

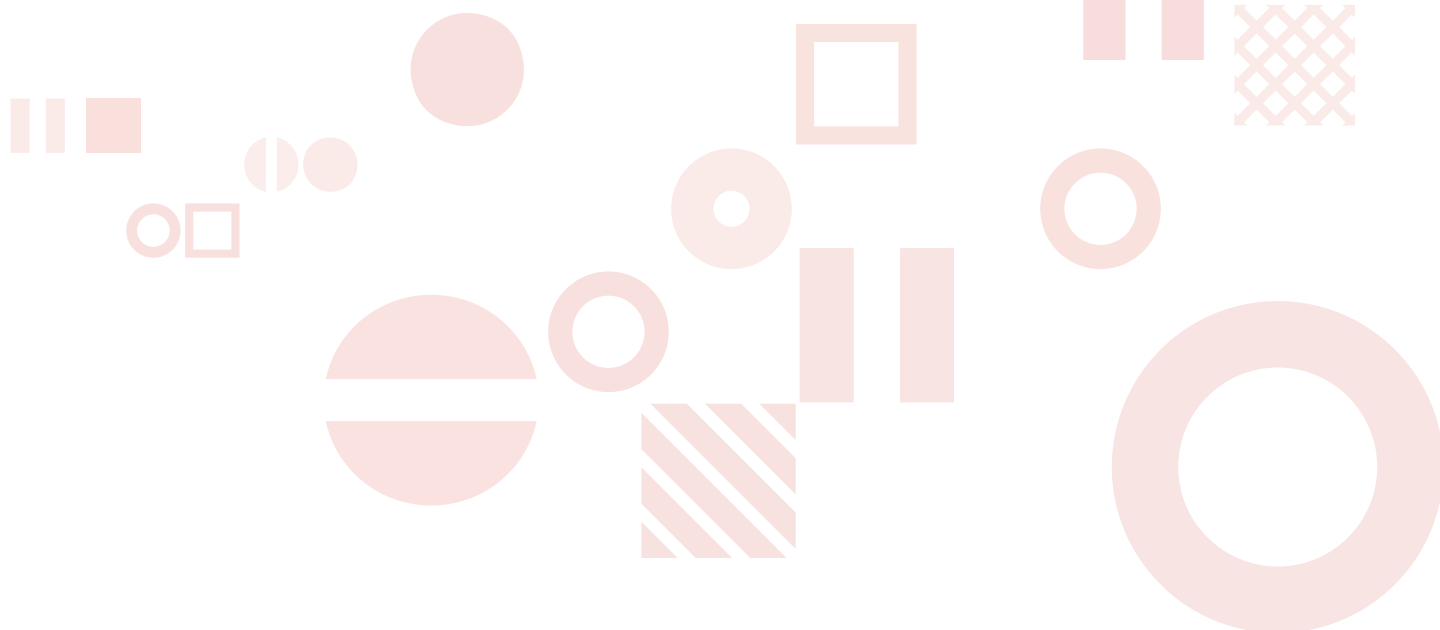


Graduate School of Mathematics  
Department of Mathematics,  
School of Science

Nagoya University  
2024–2025

# C O N T E N T S

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# Welcome to the mathematical world

Mathematics has a long history and tradition from ancient Greece to the present. Motivated or inspired by problems not only within mathematics but also in other fields and the real world, mathematics has been evolving and expanding its coverage. The Graduate School of Mathematics and the Department of Mathematics, Faculty of Science, conduct a broad range of education and research, from mathematics in the traditional sense -- what is called the pure mathematics -- to the areas related to various sciences such as mathematical physics, information theory, theoretical computer science and mathematical biology. I hope this pamphlet and our web page will help you find your way to your mathematics.

Our basic aim of education in the Graduate School of Mathematical Sciences and the Department of Mathematics stresses on the fundamental knowledge of mathematics, to broaden students' perspective, and to respect students' independence.

Based upon this policy, on top of the education program, we also provide various support system.

We offer systematically organized courses, a wide variety of intensive courses, small class groups (seminars) under the supervision of advisors, and provide many opportunities such as Colloquia and research seminars to learn about the frontiers of mathematical sciences. In addition, our graduate school supports "Student Projects", in which students plan and organize seminars and conferences on their own. We also offer a G30 International Graduate Program, which is a full-degree program taught entirely in English.

On top of that, we have not only an excellent library with a huge collection of literature, and a secure computer network system, but also a team of very friendly staff who support education and research activities in our school.

Some of you might think that you can do mathematics alone.

Of course it is important to have the attitude and the ability to solve problems yourself. However, in reality, there will come on time when it is essential for you to seek advice from seniors, such as your academic advisors.

You will be guided to read relevant articles and develop your own sense towards mathematics.

It is often the case that you can deepen your understanding and advance your research by interacting with others. And I believe that our Graduate School has abundant human resources to make such interaction fruitful. Our faculty members, as well as all your colleagues, have something different from you in regard to areas of expertise, styles of learning and research and so on. To encourage you in engaging mathematical discussion with others in the Graduate School, the daily Cafe David session is stuffed with friendly graduate students and even academics ready to answer questions that you may have.

Please feel free to participate in the Cafe David, we will even provide free coffee for you!

Recently, the society, especially companies, expects more and more from mathematics, and our alumni are successful in various field in the society. With the help of the Mathematical Sciences Alumni Association, our Graduate School has organized various activities to support students' career development, such as courses on mathematical sciences in society and business career seminars. In recent years, we also provide career path seminars and industry-university collaborative activities to enhance the support for PhD students in their career development.

Please join us in the Graduate School of Mathematics and in the Department of Mathematics. We are looking forward to discussing mathematics together with you.



Dean of Graduate School  
of Mathematics

Hitoshi MORIYOSHI

## Introduction of Teaching Faculty



ARANO, Yuki

keywords

**Operator algebras, quantum groups, tensor categories**

I am interested in operator algebras, especially quantum groups in the operator algebraic approach. Along this, I also worked on tensor categories and actions of quantum groups on operator algebras.



AWATA, Hidetoshi

keywords

**Integrable models, Conformal field theory**

My current subject is quantum field theory with infinite-dimensional symmetry such as Virasoro algebra, for example, the string theory, conformal field theory and two-dimensional integrable model.



BACHMANN, Henrik

keywords

**Number theory, multiple zeta values, modular forms**

I am interested in different aspects of multiple zeta values. These are real numbers appearing in various areas of mathematics and theoretical physics. In particular, I am studying their  $q$ -analogues to understand the connection of these numbers to modular forms.

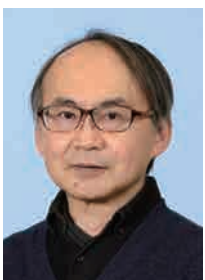


FUJIE-OKAMOTO, Futaba

keywords

**Graph colorings and labelings, Traversability in graph, Connectivity in graph**

In the area of graph theory, my research interests include studying graph structures through graph colorings / labelings and distances in graphs. One of my current topics is to study traversability in graphs using various covering walks.

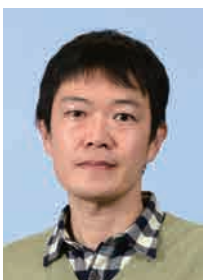


FUJIWARA, Kazuhiro

keywords

**Number theory, Arithmetic geometry, Non-commutative class field theory**

I am trying to understand a very primitive but basic object, "integers," via modern aspects such as automorphic forms and Shimura varieties (non-commutative class field theory). My approach mainly uses algebraic and geometric methods, including cohomology theory.



FURUSHO, Hidekazu

keywords

**Number theory, Arithmetic geometry, Arithmetic topology**

My research is based on number theory. I am interested in various fields (particularly arithmetic geometry and arithmetic topology) related to number theory. I am fond of working with polylogarithms, (multiple) zeta functions/values and their geometric backgrounds.



GARRIGUE, Jacques

keywords

**Programming languages, Type theory**

I am studying the theory underlying functional programming languages. For more than 20 years, I have been working at fitting types onto the world, but the job is far from finished.



HAMANAKA, Masashi

keywords

**Mathematical physics, Elementary particle physics, Noncommutative solitons**

I am interested in the mathematical structure behind laws of nature, especially elementary particle physics and string theory. Presently, I study noncommutative solitons and integrable systems related to  $N=2$  string theory and twistor theory.



