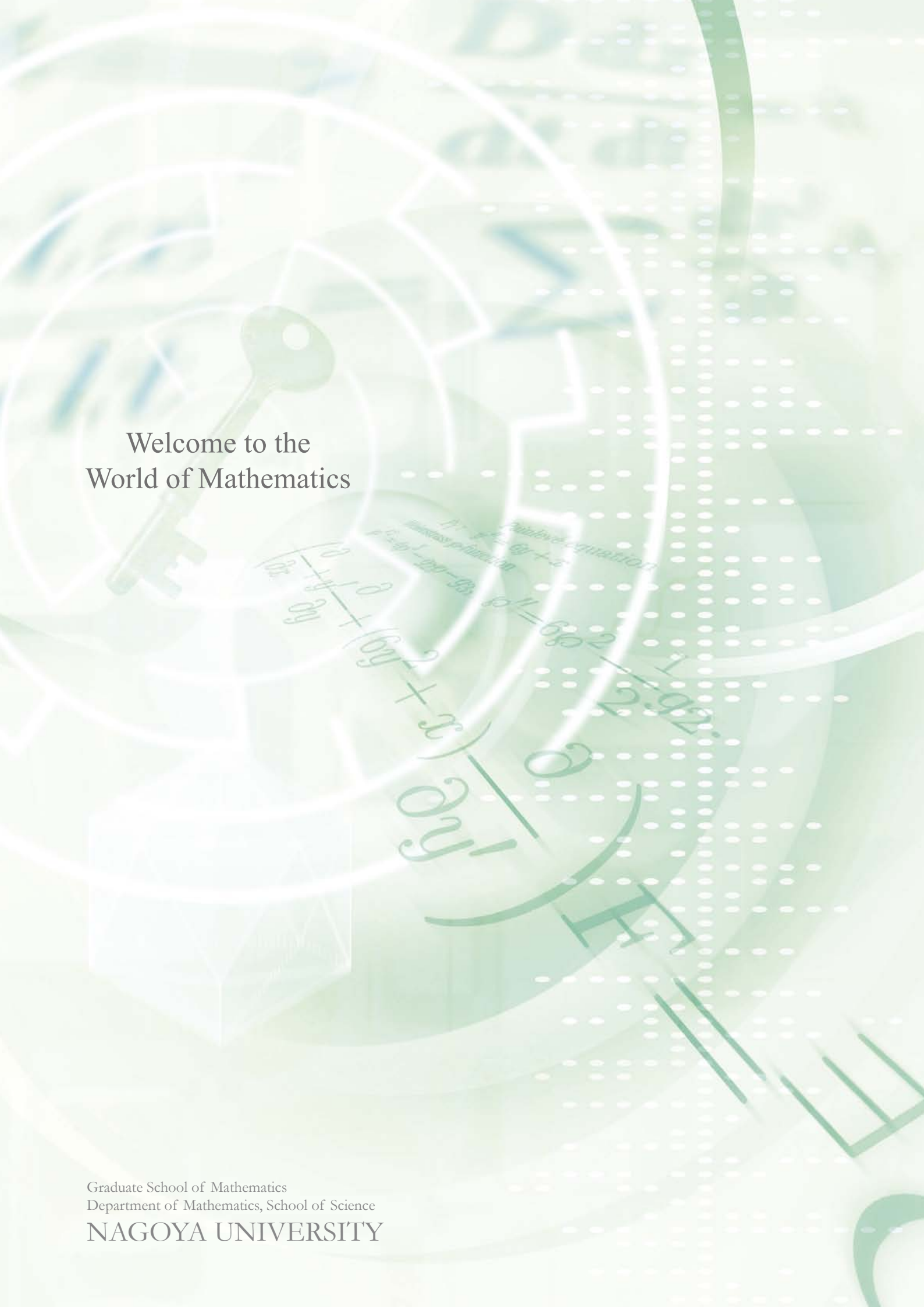


Welcome to the World of Mathematics

Graduate School of Mathematics
Department of Mathematics, School of Science
NAGOYA UNIVERSITY

