanding of the concept of orthogonality.

●Objectives of the Course
The first half of the course will deal with solving linear systems in a systematic way. We will view linear system from several different points of views and see how this will lead to a lot of powerful tools for real life applications.

●Course Content or Plan
Linear systems, Gaussian elimination, matrices, vectors, linear maps, matrix multiplication, the inverse of a linear map, subspaces of R^n, image and kernel, linear independence, bases, dimension, coordinates, orthogonal bases, the Gram–Schmidt algorithm, QR factorization, orthogonal complement, orthogonal maps, least square approximations.

●Course Prerequisites and Related Courses
No formal prerequisites. Some ability to manipulate systems of linear equations and understanding of elementary geometry will be useful for the understanding of the course material. It is *strongly* recommended to also follow the course Mathematics Tutorial I b. Highly motivated students can also attend the lecture “Mathematics for machine learning”, where some concepts of Linear Algebra 1 are applied.

●Course Evaluation Method and Criteria
There will be two main, written exams: midterm and final. Additionally, there will be homework assignments and quizzes. The grading scale will be A+, A, B, C, C-, F. Students need to notify the course withdrawal to the instructor when they have no intention of finishing the course during the semester.

●Study Load (Self-directed Learning Outside Course Hours)
Students are expected to review the previous lecture of Linear Algebra I before attending the next lecture.

●How to Respond to Questions
Email or social media.

●Notice for Student
Everything you need to know will be on the regularly updated homepage below. Please check this homepage regularly for updates.

Textbook	None
Reference Book	Otto Bretscher: ***Linear Algebra with Applications***, fourth edition, Pearson 2009. *ISBN: 978-0-13-600926-9*
Reference website for this Course	https://www.henrikbachmann.com/la1_2022.html

Fundamentals of Chemistry 1

Undergraduate / Graduate	Undergraduate	**Registration Code**	0065418
Course Category	Basic Courses in Natural Sciences	**Credits**	2.0
Term (Semester) / Day / Period	G-I（1st year, Fall Semester) / Fri / 4（14:45～16:15）		
Instructor	PHUNG Quan manh		

●Goals of the Course【Standardized across all programs】

Chemistry is a discipline that deals with substances and their changes, and is the basis of a wide range of science fields. Its targets range from atoms to molecules, macromolecules, solids, liquids, and substances existing in living organisms and the global environment and forming the universe. We are surrounded by various substances, so it is crucial to understand them and their behavior. Fundamentals of Chemistry I and II are designed to be taken consecutively throughout the year. The courses deal with the basic units of substances such as atoms and molecules, as well as the structures and functions of various substances. It is planned to systematically learn the basics and attractiveness of chemistry, such as the exchange of energy, the progress of chemical reactions, and the relationship between life phenomena and substances.

●Objectives of the Course

Students will gain an understanding of:

- the fundamentals of chemical reactions,
- chemical and physical properties of atoms and molecules in different phases,
- the electronic structure of atoms and molecules and its impact on chemical properties, basic laws of thermodynamics and their applications in chemical reactions.

●Course Contents or Plan

1 Chemical Tools: Experimentation and Measurement (Ch. 1)
2 Atoms, Molecules, and Ions (Ch. 2)
3 Mass Relationships in Chemical Reactions (Ch. 3)
4 Reactions in Aqueous Solutions (Ch. 4)
5 Periodicity and the Electronic Structure of Atoms (Ch. 5)
6 Ionic Compounds: Periodic Trends and Bonding Theory (Ch. 6)
7 Review and Midterm evaluation (Chs. 1 – 6)
8 Covalent Bonding and Electron-Dot Structure (Ch. 7)
9 Covalent Compounds: Bonding Theories and Molecular Structure (Ch. 8)
10 Thermochemistry: Chemical Energy (Ch. 9)
11 Gases: Their Properties and Behavior (Ch. 10)
12 Liquids and Phase Changes (Ch. 11)
13 Solids and Solid-State Materials (Ch. 12)
14 Solutions and Their Properties (Ch. 13)
15 Review and Final evaluation (Chs. 1 – 13)

●Course Prerequisites and Related Courses

None

●Course Evaluation Method and Criteria

Students will be evaluated based on one midterm exam (25% weight), one final exam (comprehensive, 45% weight), and homework (30% weight). Multiple choice homework will be given at the end of each class. Homework must be submitted before the next class starts. Both midterm and final exams will be multiple choice.