HAYASHI, Masahito

keywords

**Quantum information, Information theory**

In order to unravel the mystery of quantum theory, I study quantum information theory based on the information theoretical aspect. My study treats this topic from the viewpoints of information theory and representation theory.



HAYASHI, Takahiro

keywords

**Quantum group, Hopf algebra, Tensor category**

The field I am working in is quantum groups and their representations. In particular, I am interested in generalized quantum groups and their relations to other areas of mathematics, such as classical representation theory and integrable systems.



HESSELHOLT, Lars

keywords

**Homotopy theory, Algebraic K-theory, p-adic arithmetic geometry**

My research focuses on the study of automorphisms of high dimensional manifolds through homotopy theory, algebraic K-theory, and topological cyclic homology. In this investigation, invariants and constructions in  $p$ -adic arithmetic geometry naturally appear.



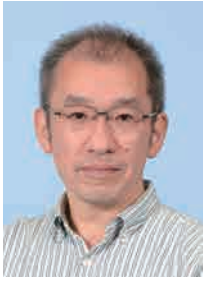
HIRAI, Hiroshi

keywords

**Optimization, Algorithms**

I am working on optimization and algorithms. I am particularly interested in their applications/connections to various fields of mathematical sciences and methodologies invented by their interactions. My recent intensive research includes algebraic generalizations of combinatorial optimization and geodesically convex optimization on nonpositively curved spaces.





## HISHIDA, Toshiaki

### keywords

**Partial differential equations, Navier-Stokes flow**

My interests are focused on the existence, uniqueness, regularity, stability and asymptotic behavior of the Navier-Stokes flow in several unbounded domains. I often employ functional- and real-analytic methods.



## KAWAMURA, Tomomi

### keywords

**Knot theory, Topology**

My main research interest is the relations between diagrams and invariants of knots and links. It is amazing that a lot of formulas are proved using advanced theories, though some of them seem to be very easy.



## ISHII, Akira

### keywords

**Algebraic Geometry, McKay correspondence, Derived category**

I am studying correspondences between algebraic varieties and associative algebras through derived categories. A typical case is the McKay correspondence which relates resolutions of a quotient singularity and the skew group algebra.



## KITA, Nanao

### keywords

**Graph theory, Combinatorial optimization, Discrete algorithm**

My research is in graph structures and algorithms for combinatorial optimization problems on graphs. I am particularly interested in deriving various decomposition theorems of graphs that unveil the essence of computational properties for combinatorial optimization problems.



## IZUMI, Keisuke

### keywords

**Theory of Gravity, Cosmology**

I study various topics related to gravity to understand the whole structure of quantum gravity. I work on both classical and quantum aspects of gravity; general relativity, quantum field theory on curved spacetime, quantum scattering problems involving gravitational effects, and cosmology.



## KUBO, Masashi

### keywords

**Source coding, Channel coding**

My research field is information theory. This includes many topics, and I especially study source coding and channel coding. These topics concern rate of data compression and channel capacity respectively. They are based on the theory of stochastic processes.



## JAERISCH, Johannes

### keywords

**Ergodic theory, dynamical systems, chaos, fractals**

My research focuses on ergodic theory and dynamical systems, especially the mathematical theory of the thermodynamic formalism, which originates from statistical physics. I am very interested in the interplay of geometric and measure-theoretic properties of chaotic dynamical systems. In particular, the fractal geometry of dynamically defined, highly irregular sets.



## LE GALL, François

### keywords

**Algorithms, Computational complexity, Quantum computing**

My research area is theoretical computer science, the field of computer science that investigates computation from a mathematical perspective. I am especially working on algorithms (algebraic algorithms, graph algorithms, distributed algorithms), computational complexity (especially communication complexity and interactive proofs) and quantum computing.



## KANNO, Hiroaki

### keywords

**Quantum field theory, Supersymmetric gauge, String theory, Integrable system**

I am working on the quantum geometry underlying the web of dualities among supersymmetric gauge/string theories. Representation theory and integrable systems are powerful tools for the investigation of quantum invariants in such a geometry.

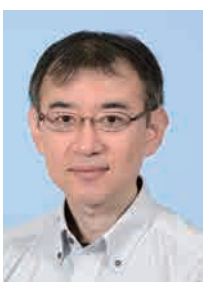


## MATSUO, Shin-ichiro

### keywords

**Geometric analysis, Differential geometry**

My research interests include gauge theory, Nevanlinna theory, and positive scalar curvature. I have worked on topics such as the ASD equations, the Seiberg-Witten equations, Brody curves, mean dimension, and the Kazdan-Warner problem.



## KATO, Jun

### keywords

**Nonlinear partial differential equations, Fourier analysis**

My research field is nonlinear partial differential equations relevant to wave propagation phenomena, and related topics. I have been studying the solvability of such equations by using functional analysis, Fourier analysis, etc.



## MINAMI, Kazuhiko

### keywords

**Solvable lattice models, Statistical mechanics, Quantum structures**

I investigate the quantum and statistical structures of lattice models. This field is related to solvable lattice models, their algebraic structures, critical phenomena, and real magnetic materials.



## MORI, Ryuhei

### keywords

Quantum information, Computational complexity, Algebraic algorithms

My research area includes quantum information, computational complexity and algebraic algorithms. I am interested in mathematical approaches to information and physics.



## NAKAOKA, Hiroyuki

### keywords

Homological algebra, Additive category, Representation theory of algebras

In my research I aim to capture categorical frameworks appearing in algebra. In particular, recently I am engaged in research on the structure of additive categories related to the representation theory of algebras, such as abelian categories, exact categories, and triangulated categories.



## MORIYOSHI, Hitoshi

### keywords

Noncommutative geometry, The Atiyah-Singer index theorem

Noncommutative Geometry is a new framework in Mathematics proposed by A. Connes. The Atiyah-Singer Index Theorem is a central theme in Noncommutative Geometry, which is my current research subject.



## NAKASHIMA, Makoto

### keywords

Probability theory, Branching process, Statistical mechanics

Probability theory is used in several areas and has a lot of applications. I am studying branching processes and polymer models which are related to biology and physics.



## NAGAO, Taro

### keywords

Random matrices, Semiclassical theory

Random matrices are matrices with random number elements. Using methods such as semiclassical analysis, I study random matrices from multilateral viewpoints, such as fundamental theory and various applications.



## NAYATANI, Shin

### keywords

Nonpositively curved metric spaces, Rigidity of discrete groups, Harmonic maps

I am interested in themes of differential geometry such as conformal geometry, geometric rigidity and spectral geometry. Recently, I study Laplace-eigenvalue maximization and its relation to space realization.



## NAITO, Hisashi

### keywords

Discrete Geometric Analysis, Variational Problems, Differential Geometry.

I study discrete geometry related to material sciences by using analytic method. Usual discrete geometry is a discretization of smooth object, however crystal structures are essentially discrete object. Using graph theory, I research properties of crystals/molecules structures from mathematical view points.



## OHIRA, Toru

### keywords

Mathematical biology and physiology, Delayed stochastic systems

My interest lies in creating mathematical models of various physical, biological and social phenomena. I particularly focus on systems with feedbacks and interactions under the influence of noise / fluctuations and delays.



## NAKAMURA, Yusuke

### keywords

Algebraic geometry, Minimal model theory

My research interests are singularity theory in algebraic geometry (especially in minimal model theory) and applications of minimal model theory. Recently, I am also interested in the interaction between algebra and combinatorics.



## OHKUBO, Shun

### keywords

Number theory p-adic representations p-adic differential equations

My current research interest is a p-adic aspect of Number theory. I am studying p-adic representations appearing in Number theory. I am also studying related p-adic differential equations.

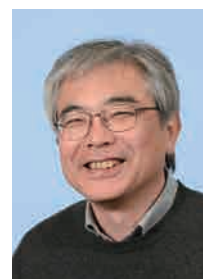


## NAKANISHI, Tomoki

### keywords

Cluster algebras, integrable systems

I am currently working on the theory and applications of cluster algebras. I am particularly interested in formulating cluster algebra structure in view of the theory of root systems.