An Invitation to Mathematics

Mathematics as a field of study

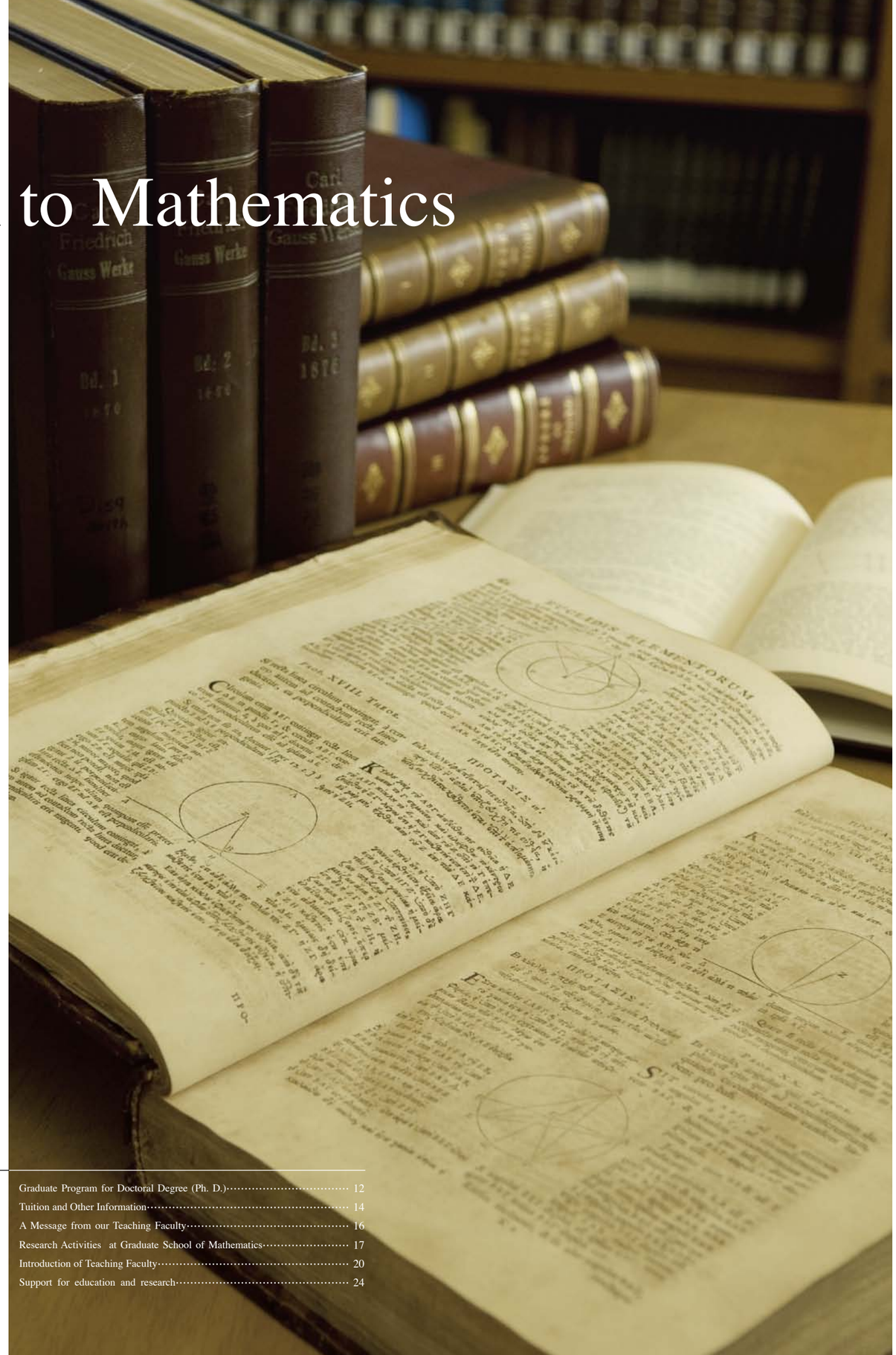
What image of mathematics exists in society today? What would one learn from mathematics in university? What is the mathematics researched in universities like? Hasn't a subject such as mathematics been fully investigated and researched already? What are the unsolved problems remaining in the field of mathematics? These and others are the questions that we find students wondering about.

Mathematics as the common language among sciences

With Newton's theory forming the base for differential integral calculus in the 17c, the application of mathematics as the common language bringing sciences together began. Since that time, whether the topic at hand is nature or society, mathematics has been applied as the common language. Contrary to common perception, mathematics is closely related to many other fields, and because of this it is often applied successfully to progress other fields. A recent example is the internet, which has come to represent modern communication. Today we cannot survive without it, but it only came about as a result of code theory, for which the unpredictable application of whole number theory has proven very important.

Mathematics within science

Research in mathematics is not nearly as complex or overwhelming as is thought. Most of the important ideas in the field of mathematics can be found in the interaction around us in nature and society. As the common language of science mathematics has led to many discoveries, serving as an invaluable tool to other field's development. We expect that mathematics will continue to develop in its own right, as it continues to be applied to other science fields.



Education and Research
at Department of Mathematics,
School of Science/
Graduate School of Mathematics
in Nagoya University

Mathematics research as a base for study in science/ an independent style graduate school education

Among all the progress and development made in academics in the 20th century one of the most remarkable contributions is that of the basic principles of mathematics to a broad variety of fields of science. Now mathematics serves not only as a common language among natural sciences, but also in sociology and anthropology, serving as the language of expression for phenomenon across these fields.

A tradition of freedom that bares high level research

The predecessor of this program with its tradition of study in pure mathematics has been recognized internationally as a place for high level learning. With the goal of carrying on this tradition of high level research on an international scale, we have expanded our learning environment to include experts from a variety of fields such as mathematical physics.
This program also maintains the tradition of conducting seminars that promote the expression of ideas from all members, regardless of relative status, among professors, associate professors, and students. We are proud of the fact that several mathematicians who spent their younger years here in Nagoya University's math department then went on to make world renowned achievements.