Grade evaluation will be according to the the GPA System at Nagoya University: "A+": 100-95%, "A": 95-80%, "B": 70-80%, "C": 65-70%, "C−": 60-65%, "F": 60-0%.

Course Withdrawal: Students need to request a course withdrawal when they have no intention of finishing a course during the semester. Course withdrawal request must be in written form (email). The last day to withdraw is the last class day in November.

●Study Load (Self-directed Learning Outside Course Hours)

Homework is crucial for mastering new material and developing skills in applying concepts. Weekly homework will be

electronic. A general guideline says an average of 2 hours of study time per week (assignments and reviews) is necessary for each 1 credit hour.

●How to Respond to Questions
By email or in-person during office hours.

●Notice for students
It is essential to sit in the exams during the scheduled class time. **There will be NO make-up exams.** In the event of a missed exam due to a serious illness, accident, or family emergency, compelling **written** documentation of the reason for the absence will be required. If the reason is accepted, the final grade will be calculated from the appropriately weighted average from the homework and/or the other exam. If the reason is deemed insufficient, the absence will be unexcused, and zero points will be awarded for the missed exam.

Attendance is necessary for successful completion of this course. No points will be awarded for attending lectures, but attendance may be taken. The lectures will be hybrid (in-person and online), records of the lectures will be provided on Microsoft Teams.

The exams focus on problem-solving and will be similar to the homework problems. Both exams and homework will be on Pearson Mastering Chemistry.

Textbook	Chemistry (J. K. Robinson, J. McMurry, and R.C. Fay), 8th Ed., Pearson, 2020 ISBN: 9781292336145
Reference Book	Reference book will be announced in the first class if necessary
Reference website for this Course	

Go in Japanese Culture

Undergraduate / Graduate	Undergraduate	**Registration Code**	0065421
Course Category	Global Liberal Arts	**Credits**	2.0
Term (Semester) / Day / Period	Fall Semester / Fri / 4（14:45～16:15）		
Instructor	SHIGENO Yuki		

●Goals of the Course【Standardized across all programs】
If you want to be active in the international community, you have to have a deep understanding of traditional culture of your own country. The goal of this course is for the students to learn how to play Go with a standard board. Through this the students are expected to deepen understanding of Japanese traditional culture.

●Objectives of the Course
Learn the basic rules of Go and play a game.

●Course Contents or Plan
Lesson 1 Guidance, history of "Go" and its diffusion in Japan. The rules of Go, Individual games by mini (9x9) board.
Lesson 2-4 Introduction of Go activities, The rules of Go, Individual games by mini (9x9) board.
Lesson 5 Invite guest to listen to their experiences of Go and play against guest. Individual games by mini (9x9) board.
Lesson 6 Group challenge (solving problems in a group) Individual games by mini (9x9)board.
Lesson 7-9 Learn on a medium-sized (13x13) Go board
Lesson 10 Invite guest to listen to their experiences of Go and play against guest. Individual games by medium-sized (13x13)board.
Lesson 11-14 Learn on an official-sized (19x19) Go board.
Lesson 15 Group challenge (solving problems in a group), Individual games.

The contents may be replaced or changed depending on the situation.

●Course Prerequisites and Related Courses
No pre-requisites. Students from any background are eligible. The course is not designed for Go players, and suitable for students of wide background.

●Course Evaluation Method and Criteria
- Lessons attendance rate.
- Number of games played during the lectures.
- Some quizzes will be held during the lectures. Students who miss more than 30% of the quizzes will receive a W grade.
- For course withdrawal, students need to send a notification to the instructor. Those who are absent more than 5 times will receive a W grade.

●Study Load (Self-directed Learning Outside Course Hours)
Play to various people using the Go app "Go Quest" at least once of week. To inform Handle Name is necessary.

●How to Respond to Questions
by email

●Message from the Instructor
Go is a game which we called of "peace" where players respect each other and prosper together.
It is a special opportunity to experience Japanese culture. At the same time, there are people who are enjoying it in nearly 90 countries around the world, and it is also popular as a mind sport. If you visit a local Go club or Go event you will have a chance to get to know each other through Go.
The basic rules are simple, let's have a try!

●Courses taught by Instructors with practical experience
The lesson will take a teacher with practical experience (Nihon Ki-in) makes use of her practical experience.

Textbook	None
Reference Book	Go, A complete Introduction to the Game, by Cho Chikun Kiseido Publishing Company, 1997 ISBN: 978-4-906574-50-6
Reference website for this Course	Go Quest http://wars.fm/go9 International Go Federation (IGF) http://www.intergofed.org