## OHTA, Hiroshi

### keywords

Symplectic geometry, Gauge theory, Floer theory

Recently, I mainly study two subjects; One is Floer cohomology theory in symplectic geometry based on certain homotopical algebras (so called  $A_\infty$  algebras), and the other is to relationships between singularity theory and symplectic/contact geometry.



## OKADA, Soichi

### keywords

Enumerative and algebraic combinatorics,  
Combinatorial representation theory

My research interests are in combinatorics and its connection with other fields, such as algebra, representation theory, and integrable systems. More specific topics of interest are related to Young diagrams, symmetric functions, alternating sign matrices, classical groups, etc.



## SUZUKI, Hiroshi

### keywords

Algebraic number theory, Capitulation problem

When I calculate some groups, Hamiltonian graphs, Schur polynomials, etc., I feel that this is not number theory, and I sometimes remember NaN.



## OUCHI, Genki

### keywords

Algebraic geometry, Derived category

I am studying algebraic geometry. My main research interest is symmetry of algebraic varieties in the context of the group theory, complex dynamics, derived categories and so on. Especially, I am interested in the geometry of Fano varieties and Calabi-Yau varieties in the wide sense.



## TAKAHASHI, Ryo

### keywords

Commutative algebra, Representation theory of rings

I have been studying the boundary between commutative algebra and representation theory of rings, that is, representation theory of commutative rings. The main purpose is to understand the structure of finitely generated modules over a commutative noetherian ring.



## SASAHARA, Yasuhiro

### keywords

Global analysis, Calculus of variations

I am studying variational problems which appear in geometry and mathematical physics. In particular, I'm interested in problems which do not result in solving differential equations.



## TANIMOTO, Sho

### keywords

Algebraic geometry, Arithmetic geometry,  
Diophantine geometry

I am interested in the interaction between higher dimensional algebraic geometry and arithmetic/diophantine geometry, and in particular its applications to rational points and rational curves. I frequently use higher dimensional algebraic geometry such as the minimal model program in my research.



## SATO, Takeshi

### keywords

Modular equations,  $\pi$ , Periods

I study special functions (hypergeometric functions, modular functions, e.t.c.), especially period relations and iterative and series approximations to  $\pi$ .



## TERASAWA, Yutaka

### keywords

Partial differential equations, Fourier analysis,  
Fluid mechanics

I study incompressible Navier-Stokes equations and their generalizations, which describe various fluid phenomena. To study these, Fourier, functional and stochastic analysis are important, and I am interested in their study, too.



## SHIROMIZU, Tetsuya

### keywords

General relativity, Cosmology,  
Differential geometry

My research interests are black hole spacetimes and cosmology based on general relativity (GR). Motivated by string theory, I am currently studying higher dimensional GR and anti-deSitter spacetime.



## UEDA, Yoshimichi

### keywords

Non-commutative analysis, Operator algebras,  
Free probability theory

I am studying various topics based on operator algebras. I would rather like the so-called measure theory in mathematics, and hence I am working on problems related to harmonic analysis, probability and ergodic theory in addition to problems on operator algebras themselves. My goal is to give contributions to non-commutative analysis, i.e., analysis for non-commutative quantities.



## SUGIMOTO, Mitsuru

### keywords

Partial differential equations, Fourier analysis

I am studying various properties of solutions to partial differential equations by means of "estimates". Fourier analysis is the main tool, but it is also an important object of study in itself.



## UZAWA, Tohru

### keywords

Group theory, Representation theory,  
Geometry

Representation theory deals with symmetries in vector spaces. It is an extremely active field, with connections to various fields, both pure and applied.





## YANAGIDA, Shintaro

keywords

Quantum Algebras, Algebraic Geometry

I am studying quantum algebras, such as quantum groups, Hall algebras and vertex algebras, mainly using geometric methods. I am also interested in the moduli problems in algebraic geometry.



## BOURNE, Chris

keywords

Operator algebras, Noncommutative geometry, Mathematical physics

Operator algebras and noncommutative geometry are subjects that arose from the mathematical description of quantum mechanics. I am interested in using these fields as well as ideas from index theory to give a new perspective on systems in physics and elsewhere.



## YOSHIDA, Nobuo

keywords

Probability theory, Statistical mechanics

There are strict laws which govern "randomness". Attracted by this paradox, I have decided to specialize in probability theory. I am mainly interested in research subjects related to statistical physics.



## RICHARD, Serge

keywords

Functional analysis, Spectral and scattering theory, Index theorems

I study spectral and scattering problems which have their origin in quantum mechanics. My research focusses on the development of algebraic frameworks for the quest of index theorems in scattering theory.





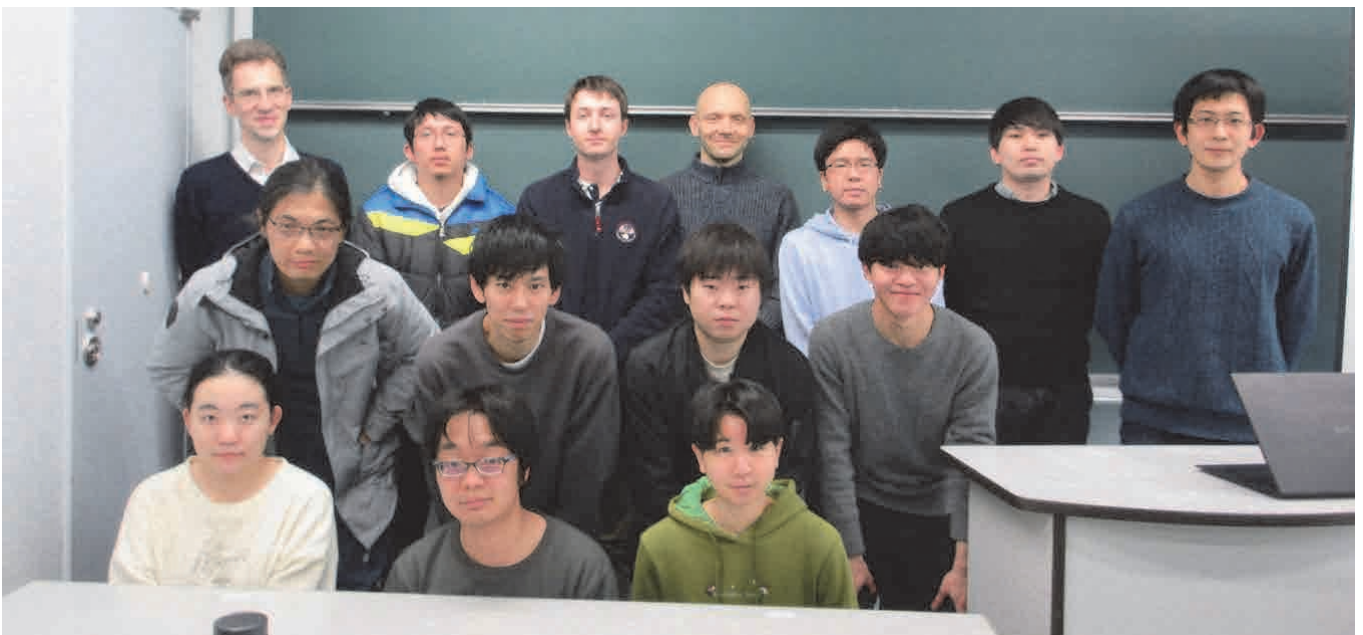
## Message from Teaching Faculty

## Le Gall, François



I arrived in Japan in 2000 after my undergraduate studies in France. I choose to study in Japan because I was very interested in Japanese culture and the Japanese writing system (especially kanjis). I was also lucky to receive a Japanese government (MEXT) scholarship. My original plan was to stay in Japan for two years, obtain my master's degree and then go back to France. But I really enjoyed both student life in Japan (especially the many extracurricular activities offered by Japanese universities – I was practicing Japanese archery, called Kyudo) and doing research, so I decided to stay three more years for a PhD. After that, still excited by life in Japan, I decided to stay further. It has now been 23 years since I arrived in Japan...

These days I am mainly doing research on quantum computing, a very active research area at the intersection of computer science, physics, and mathematics. As you may know, there has been significant worldwide progress on developing quantum computers (for instance, the first quantum computer made in Japan has been announced in March 2023). Our understanding of their computational power is, however, very limited: we don't understand precisely which problems quantum computers can solve more efficiently than current computers. I am aiming to make progress on this question using tools from Mathematics. The main research topics I am working on are mathematical analysis of quantum algorithms (i.e., algorithms for quantum computers) and quantum complexity theory (understanding the computational power of quantum computers). My goal is to discover new applications (and especially a "killer application") of quantum computers.