A flexible system of education

"High level research makes high level education possible". This is our conviction at Nagoya University. With this concept as our guide, all teaching staff are dedicated to covering the basic courses of students from their first year, including the following: basic mathematical education, undergraduate courses in the School of Sciences and more specialized courses in the Graduate School of Mathematics, and the role of advisor for students in both the undergraduate and graduate programs.
The educational approach of this graduate school is to prioritize each student's desire for their own educational course. Highlighting students' interests facilitates the necessary motivation for students to progress smoothly in their studies and research. The "level system" was introduced to act as a pillar among a broader program of flexibility. This aspect of the program is particularly aimed at students educated in another learning environment or university, facilitating their smooth transition to our school's curriculum.

Nurturing specialists in mathematical sciences with great independence and broad vision

The educational goal of the school of mathematical sciences and graduate school of mathematics is to nurture human resources with the mathematical science skills required to solve problems and the ability to apply them independently. In order to achieve this one must acquire the skills to think logically, view problems with a broad perspective, and conduct complex expression. It is for this purpose that various mechanisms and programs have been introduced. For example, to ensure that the basic skills are mastered at a high level, the "core curriculum" has been introduced. In order to promote the receiving of advice from numerous professors several programs were introduced as follows: multiple advisor system, office hours, and to promote careful selection of research topics and their practical application, "student project" was introduced.

Contents

Gathering together in Nagoya to pursue the study and research of mathematics

Shoji Toshiaki
Dean, Professor

Lars Hesselholt
Professor

Kohji Matsumoto
Professor

Yoshifumi Kimura
Professor

Jacques Garrigue
Associate Professor

Tetsuya Tate
Associate Professor

Matthew Clarke
Visiting Researcher

JungHun Lee
from Korea

YanYan Wang
from P. R. China

Hyunmi Park
from Korea

Shoji: I am the dean of this school. My area of specialty is algebra and I focus mainly on representation theory. As dean I do not currently teach many courses, but in my seminar I enjoy researching with my students very much. Today we are discussing why one should choose Japan or Nagoya University to pursue studies so let us speak frankly.

Clarke: I am Matthew Clarke. I am studying at Cambridge University and have just arrived in Nagoya this summer.

Matsumoto: I am Matsumoto. My area of specialty is number theory. Recently I am surprised to realize that I have become a real old face here in the graduate school.

Garrigue: I am Jacques Garrigue. Computer Science is my expertise. I am originally from France but have been in Japan for 18 years now.

Park: My name is Park Hyunmi and I come from Korea. After finishing high school in Korea I came to Japan's Niigata University for undergraduate studies, and then Nagoya University for graduate studies. My research focus is representation theory and combinatorics.

Tate: My name is Tate Tatsuya. My area of specialty is global analysis.

Kimura: My name is Kimura and I teach here. My specialties are fluid dynamics and numerical analysis of differential equations. In the past, I had the experience of living abroad for a long period.

Hesselholt: My name is Hesselholt and I am from Denmark. My research focus is algebraic K-theory and I have been in Japan for about 5 years. Before coming to Japan I was in the U.S. for about 15 years. Nice to meet you.

Lee: I am Lee JungHun and I come from Korea. I am currently a second year undergraduate student studying mathematics.

Wang: I am Chinese and my name is Wang YanYan. I come from Shandong. I came here after completing my studies at China's Ocean University. I am currently here on a scholarship from the Chinese Government, for study abroad. My advisor at home had studied abroad at Nagoya University so after hearing about his experience, I decided to come here myself.

Matsumoto: Firstly, for those who came to Japan from abroad, would you please tell us what your first impression was upon arriving?

Garrigue: Well, it has been over 15 years now so I really don't remember. Ha ha…

Lee: The first time I came to Japan was for an interview, but my overall impression was good. At that time, after my interview, I went to the campus cafeteria. I saw many students happily enjoying their studies and thought to myself, "studying could be fun if I came here". My impression has not changed since then.

Park: I think Japanese students are very serious about their work. I have never been to a Korean university so I cannot say for sure, but I have the impression that it is a place to learn only for one's future career. That impression was created through listening to my friends who study there. I really wanted to study seriously at university.

Shoji: Are there many students like you who decide to come from Korea to Japan to study mathematics?

Park: No, there are not so many, perhaps more studying biology or natural sciences. For me though rather than English, Japanese language seems close to Korean so I thought studying here would somehow work out better.

Lee: The grammar is almost the same, so you really just need to exchange the words between the two languages and it usually works out. (smile)

Shoji: Where did you study Japanese?

Lee: I studied in Korea and sat for the Examination for Japanese University Admission for International Students. After passing, I sat for the entrance exam at Nagoya University. Last year I took basic education courses, and studied Japanese on my own.

Park: When I first arrived in Japan I found it exhausting to sit through a full day of lectures. Now that I am used to it, I can manage with just a bit of study time following class. I find Japanese easier to follow than English now.