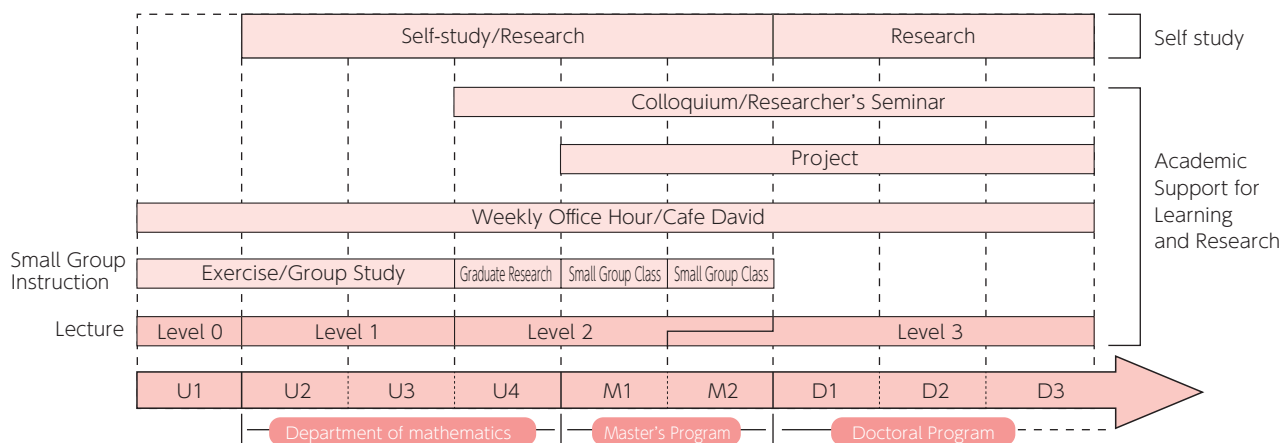


# Original Program

## Fostering Creativity in Mathematics

### Level System and Educational Program

Students can pursue a purpose-centered education suited to their area of inquiry and unfettered by their official school year.



### Level System

The Level System is our central mechanism for classifying programs of study into educational purposes, organizing both undergraduate and graduate degree curriculums as a coherent whole. Thus, all lecture and small group classes fall into a certain level.

#### Level 0

All science major students work together in the initial disciplinary phase of the art of science level 0 classes and learn subjects including calculus and linear algebra.

#### Level 1

Level 1 classes deal with basic concepts, which all math-majored students need to comprehend. This level corresponds to curricula for undergraduates in the second and third years. These classes encourage students to apply and connect mathematical concepts with other fields of science, such as physics, and to develop intuitive, logical and abstract thinking.

#### Level 2

The scope of level 2 classes embraces various areas of advanced concepts. These classes provide scholarly training in logical, abstract and systematic approaches commonly used in mathematics through a wide diversity of subjects. This level is intended for fourth year undergraduates and graduate students. It is advisable to complete the set of classes within two years.

#### Level 3

Level 3 classes serve as advanced courses, and are designed based upon the elemental portions of the curriculum up to level 2, the so-called core program. These are intended for all 2nd year or above graduate students and should be completed over three or four years.

## Basic Principles

### Emphasis on Basic Skills and Broad Minds

The Department of Mathematics and the Graduate School of Mathematics aim to cultivate self-motivated individuals, who can successfully navigate inquiry, reflection, and discovery based upon scholarly training in mathematics. Our commitment is to maintaining an enlightening environment for problem-conscious students where, together with scholars and fellow students, they can refine their ideas and apply logical reasoning in seeking solutions to problems.

Prospective students should know that in the mathematics department:

- ◎ Research planning, pursuit of research and regular reporting of result are expected.
- ◎ The education in the department is designed to support students' self-motivation.
- ◎ Research is pursued in dialogue with active researchers and fellow students.

### Emphasis on Independent Will

The aim of the doctoral program is to foster researchers with multiple talents in mathematical science who are also capable of working in various fields. In the Graduate School of Mathematics we offer doctoral student an active and global work place in order that students enrich their knowledge by working together with younger researchers.

Mathematical scientists are not only those who work in a university or a laboratory but include those competent to solve problems of any field of the mathematical science. Therefore, we encourage you to take a broad perspective in considering your career options after graduation.



### Learning Mathematics at "Cafe David"



The idea of studying mathematics brings images to mind of large lecture halls and rigorous self-study. These traditional methods of study are indeed important, but there are also dynamic alternatives. One of those is to gather various thinkers together to debate and discuss mathematics. The photo is of our own weekly event, "Cafe David". Here, undergraduate students, graduate students, and teaching faculty gather in a casual cafe meeting style, to chat over both academic and less formal questions. The well known mathematician often said to represent the 20th century David Hilbert is whom we have named our "Cafe David" after. As the name suggests, delicious coffee is on offer for department members in attendance. Discussion here allow many to overcome common barriers that exist between undergraduate and graduate student, or between students and faculty, or among academic areas or schools, strengthening relationships and intellectual understanding at the same time. In addition, graduate students join "Cafe David" as teaching assistants, offering a comfortable environment to answer tough questions from lectures. Faculty provide assistance here in the form of office hours and students can learn from interaction in this active public learning space.

Wouldn't you like to come and take a look at our diverse learning styles of mathematics?



# Undergraduate Program



## Learning and Lecture Content

The following is a brief description of what is offered at Nagoya University for mathematics majors.

### Level 0 (Freshmen)

You will learn calculus and linear algebra through examples and by working on exercises. These are the “raw material” of modern mathematics. You will be asked to carry out explicit computations, which will give you access to computational skill, and will foster proper intuition for mathematical concept. It is of utmost importance that you work Mathematics as many problems as possible, gaining exposure to mathematics.

Semester	Lecture	Small Group Class
Spring	Calculus of one variable/Linear algebra/Perspective in mathematics	Exercise in mathematics
Fall	Calculus of several variables/Linear algebra/Perspective in mathematics	Exercise in mathematics

### Level 1 (Sophomore)

First calculus and linear algebra will be reworked rigorously in the language of modern mathematics -sets and maps. Totally new concepts, such as complex function theory and topological spaces will enter the scene. The learning curve is steep, and you will be required to put in a lot of effort and your patience will be taxed, but the reward will be high: an entrance ticket to modern mathematics.

Semester	Lecture	Small Group Class
Spring	Sets and mappings/Linear space and linear mappings/Calculus of one variable	Exercise in mathematics
Fall	Calculus of several variables/Topological spaces/Complex function theory Normal forms of matrices/Introduction to information sciences	Exercise in mathematics

## Message from an International student



### Risan

My name is Risan. I am a second-year master's degree student (M2) in the Graduate School of Mathematics. My research area is around the connection between a variant of multiple zeta values called finite multiple zeta values and modular forms under the supervision of Prof. Henrik Bachmann.

Before enrolling at Nagoya University, I graduated from an undergraduate program with a Computer Science major (and only a minor in Mathematics). After graduating, I worked for several years on software engineering jobs in several IT companies. Even though my background was mainly not in pure Mathematics, I have always been interested in Mathematics from a very young age. I am very glad that our graduate school accepts people from diverse backgrounds like me. Here, I got a lot of chances to learn from experts in different fields of Mathematics. Moreover, I also got chances to apply my Computer Science knowledge in my research. For those from different

backgrounds but are very passionate about Mathematics, do not let your fear prevent you from following your passion. With very diverse research areas, our graduate school is also a good place to find an area that might fit your interest. Moreover, the G30 program allows me to study and do research in English, which has been my preferred language. If you want to learn Mathematics in English at one of the best schools in Japan, our graduate program will be a perfect program for you.

Outside of study and research, I have been a teaching assistant in several courses. That gives me experiences that will be very useful if I pursue an academic career in the future.

Finally, be calm and make an informed decision. I hope you will have a rewarding journey.