Wang: I studied Japanese a bit in China, but mainly since coming here. I just came to Japan last year so my Japanese is not very good yet. Japanese sentence structure and vocabulary are difficult. For example, the characters read as "daijoubu" in Japanese language, mean something different in Chinese. "Tegami" (meaning letter in Japanese) is also different. The meaning in Chinese is.., well, it may be better not to say. Ha ha..

Clarke: Many students in my same study room invite me to lunch often, and also teach me Japanese words. Everyone is friendly and kind. We even went out collecting "kabuto" beetles together before.

Tate: Forgive me, but I've been wanting to ask this question. Inside your head do you think about mathematics in your native language or in Japanese?

Park: It depends on the situation. Things that come to mind in Korean, I think about in Korean, but things that quickly come to mind in Japanese, I think of in Japanese. Linear functions, for example, I studied thoroughly in Korea so when I take notes related to that I find it quicker to write "function" in Korean language. When I look at my notes from lecture I see Korean, Japanese, and English all mixed, and think how I'd be a bit embarrassed to share them with others.

Lee: In my experience it is divided between high school and university. Things I learned in my Korean high school, I tend to think of in Korean. While things I learned in university, I think of in Japanese. When professors study and research in English, do you translate everything into Japanese in your head before you think it through?

Matsumoto: No. In such situations my head has already transformed into English mode. When it comes to writing articles in English, of course I am concerned about using proper grammar but when writing proofs on the blackboard in class in English, I don't worry about correct grammar.

Garrigue: When I was teaching first year students calculus it was rather difficult. Apparently students cannot read my writing in roman letters (smile). But the way of writing functions is altogether different.

Matsumoto: What's your impression of Nagoya?
Lee: It's great. It is rather quiet here and prices and rent are cheaper than other cities. The only thing is that the humidity level in summer is high so your skin feels rather sticky, and I don't like that part much.
Park: I am from Jeju Island in Korea where the climate is quite warm. But, the wind there is strong so it never feels as hot as this. Niigata was never this humid so Nagoya really feels hot to me.
Wang: Nagoya is a beautiful city. But it is also hot.
Hesselholt: I love the climate in Japan. It's good for me because I prefer it to be hot rather than cold.

Matsumoto: Are there differences that you notice in daily life here compared to your home country?
Park: In my case I have gotten too used to Japan perhaps, so that when I go home if I run into someone I often say "sumimasen" or "excuse me" in Japanese. When talking with friends back home, sometimes I get excited about our discussion and phrases come out in Japanese. This always surprises my friends.
Matsumoto: Do you have any problem with the food here?
Park: No, not at all. I don't have any allergies and I really love soba (buckwheat noodles).
Lee: I even like "natto". I think it is truly delicious, but when I recommended it to a friend, they didn't seem to believe me at all. I told them I pitied them for not being able to enjoy such a wonderful food. Ha ha.
Shoji: Well, even some Japanese people cannot eat "natto". (smile) Where do you all live now?
Lee: I am living in a dormitory that the university introduced me to in Nagoya's port area called Nagoya International Student Center. There is also a foreign student resident hall on the Higashiyama Campus, but there is a 6 month limit for living there. The residence hall in the port area allows students to stay one year, with the possibility of extension if rooms are available.
Kimura: How do you commute to campus, by subway?
Lee: I often come by bicycle.
Shoji: That should be good for your health!
Park: I do get a bit sun burned along the way though. Ha ha.
Lee: In summertime I think I'd fall over from the heat, so I try to commute by train. (smile)
Matsumoto: What is your plan for after studying mathematics here?
Park: If possible I'd like to continue studying, but I'll really have to write a good master thesis in order to do that.
Shoji: In our system it is possible to enter the doctor course without such a high level of originality in your master thesis.
Park: Yes, perhaps that is true but I still feel I want to aim high. If I feel that continuing my education here is best for me, I would like to be able to do that. That is why I am studying hard now. If I do not manage to enter the doctor course, then I will seek a job.
Lee: I am also really enjoying myself here so I hope to finish a master degree, then doctor degree, then move on to become a professor. But, in Korea we are required to serve in the military, due to conscription laws, so I will probably return to Korea to carry out my service after finishing my master degree. I do not know what I will do after that.
Matsumoto: If you want to become a professor, would you like to do so in Korea or Japan?
Lee: Ideally I'd like to be a professor throughout the world, moving around. But if it is between Japan and Korea, I'd choose Japan because students are more serious. (smile)
Park: I'd like to be in either Korea or Japan. I don't know any other enjoyable place to be. (smile) But if I were to return to Korea, I'd feel I was giving up a good opportunity here, so I think I'd prefer to be in Japan.
Wang: I'd like to become a professor in China. It is a difficult goal, but if you have studied abroad in the U.S. or Japan they say it is easier to become a teacher.
Park: I think Japan is a great environment for foreign students to study in. There are fewer foreign students in math than in engineering fields, so there are more opportunities to get scholarships. Currently I am receiving a JASSO (Japan Student Services Organization) scholarship. If you are able to confidently sell yourself and your abilities, you'll likely find a way.
Lee: Same for me. I was introduced to the scholarship by the office staff of this school.
Shoji: On campus there is a center for foreign students. It is a good place to seek information about Japanese language study and daily life from various coordinators. Sometimes they hold events. Please feel free to contact them anytime.
Lee: In May after entering the university I was invited to a party at the International Residence Hall. There I exchanged contact information with various students and when I have time we meet up, or get in touch when I go home.
Shoji: Even among the national universities Nagoya University has a high number of students from China and Korea. We have a larger number of doctor course students sent from Chinese universities than even Tokyo or Kyoto University.
Park: I have a question I'd like to ask our professors. Why did you choose Nagoya University to work at?
Matsumoto: Among Japanese universities Nagoya University provides a very good research environment. There are great facilities and brilliant staff.
Garrigue: I was originally at Kyoto University. At that time an excellent student came to us from Nagoya University and I thought to myself, "I want to teach computer science to brilliant students such as this". (smile)
Hesselholt: How do you find Nagoya University courses? Are they easy?
Wang: No, I don't find them to be easy. If you don't study on your own you cannot keep up. It is rather difficult, but courses are interesting.
Lee: The reason that I chose Nagoya is the same as was just mentioned, the cost of living is low. (smile) I also found Nagoya University professors to be especially kind to students. "Café David"is a good example of this, where students have a great opportunity to talk to professors. I haven't taken advantage of this enough yet, so I'd like to do so more in the future.
Park: When I was attending Niigata University, I wanted to study representation theory and combinatorics. Nagoya University was among those recommended to me by a professor I consulted. The day after I passed the entrance exam here all the professors were gathered at the school and carefully explained the details of the program. So my

impression of them was very good. I thought to myself, "communication with these professors seems really comfortable". Niigata University is also a nice place, but there are relatively few graduate students and few opportunities to exchange ideas about research. I found this to be a waste. In this school's doctoral program I've found senior students to be very intelligent and willing to teach you many things. I find this to be stimulating, and it makes me glad that I chose Nagoya University.
Shoji: I hope in the future you will continue to feel free to consult us about anything that arises. Let us all enjoy our studies, research and lives here together.

An Original Program Fostering Creativity in Mathematics

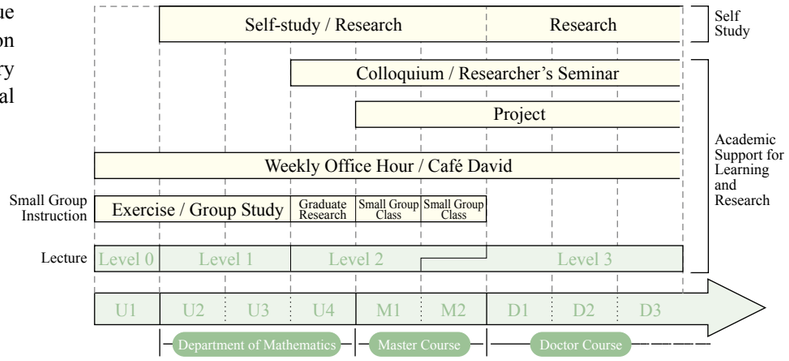
Connecting Mathematicians through Cafe David

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 above photo is of our own weekly event, “Café David”. Here, undergraduate students, graduate students, and teaching faculty gather in a casual café 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 “Café David” after. As the name suggests, delicious coffee is on offer for department members in attendance. Discussions here allow many to overcome common barriers that exist between undergraduate and graduate students, 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 “Café 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 take a look at our diverse learning styles of mathematics?

Cafe David

Level system and educational program

In this way 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 lectures 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 science-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

An 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 results 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.

Emphasizing Independent Will

The aim of the doctoral program is to foster researchers with multiple talents in mathematical sciences who are also capable of working in various fields. In the Graduate School of Mathematics we offer doctoral students 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 sciences. Therefore, we encourage you to take a broad perspective in considering your career options after graduation.

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 differential 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 concepts. It is of utmost importance that you work through as many problems as possible, gaining exposure to mathematics.

Semester	Lecture	Small Group Class
Summer	Calculus of one variable/ Linear algebra/ Overview of mathematics	Seminar on mathematics
Winter	Calculus of several variables/ Linear algebra/ Overview of mathematics	Seminar on mathematics

Level 1 (Sophomore)

First differential 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
Summer	Sets and mappings/ Linear space and linear mappings/ Calculus of one variable	Seminar on mathematics
Winter	Calculus of several variables/ Topological spaces/ Complex function theory Normal forms of matrices/ Introduction to information sciences	Seminar on mathematics

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 Lesbesgue 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 Group Class
Summer	Introduction to group theory/ Introduction to curves and surfaces Introduction to differential equations/ Lebesgue integrals and measure theory	Seminar on mathematics
Winter	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 list of courses offered during the academic year 2008 is given below. There are also numerous "crash 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 Group Class
Summer	Fields and Galois theory/ Manifolds/ Functional analysis/ Introduction to probability theory/ Introduction to mechanics/ Introduction to numerical analysis/ Omnibus lectures	Senior reading course
Winter	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 Lecture Courses

Intensive courses are those conducted by lecturers 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 lecturers are brought in to offer various perspectives, including that of the corporate world and practical applications. To find out more information about intensive lectures conducted in 2008 and the small group classes explained below, please see our graduate school's web page, under "Education & Job Search".