### Level 1 (Junior)

You will be introduced to mathematics that was developed in the early 20th century. Level 1 ends with the introduction of the Lebesgue integrals and its application to Fourier analysis, curves and surfaces which generalize circles and spheres, groups and rings that are algebraic abstraction of numbers, polynomials and maps. There will be "Omnibus lectures" on how mathematics relates to the real world, and what lies ahead of all this, "group study" where you pick the text of your choice, discuss the content with your fellow students, give talks, and give a poster presentation.

Semester	Lecture	Small Groupe Class
Spring	Introduction to group theory/Introduction to curves and surfaces Introduction to differential equations/Lebesgue integrals and measure theory	Exercise in mathematics
Fall	Rings and polynomials/Introduction to differential forms Introduction to functional analysis/Omnibus lectures/Group study	Group study

### Level 2 (Senior)

Lectures for seniors at Level 2 are all open to seniors and graduate students. The subject matter of these lectures differ by year. A partial list of courses offered in the past is given below. There are also numerous "intensive courses", which typically last for a week, designed to give an overview of research at the forefront. Courses at this level emphasizes the diversity and universality of mathematics that can only be appreciated by taking a higher viewpoint. You are not only expected to learn from these courses, but also to develop your own viewpoint/taste for mathematics. Reading courses under faculty supervision are offered, where you will learn how to read a book or a research article, how to formulate your thoughts in a mathematical way, and how to discuss mathematics.

Semester	Lecture	Small Groupe Class
Spring	Fields and Galois theory/Manifolds/Functional analysis/ Introduction to probability theory/Introduction to mechanics/ Introduction to numerical analysis/Omnibus lectures	Senior reading course
Fall	Elliptic curves/The heat kernel and the index theorem/ Introduction to partial differential equations/ Electromagnetic theory/Methods in applied mathematics (offered in English) / Functional programming languages	

# Graduate Program for Master's Degree



## ■ Fostering Scholars who Investigate, Think and Discover on their Own

The Graduate School of Mathematics aims to cultivate self-motivated individuals, who can successfully navigate inquiry, reflection, and discovery based upon scholarly training in mathematics. Our commitment is to maintaining an enlightening environment for problem-conscious students where, together with scholars and fellow students, they can refine their ideas and apply logical reasoning in seeking solutions to problems.

## ■ Intensive Course

Intensive courses are those conducted by lectures from other universities or institutions, intensively, over short periods of time. Content ranges widely from those of an introductory nature, that require no prior technical knowledge at all, to those that focus more narrowly on the most cutting edge findings in a specific field. Not only are the mathematical fields of Algebra, Geometry, Analysis to Applied Mathematics and Mathematical Physics covered, but lectures are brought in to offer various perspectives, including that of the corporate world and practical applications. To find out more information about intensive lectures and the small group classes explained below, please view the electronic syllabus of the Graduate School of Science/Mathematics/School of Science.

## ■ Small Group Class

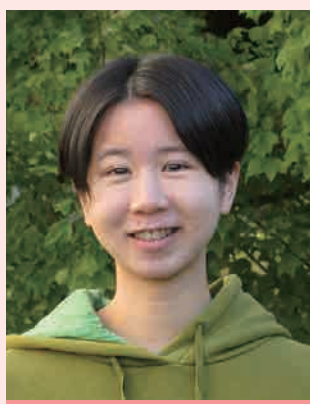
Small Group Class is a two-semester seminar intended to develop reading, critical thinking and discussion skills. In the seminar class students expand upon their learning from faculty lectures and identify their specific focus of interest/research from within areas presented in lectures. Within the chosen subject area, classes offer multifaceted lectures guided by student interest. The pace of the lectures is tailored to participating students' needs. As seen from the chart above, students can both improve their skills and explore their chosen field in the small group class. Master's students will belong to a credit-earning seminar each year. At the same time they are strongly advised to attend another seminar. Students who attend regularly and submit successful assignments will be awarded at most 1 credit over 2 years in addition to the credits from other classes for which they are registered.



## Teaching Assistants (TA)

Teaching Assistant positions are filled primarily by first year master's students. They are hired to aid professors with lectures and seminars for undergraduate student of first, second, and third year in the science department, as well as others, and to assist with Cafe Davis. Duties of a TA include designing and correcting class exercises, writing interpretations, and attending to all Q & A in and out class. These duties offer graduate students an opportunity to join the backstage of university lectures. Experiencing lectures from the standpoint of a teacher allows TAs an invaluable opportunity for their future, to learn now what it is to teach. In addition, as TA, one can understand many of the typical problems that students repeat, as well as those of beginning instructors and how to avoid them. Wages are paid to TAs, but many past TAs say that the real value in this assistant position is the opportunity to enhance one's own learning and future research.

### Message from an International student



#### NG lu-iong

I am recently a PhD student from Taiwan. My research interest focuses on quantum algorithms especially for algebraic problems. I earned my Bachelor's degree in Mathematics from National Taiwan University, and received my Master's degree here, the Graduate School of Mathematics, Nagoya University.

As a prospective student, one can easily find useful information from the website, such as the research area of each professor, and the admission requirements. I applied for the Japanese curriculum and took the examination in English in the same room with native applicants. There is also an oral exam for the PhD program, which I requested to take in English. During the process for admission and registration, administrators were very kind and willing to give me supports even

when I was not in Japan, and the documents sent by post was delayed due to the COVID-19. Also, thanks to the administrators, in the first year I got the chance to live in the dormitory of Nagoya University for international students, which let me fit in the life in Nagoya easier.

My advisor is Professor Le Gall. Since I came to Nagoya, everyone in our lab have been friendly and enthusiastic in discussing research so that the environment makes me able to ask questions or participate in discussions comfortably. Some of our members came from areas such as computer science or information engineering, so although we are in the Graduate School of Mathematics, one has many opportunities to communicate with people from different background. On the other hand, it is necessary for me to study quantum theory, which I didn't have any knowledge before as an undergraduate math major.

Before applying for the Master program, I have already passed the N1 level of Japanese language Proficiency Test (JLPT), but it was far away from being able to discuss math in Japanese. This didn't bother me a lot because we speak English in our seminars. Outside of our lab, I took courses in Japanese and in English, and most of the time I talk to friends in the same office in Japanese. It is lucky to have friends from different labs who are working on different fields of math, so you can ask questions and hear about cultures of other fields.

# Graduate Program for Doctoral Degree (PH.D.)



## ■ Fostering the Next Generations of Young Scholars

The primary goal of our doctor courses is to foster the next generation of young mathematicians. To understand the necessary broad range of skills involved in mathematical sciences and be prepared to apply them appropriately to various problems. The doctoral course in particular requires self-driven learning, including discovering problems on one's own and building the skills necessary to solve them. Sending our PhD holders equipped with these skills as competitive professionals out into society is the ultimate goal.

## ■ Active Student Body

Our current doctoral students are involved in student organized seminars on campus, as well as the planning and organizing of national academic conferences for young scholars. This is in addition to active independent research of their own.

We believe this combination of activities results in the high quality research output our department's doctoral students produce. Among other activities, Student Project received strong support from our department.

### «« Student Project Titles of 2023 »»

- |  |   |
|--|---|
| 1 Birational Geometry and its Applications   | 3 Lie algebraic approach towards Kaneko-Zagier conjecture                       |
| 2 Multiple zeta functions and related topics | 4 An Extremal Eigenvalue Problem for the Laplacian on a Compact Kähler Manifold |

### «« Student Project Titles of 2022 »»

- |  |                                   |
|--|-----------------------------------|
| 1 A research on the Pick property of reproducing kernel Hilbert spaces | 2 Zeta-functions and Sieve method |
|--|-----------------------------------|

## RA (Research Assistant)

Many doctoral students may be employed as research assistants (RA) to help them develop their research skills and to provide opportunities for participation in various research groups in the Graduate School of Mathematics.

## JSPS Fellows

This program was established by JSPS (Japan Society for the Promotion of Science) to assist promising and highly qualified students wishing to conduct research in universities or institutions. Fellowships are awarded for a period of two to three years with monthly research-related expenses and Grants -in Aid for Scientific Research. Detailed information is provided at: <http://www.jsp.go.jp/english/index.html>

## Nagoya University Interdisciplinary Frontier Fellowship THERS Interdisciplinary Frontier Next Generation Researcher

Nagoya University aims to cultivate “doctoral professionals who can pioneer interdisciplinary research areas, create future knowledge for social implementation, and act globally.” These scholarships provide excellent and aspire students with financial supports and opportunities to acquire various professional skills during the regular study period of doctorl course. Scholarships intend to encourage student with a doctoral degree to play a more active role in various fields of the society.



### Message from an International student



#### Qi Xuanrui

##### Self-introduction

Hello everyone! My name is Xuanrui Qi and I was originally from China; before I came to Nagoya University to pursue graduate studies, I did my undergraduate degree in the United States. I entered the Graduate School of Mathematics in 2019 as a master's student, and I just finished my master's degree earlier this year. Currently I am a doctoral student in the school.

##### Academics & Research

Currently, I am interested in a few different areas in mathematics related to category theory and theoretical computer science. My research advisor is Professor Jacques Garrigue. Particularly, I am working in applied category theory, which involves using the methods of category theory to model and solve problems in various areas, such

as quantum programming and machine learning.

At the Graduate School of Mathematics, every graduate student participates in one or more weekly reading seminars where student present material from advanced books and research papers. This is a very good opportunity for beginning graduate students to learn about the frontiers of contemporary mathematics and to learn about mathematical research. Moreover, there are many interesting seminars to choose from, as the department has more than 30 faculty members working in a variety of pure and applied fields.

##### Life on and off campus

Nagoya University is very international and has good support for international students. On campus, there are many staff members who can speak English fluently. There are also a variety of Japanese language courses offered by the university, as well as many events and seminars targeted at international students so that they can transition to social and academic life smoothly; there are also events that help international students bond with other international students from their own or other countries.

Life in Nagoya is quite convenient in every aspect; it is also a relatively cheap city to live in. Nagoya is a moderately large and quite international city with a population of more than 2 million. People here are really friendly and helpful, and there are many people from different backgrounds, so you will definitely feel at home in Nagoya. There is a subway station right on the main Higashiyama campus, and there is a sophisticated subway and bus system. Both Nagoya Station as well as the main commercial area, Sakae, can be reached within 30 minutes using the subway.



## G30 International Programs

Because of its internationally-recognized achievements and established academic standing, Nagoya University is among the few universities selected by the Japanese government to offer international programs designed for international students. The objectives of these programs are to strengthen the international competitiveness of Japanese higher education and to offer a first-rate educational opportunity to high-achieving students worldwide. Since 2011, Nagoya University's flagship departments started offering the "G30 International Programs" which are full-degree programs taught entirely in English. Through a multi disciplinary general education curriculum, these programs aim to cultivate ethical leaders who are able to develop innovative solutions through inquiry and analysis, with strong communication skills to be productive members of our global society.

For more information, please visit the following website.

<http://admissions.g30.nagoya-u.ac.jp/about/>

Research Group	Professor	Associate Professor	Lecturer Assistant Professor
Combinatorial Theory	Hiroshi Hirai Soichi Okada		
Analytic Number Theory		Henrik Bachmann	
Algebraic Number Theory	Kazuhiro Fujiwara	Henrik Bachmann Hiroshi Suzuki	Shun Ohkubo
Arithmetic Geometry	Kazuhiro Fujiwara Sho Tanimoto		Shun Ohkubo
Number Theory	Hidekazu Furusho		
Algebraic Geometry	Kazuhiro Fujiwara Akira Ishii Sho Tanimoto	Shintaro Yanagida	Genki Ouchi
Fractal Geometry		Johannes Jaerisch	
Commutative Algebra	Ryo Takahashi		
Representation Theory	Tomoki Nakanishi Soichi Okada Ryo Takahashi Tohru Uzawa	Yuki Arano Takahiro Hayashi Hiroyuki Nakaoka Shintaro Yanagida	
Category Theory		Hiroyuki Nakaoka	
Topology	Hitoshi Moriyoshi Hiroshi Ohta	Tomomi Kawamura	
Algebraic Topology	Lars Hesselholt		
Homotopy Theory	Lars Hesselholt		
Differential Geometry	Hitoshi Moriyoshi Hisashi Naito Shin Nayatani Hiroshi Ohta	Shinichiroh Matsuo	Takeshi Sato
Complex Geometry		Shinichiroh Matsuo	
Discrete Geometric Analysis	Hisashi Naito		
Graph Colorings and labelings		Futaba Fujie-Okamoto Nanao Kita	
Dynamical Systems		Johannes Jaerisch Shinichiroh Matsuo	
Ergodic Theory		Johannes Jaerisch	
Global Analysis	Hitoshi Moriyoshi	Shinichiroh Matsuo	

Research Group	Professor	Associate Professor	Lecturer Assistant Professor
Functional Analysis	Serge Richard Yoshimichi Ueda	Chris Bourne	
Operator Algebras	Yoshimichi Ueda	Yuki Arano Chris Bourne	
Fourier Analysis	Mitsuru Sugimoto	Jun Kato Yutaka Terasawa	
Partial Differential Equations	Toshiaki Hishida Hisashi Naito Serge Richard Mitsuru Sugimoto	Jun Kato Yutaka Terasawa	Yasuhiro Sasahara
Probability	Nobuo Yoshida	Masashi Kubo Makoto Nakashima	
Infinite Analysis	Tomoki Nakanishi	Hidetoshi Awata Takahiro Hayashi Shintaro Yanagida	
Mathematical Physics	Hiroaki Kanno Taro Nagao Tomoki Nakanishi Tetsuya Shiromizu	Chris Bourne Kesuke Izumi Kazuhiko Minami Shintaro Yanagida	Masashi Hamanaka
Applied Mathematics (mathematical biology & physiology, nonlinear mathematics, quantum foundation)	Toru Ohira		
Particle Physics			Masashi Hamanaka
General Relativity	Tetsuya Shiromizu	Kesuke Izumi	
Cosmology	Tetsuya Shiromizu	Kesuke Izumi	
Statistical Mechanics	Taro Nagao Nobuo Yoshida	Kazuhiko Minami	
Theoretical Condensed Matter	Taro Nagao	Kazuhiko Minami	
Fluid Mechanics	Toshiaki Hishida	Yutaka Terasawa	
Numerical Analysis	Hisashi Naito		
Information Theory	Masahito Hayashi	Masashi Kubo Ryuhei Mori	
Quantum Information Theory	Masahito Hayashi François Le Gall	Ryuhei Mori	
Quantum Network	Masahito Hayashi		
Theoretical Computer Science	Jacques Garrigue Hiroshi Hirai François Le Gall	Nanao Kita Ryuhei Mori	
Algorithm Theory	Hisashi Naito François Le Gall	Nanao Kita Ryuhei Mori	
Programming Theory	Jacques Garrigue		
Type Theory	Jacques Garrigue		
Optimization Theory	Hiroshi Hirai		

## Mathematics without Borders

Mathematics has no borders. No matter what nationality they are, mathematicians around the world strive each day through their research to progress the development of mathematics.

Among them there are always researchers out there somewhere pursuing answers to the same problems. Therefore, it can be said that the exchange of information regarding research is extremely important. In order to exchange this up to date information our school works hard to promote and offer various conferences, intensive courses, seminars and workshops. In this vein, we established formal academic alliances with Korean Institute for Advanced Study (KIAS), Paris 7 Denis Diderot University, etc. With them we have conducted cooperative research workshops and the exchange of graduate students as research assistants.

### Message from an International student



#### John Ashley

Hello everyone! I am John from the Philippines! I came to Nagoya University to pursue graduate studies. More interestingly, the university has deep historical ties with the development of algebraic geometry as we know today, which amplified my interest in pursuing the said subject at the university. Currently, I am a doctoral student working on the relationship between algebraic geometry and representation theory. My current theme is the McKay correspondence, which in the simplest terms, gives a dictionary between the representations of a group and the geometry of a resolution of singularities.

At the Graduate School of Mathematics, the education system consists of lectures and reading seminars every week. One of the interesting components is the intensive lecture where every external professor visits the university to give lectures on his/her current research accessible to students. Also, because Nagoya University is known for international connections, personally witnessing some lectures by both Japanese and foreign scientists is one of my fruitful experiences on the program.