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. MA 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 MA course students. They are hired to aid professors with lectures and seminars for undergraduate students of first, second, and third year in the science department, as well as others, and to assist with Café David. Duties of a TA include designing and correcting class exercises, writing interpretations, and attending to all Q & A in and out of 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.

Graduate Program for Doctoral Degree (Ph. D.)

Fostering the Next Generation of Young Scholars

The primary goal of our doctor course 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 receives strong support from our department, as well as from the Program for Enhancing Systematic Education in Graduate Schools since 2007.

Student Project Titles of 2011

1	Combinatorial representation theory and related topics	2	Studies in commutative rings of positive characteristic from the view point of F-purity
3	Algebraic topology and algebraic K-theory	4	Interplay between topology and logic
5	Who killed the prime factorization again?	6	Dynamical systems and geometry
7	Arithmetic geometry and related topics	8	Fuchsian groups and Kleinian groups
9	Interdisciplinary number theory	10	The Dixmier-Douady class
11	Cluster algebras and related topics	12	Analytic geometry on Harnack inequalities
13	The variation of reproducing kernels		

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. The RA system has been financially supported by the Program for Enhancing Systematic Education in Graduate Schools since 2007. Grants-in-Aid for Scientific Research also helps to support doctoral students as research students. There were 15 RAs in 2007, 12 in 2008, 14 in 2009,9 in 2010,and 12 in 2011,65 in total.

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: HYPERLINK "http://www.jsps.go.jp/english/index.html

COLUMN

Paving the way for passage to Germany

One of the great mathematicians of the nineteenth century, G. Lejiune Dirichlet, was born in Düren (Germany) and made notable contributions to modern number theory and calculus. Following precedent, Yoshitaka Sasaki, a graduate student in our department of mathematics, chose the same country and field as Dirichlet when considering location and theme for attendance of a mathematical conference with the financial support of Good Practice (GP). Mr. Sasaki, as a leader of the GP project team "Comprehensive Approaches of zeta- and *L*-functions", successfully embarked on his academic career internationally, and paved the way for progress in his area of specialty.

Having experienced various academic presentations, Mr. Sasaki and his team have spent much time conjecturing their outline of the GP project. He also has shown great devotion to his specialty, paving the way for this project, and hosting many seminars. His latest activity includes giving a talk about D. Goldfield and J. Hoffstein in a lecture titled, "Introduction of Multiple Dirichlet Series", in August 2008. "I believe that the principle of zeta–functions remains its possible application to various mathematical fields has much yet to be investigated, such as application to algebra, geometry and analysis; and that new approaches to it should be sought." Mr. Sasaki also said, "I am interested in understanding these characteristics of zeta- and *L*-functions, and that is the main objective in establishing our team project."

After collecting information about conferences hosted both domestically and abroad, within the limitations of the expenses covered by GP, he and his team members finally selected the conference titled, "New Directions in the Theory of Universal zeta- and *L*-functions" held from October 6 to 10, 2008 at Würzburg University in the northern area of Bayern, Germany. They hoped to gain inspiration and further understanding of advanced study of number theory. This well-timed conference was also complementary to their academic needs; their specialty, number theory, involves other fields of mathematical knowledge and this conference dealt with application studies of probability theory, whose field has progressed remarkably in recent days.

Consequently, Mr. Sasaki said that his days at Würzburg were intellectually enjoyable. The first day at the university Mr. Sasaki presented his paper "Multiple Zeta Values for Coordinate-wise Limits at Non-positive Integers", to which, as a result, host Professor J. Steuding gave favorable comments. "I was nervous during my presentation, so relieved to hear his positive feedback. I was afraid of hearing something like "it is logically wrong!" said Mr. Sasaki. The problem session was scheduled on the third day and it provided his team a good opportunity to exchange information. An excursion to a beautiful area of historical heritage beside a river called residenz, on the last day helped all participants from Japan to relax and get acquainted with graduate students and professors from various countries.

Mr. Sasaki observed after returning from Germany that he was grateful for the opportunity to have made the project proposal and carry it out because he could look for the best academic institution, most suitable for their purpose across the globe and carry out the plan with financial assistance. Sasaki said, "There are still only few institutions that will initiate use of academic grants for students." Being confident and encouraged, he is now busy preparing for other mathematical conferences in Japan, coming up in the next few months. He is sure that this academic venture to Germany will become one of the most important building blocks of his future study.

Tuition and Other Information

Tuition and Other Fees (as of April, 2011)

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
Traning 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

from HANDBOOK for International Students 2011-2013, Nagoya University

Fee 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 small, it is advisable to prepare to pay the necessary fees. The application process for fee exemptions takes place each semester. Applications for the spring semester are generally accepted from the end of February to March, and for the fall semester, from the end of August to the middle of September. Please pay close attention to these deadlines. Students should contact the office of their school 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

As of November 2008, Nagoya University is currently home to 1,360 international students, 69.8% of them independently financed. A variety of financial support is available to these students. Information about scholarships is posted on the school bulletin board. Students are advised to check the boards daily.

Japanese Language Programs

The Education Center for International Students, Nagoya University offers the following Japanese language courses.

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

2. Special Japanese Programs

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

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

Advising & Counseling Services (ACS)

http://www.isa.provost.nagoya-u.ac.jp/en/

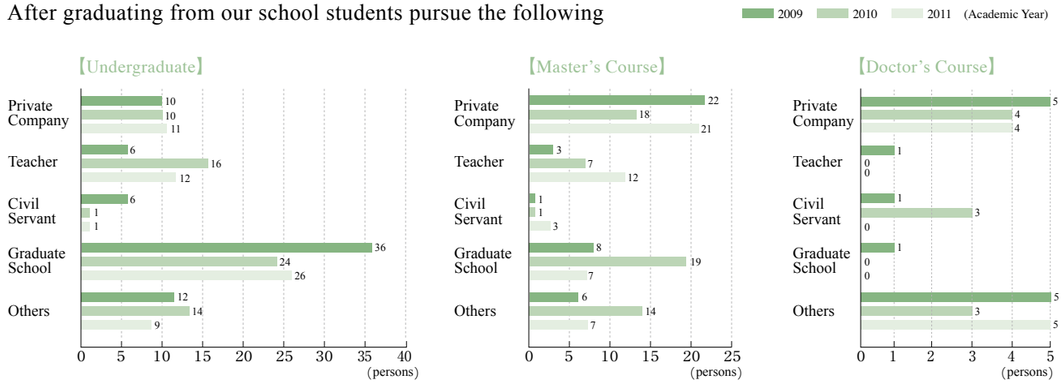
ECIS(ACS Office) is a university-wide office to assist international students with issues or problems they may have. We provide information and advices to international students about academic and personal matters, as well as cross-cultural adjustment and psychological issues. If you have any difficulties or concerns while you are in Japan, please feel free to contact us. We will keep our discussions confidential.

Office Hours and Staff

Advisor	Ms. Machiko MATSUURA / Director (Professor)				
Office	Room742 West wing, IB Building				
Office Hours	Mon	Tue	Wed	Thu	Fri
10:00-12:00	-	○	○	-	○
13:00-16:00	○	○	-	○	○
Advisor	Ms. Makiko TADOKORO / International Student Advisor & Counselor (Associate Professor)				
Office	Room740 West wing, IB Building				
Office Hours	Mon	Tue	Wed	Thu	Fri
10:00-12:00	○	○	○	○	○
13:00-16:00	○	○	-	○	○
Advisor	Ms. Naomi BANNO / International Student Advisor & Counselor (Associate Professor)				
Office	Room738 West wing, IB Building				
Office Hours	Mon	Tue	Wed	Thu	Fri
10:00-12:00	○	○	○	autumn only	○
13:00-16:00	○	○	○	autumn only	○
ACS Office	From Monday to Friday: 10:00-12:00, 13:00-16:00 TEL : 052-788-6117 E-mail: isa@ecis.nagoya-u.ac.jp Room739 West wing, IB Building				

from Advising & Counseling Services , Nagoya University

After graduating from our school students pursue the following



Iyama, Osamu

A message from the fjord country, Norway / Osamu Iyama

When I got off a connecting flight to Trondheim from Copenhagen, I found my breath turning into a white smoke in the cold air. It reminded me that Norway had low temperatures even in August. I often travel to Trondheim, Norway's third largest city, for academic purposes, and this was my fifth visit. Having just attended a summer conference in Poland, I thought I already knew what the weather would be like in Norway. I should have brought along my warmer outfits! Thinking of what it would cost to buy an appropriate jacket here, I sighed deeply again turning the air into a smoky vapor.

After leaving the airport, I enjoyed the beauty of the Nidelva River on the way to the Norwegian University of Science and Technology (NTNU). I was looking forward to seeing a familiar face in a certain office on the eighth floor at the university. When I got to the office, my face was wreathed in smiles. Dr. Reiten and I were delighted with this reunion. She was waiting there with a spare sweater and scarf ready for me. What a wonderful person she is! It was a series of papers that Professor Idun Reiten wrote during the 1970s that inspired my own choice of research.

I am always relaxed when I chat with her in English, because she has never pounced on my grammar mistakes. I couldn't wait to tell her the latest results of my research. The details of the discoveries I had omitted in e-mails from Japan I found easy to articulate here, face-to-face. I am particularly grateful to her for showing genuine pleasure in my findings. Students come to NTNU from all over the world. I believe her presence helps to explain why.