Despite being an international student who came to Japan with minimal understanding of the Japanese language, the university is really friendly with various forms of support, in the form of aiding in the process of documents, providing a tutor, or even meeting other international students living life in Japan. The university offers university-wide Japanese language classes for students like me who dream of living and working in Japan, to develop proficiency and fluency in the language.

Living in Nagoya has been fruitful for me because I liked the idea of residing in a simple city far from traffic and noise pollution. Because of the wide railway network across the country, reaching other prefectures from Nagoya, especially when attending conferences in other prefectures, becomes hassle-free.



## Tuition and Other Fees (as of April, 2023)

Student Status	Application (¥)	Registration (¥)	Tuition (¥)
Degree-Seeking Student (undergraduate)	17,000	282,000	535,800 per year
Degree-Seeking Student (graduate)	30,000	282,000	535,800 per year
Research Student, Graduate School Research Student	9,800	84,600	29,700 per month
Special Audit Student, Graduate School Special Audit Student	—	—	14,800 per credit
Special Research Student	—	—	29,700 per month
Training Course in Japanese	9,900	43,500	30,200 per month
Training Course in Japanese Lang. & Culture	9,800	84,600	29,700 per month

## Tuition Exemptions

Independently-financed degree-seeking students, who demonstrate excellent academic records and are in need of financial assistance, are eligible to be considered for exemptions from half or the entire tuition. However, as the possibility of obtaining an exemption is minimal, it is advisable to prepare to pay the full tuition. Unless unavoidable circumstances are found to exist, students are not qualified to apply if they have had to repeat a year or have exceeded the minimum duration for their course of study (4 years for BA, 2 for MA, 3 for PhD). The application period occurs only once a year, usually starting in February or March. Pay close attention to the annual deadline. Exemptions are granted on a per semester basis. Please contact your school office for further information.

## Scholarships

For information on the scholarships provided by The Japan Student Service Organization (JASSO), please visit the website:

<http://nupace.ecis.nagoya-u.ac.jp/en/life/jasso.html>

There were, as of May 2018, 2,641 international students at Nagoya University, 79% of them are independently-financed. Financial support available to these students is outlined below. Information about scholarships is posted on the bulletin board of each school. Students are advised to check the boards daily.

## Japanese Language Programs

The International Language Center offers the following Japanese language courses.

### 1. University-Wide Japanese Language Programs

- (1) Standard Courses in Japanese/Intensive Courses in Japanese, (2) Online Japanese Courses, (3) Kanji Course, (4) Introductory Lectures in Japanese Studies, (5) Business Japanese Course

### 2. Special Japanese Programs

ILC offers four types of Special Japanese Programs. Enrollment in these courses is limited.

- (1) Intensive Course in Elementary Japanese (2) Intensive Course in Advanced Japanese,  
(3) Japanese Language Classes for International Undergraduate Students,  
(4) Introductory Program for Korean Engineering Students

## Global Engagement Center Support Team

<https://acs.iee.nagoya-u.ac.jp/en/>

Global Engagement Center Support Team is a university-wide office to assist international students with information and advice about cross-cultural adjustment and psychological issues as well as intercultural exchange opportunities. We will keep our discussions confidential. We kindly ask you to make an appointment by e-mail before coming.

### Office

From Monday to Friday: 10:00-12:00, 13:00-16:00

TEL: 052-788-6117 E-mail: isa@iee.nagoya-u.ac.jp

Room 739 West wing, IB Building

## Career Paths after Graduation

	Undergraduate				Master's Program				Doctoral Program			
	2019	2020	2021	2022	2019	2020	2021	2022	2019	2020	2021	2022
Private Company	16	16	14	15	26	22	24	22	1	0	1	2
Academic Staff	-	-	-	-	-	-	-	-	7	7	4	5
Teacher	3	7	7	11	0	4	3	7	0	0	0	0
Civil Servant	2	2	1	4	0	1	0	2	0	0	0	0
Graduate School	18	20	20	20	11	14	10	15	-	-	-	-
Research Student	-	-	-	-	0	0	0	0	-	-	-	-
Others	6	6	12	2	9	5	9	4	0	0	2	1
	45	51	54	52	46	46	46	50	8	7	7	8





## International Conference Graduate School of Mathematics, Nagoya University

### Rationality, Moduli spaces, and Related Topics (22th)

Since 2001, Graduate School of Mathematics, Nagoya University has held international conferences almost every year. In the 2022 academic year, it held the international conference “Rationality, Moduli spaces, and Related Topics” during the period of November 7th—11th 2022. Every day we had 4 one-hour talks (on the last Friday, we had 2 talks), and there were total 18 talks by internationally renowned mathematicians. Among them, 8 talks were given by foreign participants. The conference itself has been held as a hybrid event, and most of talks were given in-person as well as live-streamed over Zoom. The number of in-person participants was 63 and there were 96 Zoom participants. The total number of participants easily exceeded more than 100. Nationalities of participants include, but not limited to, Japan, USA, Korea, China, Italy, and Russia. The topics of lectures include (i) rationality of algebraic varieties, (ii) compactifications of moduli spaces of curves and surfaces, (iii) Manin’s conjecture which is a conjecture in Diophantine geometry, and those lectures were touching on a broad spectrum of mathematics including algebraic geometry, arithmetic geometry, differential geometry, and mathematical physics. Professor Shigefumi Mori, who is a Fields medal laureate and a director of KUIAS, and Professor Shigeru Mukai, who is an emeritus professor at Kyoto University and had been a professor at Nagoya University as well, gave wonderful lectures, and in particular, Professor Mori gave a survey talk of his research, and it was a monumental lecture for algebraic geometry community in Japan.



### Past Conferences

2023(23th)	The 32nd Workshop on General Relativity and Gravitation in Japan (JGRG32)	2017(17th)	K3 Surfaces and Related Topics
2022(22th)	Rationality, Moduli spaces, and Related Topics	2016(16th)	The Navier-Stokes Equations and Related Topics
2021(21th)	International Conference on Discrete Geometric Analysis for Materials Design	2015(15th)	Zeta Functions of Several Variables and Applications
2021(20th)	The 8th East Asian Conference in Harmonic Analysis and Applications	2014(14th)	Summer School on Cluster Algebras in Mathematical Physics
2019(19th)	China-Japan-Korea International Symposium on Ring Theory	2013(13th)	Perspectives of Representation Theory of Algebras
2018(18th)	Information Geometry and Affine Differential Geometry III	2012(12th)	Conference on Resolution of Singularities and the McKay Correspondence

## The 32nd Workshop on General Relativity and Gravitation in Japan (JGRG32) (23th)

We held “The 32nd Workshop on General Relativity and Gravitation in Japan (JGRG32)” from November 27th to December 1st in 2023 at Sakata and Hirata Hall of Nagoya University. This conference was also held as “The 23rd International Conference by Graduate School of Mathematics of Nagoya University”. JGRG is the largest annual international conference in the Japanese community of gravitation and cosmology. The 1st JGRG was held in 1991, and JGRG is now a traditional international conference that has been held continuously for more than 30 years, except for one year when it was canceled due to COVID-19.

We organized JGRG32 with 26 scientific organizers including organizers from other universities, and 7 local organizers including organizers from other departments of Nagoya University. We invited a total of 11 speakers from Japan and overseas, Professor Elisa Gouvea Mauricio Ferreira (IPMU, University of Tokyo / the University of São Paulo), Professor Pau Figueras (Queen Mary University of London), Professor Marcus Khuri (Stony Brook University), Professor Hironao Miyatake (Nagoya University), Professor Soichiro Morisaki (ICRR, University of Tokyo), Professor Shi Pi (Chinese Academy of Sciences), Professor Adam Pound (University of Southampton), Professor Stephan Rosswog (Stockholm University), Professor Tadashi Takayanagi (YITP, Kyoto University), Professor Alexander Vikman (The Central European Institute for Cosmology and Fundamental Physics), Professor Nicolas Yunes (University of Illinois). In total, more than 240 people attended JGRG32. We had 125 oral and 33 poster presentations.

Finally, we would like to thank the staff of the Graduate School of Mathematics of Nagoya University, Kobayashi-Maskawa Institute for the Origin of Particles and the Universe, and the Graduate School of Physics of Nagoya University for their kind help. In addition, we would like to appreciate the financial supports from Graduate School of Mathematics of Nagoya University, Kobayashi-Maskawa Institute for the Origin of Particles and the Universe, Nagoya University, Grant-in-Aid for Transformative Research Areas(A) "Investigation of primordial black holes and macroscopic dark matter JP20H05853", and Grant-in-Aid for Transformative Research Areas(A) "Gravitation and cosmology: principles and applications based on quantum information JP21H05189".



2011 (11th)	Topology and Analysis of Foliation	2005 (5th)	Geometric Quantization and Related Complex Geometry
2010(10th)	Representation Theory of Algebraic Groups and Quantum Groups'10	2004 (4th)	Complex Geometry and String Theory
2009(9th)	Harmonic Analysis and Partial Differential Equations	2003 (3th)	Numbers, Symmetry and the Concept of Space -COE Opening Conference-
2008(8th)	Combinatorics and Representation Theory	2002 (2th)	Discrete Groups and Moduli
2007(7th)	Spectral Analysis in Geometry and Number Theory	2001 (1th)	Automorphic Forms and p-Adic Groups
2006 (6th)	Representation Theory of Algebraic Groups and Quantum Groups'06		

## Academic Cooperation Programs

Our Graduate School has several academic exchange programs shared with worldwide institutions to promote and develop cooperation in the field of mathematical sciences through the following activities:

- Exchange of faculty and students.
- Exchange of publications and other academic materials.
- Bilateral symposia and workshops.
- Meeting to improve mutual research and educational programs.
- Mutual student managed projects.

Here is the list of institutions in cooperation agreement as of March 2023:

- The Chinese University of Hong Kong, School of Data Science, since 2023
- Shenzhen Institute for Quantum Science and Technology, Southern University of Science and Technology, since 2019
- Laboratoire de Mathématiques de Reims, Université de Reims Champagne-Ardenne, since 2017
- Centre for Quantum Technologies (CQT), National University of Singapore, since 2015
- University of Yangon, since 2015
- Gadjah Mada University, since 2015
- Institute of Mathematics, Vietnam Academy of Science and Technology, since 2013
- Department of Mathematics, Nanjing University since 2012
- Department of Mathematical Science, Seoul National University since 2012
- Faculty of Mathematics, Ruhr Universität Bochum since 2011
- Université Paris 7-Denis Diderot since 2004
- The Korean Institute for Advanced Study (KIAS) since 2004



Laboratory of Mathematics, University of Reims Champagne-Ardenne and Graduate School of Mathematics, Nagoya University (2017)



University of Yangon Delegation (2017)



Intensive Education Program at Nagoya University (2017)



## International Lounge

“International Lounge” is now open, which is a room especially designed for international exchange activities of various kinds. For example, we have been holding activities for international students that provide opportunities to socialize with fellow students. We also organize events where participants are encouraged to present their views in languages other than their native language. We are committed to continue offering various activities that foster chances to talk to new people, promote deeper understanding of Japanese culture, and allow students to experience different cultures. Through these events, we hope to help the members of our community to appreciate each other’s languages, cultures, and values, and to respect each other’s viewpoint.



## Mathematicians Shouldering Tradition

**Kosaku Yoshida, Nagoya U. (1942-53), Osaka U., Tokyo U.**

He created the theory of operator semigroups. His celebrated textbook “Functional Analysis” is read all over the world.

**Tadashi Nakayama, Nagoya U. (1942-64), Osaka U.**

He is one of the members at the foundation of our department. He is famous for his studies on the modular representation theory of symmetric groups and noncommutative rings.

**Kiyoshi Ito, Nagoya U. (1942-52), Kyoto U.**

He is famous for his formula on stochastic differential equations, which is applied to mathematical finance. He received the first Gauss Prize in 2006.

**Masatake Kuranishi, Nagoya U. (1949-63), Columbia U., graduate of Nagoya U.**

He did decisive work on the deformation theory of complex structures.

**Masayoshi Nagata, Nagoya U. (1950-53), Kyoto U.**

He did famous work on the theory of commutative rings and the foundation of algebraic geometry.

**Tomio Kubota, Nagoya U. (1952-93), graduate of Nagoya U.**

He created the theory of p-adic zeta-function with Leopoldt.

**Masaki Kashiwara, Nagoya U. (1974-77), Kyoto U.**

He did decisive work on the theory of D-modules and its application to representation theory. He received the Chern Medal in 2018.

**Kazuhiko Aomoto, Nagoya U. (1978-2001).**

He created the theory of multi-variable hypergeometric functions, independently of Gelfand.

**Shigefumi Mori, Nagoya U. (1980-90), Kyoto U.**

He completed the classification theory of three-dimensional algebraic varieties. He received the Fields Medal in 1990.





### Administration Office

The Administration Office of our department supports faculty and students by maintaining campus facilities, purchasing office supplies, and arranging research and business trips. The office, for example, takes care of air-conditioning for computer laboratories and classrooms. Its constant effort provides faculty and students with a cozy environment to research and study, and the smooth arrangement of facility use and meetings. Accordingly, the office plays an important role for both faculty and students, helping them to focus on their business within a comfortable campus, doing its best to offer speedy and accurate service.



### Office of Academic Affairs



The Office of Academic Affairs was established in 2003, in order to provide specific service needed by students and faculty. In 2008, it was reorganized to deal with all educational affairs. For students and faculty, the office processes research grants (Grants-in-Aid for Scientific Research) and student aid to attend workshops, and manages study rooms and locker keys. In assisting department activities the office updates web sites, prepares to hold international conference, such as Nagoya International Conference, and hosts foreign visitors. The office aims at creating better academic surroundings with prompt service responding to department needs, with a friendly atmosphere as their motto.

## Science Library

A fully developed library is a quintessential element in providing quality mathematics education, and thus our Science Library has served us well as the “face” of our department. The library houses over 100,000 volumes related to Mathematical science and more than 1,600 kinds of periodicals, 90% of which are published overseas. One of our highlights is the Hilbert Collection, where copies of nearly 10,000 academic papers that the greatest mathematician, David Hilbert (1862-1943), had owned. It has become a valuable resource for research. Books of reference including textbooks are found in the student reference section in order to promote easy access to facilities for students. Online search catalogs are fully equipped for easy access to books and electronic journals, and librarians offer support to users seeking further information.



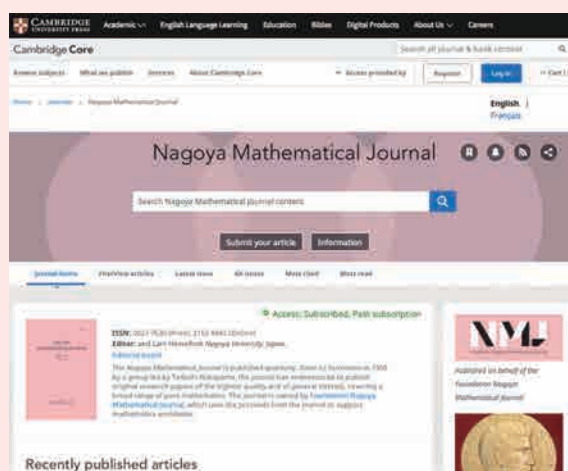
## Computers and Networks



Electronic journals and e-mail are some of the modern indispensable tools for computer networking for researchers in mathematical science. Computer laboratories are located in the Graduate School of Mathematics Building (2 rooms) and in Science Building A (1 room). All PCs are connected to the intra-campus network (NICE), which offers reliable high-speed access to the Internet. This computer network environment corresponds to the needs of both graduate students and faculty for exchanging scholastic information. Our department is committed to enhancing our information technology environment as a research tool, not only as a scaffold of numerical analysis and information science, but also for theoretical development by installing various mathematical software programs.

## Nagoya Mathematical Journal

Known as a comprehensive academic journal for mathematics, Nagoya Mathematical Journal (NMJ) has long been highly evaluated internationally, since its first edition published by our department in June of 1950. All back numbers are available as electronic archives, and can be accessed through Cambridge University Press. While reviewing many creative mathematical papers submitted to the journal from around the world, editing committees make an elaborate effort to maintain its scholastic quality. We firmly believe that the academic value of NMJ depends on the advanced level of mathematics with which our department deals. We are proud of NMJ as proof of the depth of its history and its excellence shown by mathematicians in Nagoya.



<https://www.cambridge.org/core/journals/nagoya-mathematical-journal>



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