The main purpose of this particular visit was to complete the finial draft of a paper we had collaborated on. It required examining the contents minutely as the editing process neared its end. Even a slight change can make the entire article sound more sophisticated. We were also surprised to find a few conflicting statements. In the process of choosing the academic journals which to submit the paper, we spent days discussing its contents. This also entailed exchanging e-mails with a mathematician in the U.K., also a co-author. It took two busy weeks for us to complete the final draft.

I dined out with Professor Reiten the last day before my departure for Japan. We ate our usual fare, a famous fish soup. In the restaurant, I talked about topics my students in Japan are working on. She was cheerful, joking "Osamu, you were born in the very same year in which Almost Split Exact Sequence was discovered." A memorial was held celebrating the sixty-fifth birthday of this surprisingly energetic woman in May 2007. On the flight back to Japan, I found myself wondering how much further mathematics will advance while she is still a working scholar. I returned to Nagoya the following day to continue with my research, revitalized by the days in Norway.

Kawamura, Tomomi

Before arriving here, to be honest, I was worried about working in such a huge institution. I thought that it may be overwhelming. But fortunately it did not take much time to adjust to the Graduate School of Mathematics here in Nagoya University. I thank the students and entire staff who welcomed me. I found the relationships among students and staff to be very good, no matter their position or status. They both are full of willingness to discover the world of mathematics with their enriched knowledge!

Various lectures and seminars taking place throughout the year allow both students and professors exposure to diverse research. Education seminars provide a good opportunity to learn about new research we would ordinarily not come into contact with, therefore expanding our vision in general. I have found this to be one of the great benefits of joining such a large department and feel grateful for the opportunity to participate.

What made me the most surprised was the Office Hour System that is particular to our department: Cafe David and Ladies' Lunch. The system has a cooperative nature not common to universities and has become an important part of this department. In general, office hours have meant for students a severe moment. It is normally understood as a time slot when professors wait for students' with enough courage to visit their office, asking any questions relevant to the professor's course. Some students knock on the door awkwardly or hesitate and just turn away. On the contrary, our office hour takes place in an area where students often pass by casually. This is the key! We have arranged such a setting in order to get students to come and ask us questions freely.

I participate in 2 different types of office hours. First, there is Cafe David that is organized by younger researchers and certain graduate students called TAs. The objective is to answer academic questions over a cup of coffee in an open lounge environment. But actually, many students and staff end up using it as an enjoyable opportunity to communicate with others in the department. I sometimes find that an area which I am not very strong or knowledgeable of will be discussed at Cafe David, and as a result I take away a new perspective on the topic, changing my impression of it altogether. Another one is Ladies' Lunch. As female students remain the minority in our department one of my colleagues, Professor Yukari Ito, planned this weekly event to create a space where girls can exchange information easily. They get together over lunch boxes where they can chat freely about some of the unique worries that female students often face. Although these students are normally cheerful members of our department, I do hope they can talk about concerns here, and reduce any existing related stress.

During both office hours, I find that rather than giving something to the students, I tend to learn from their strong desire and passion towards mathematics. I can say that these moments fuel my drive for my own research.

I guess the good attendance of students in our lectures is the result of an educational environment in which students and faculty can communicate openly. All members of our department community are encouraged to exchange and challenge ideas openly. As a result students and professors feel a unique level of comfort with each other. This environment motivates not only students but also faculty. That's why I tell myself every day "Ok, let's do it together!" regarding our pursuit of research in mathematics. I hope this type of comfortable communication, high research quality, and our vision for future learning, continue to evolve bringing positive opportunities for all.

International Conference by Graduate School of Mathematics

These pictures were taken at the 7th Nagoya International Conference. The Graduate School of Mathematics has been sponsoring this conference annually since 2001 with a revolving theme. In 2007, we invited Professor Toshikazu Sunada who had long worked for our department, from 1974 to 1991 and is currently a professor at Meiji University, to the conference "Spectral Analysis in Geometry and Number Theory" that was organized mainly by young researchers. While a member of our department he honed his originality and creativity, making many honorable achievements that would go on to shape his future research. We are proud to say our deparment has produced many such mathematicians known globally.

From September 1-5, 2008 our 8th annual International Nagoya Mathematics Conference titled, "Combinatrics and Representation Theory" was held. At this time, we aimed at focusing not only on our main theme of interaction of combinatorics and representation theory, but also at including the most recent research outcomes from the relevant areas of probability theory, mathematical physics, geometry, while also hoping to achieve meaningful international exchange and communication among scholars. With over 100 conference participants we invited about 20 researchers to present from: United States, France, Australia, England, Denmark, Poland, and Italy, and this time, many younger researchers including graduate students participated, too. At the conference representation theories such as classical group, Hecke Algebra, and quantum group, and those that follow such as combinatorics, enumeration problems of combinatorial objects such as plane partitions were the central themes of the addresses given by 10 Japanese and 14 foreign presenters. Starting with the lecture by Professor A. Ram entitled, "Two boundary Hecke algebras and tantalizer algebras" and ending with Professor J. Stembridge's lecture "Admissible W-graphs", a heated discussion drew in broad participation and debate among the many in attendance.

Past Conference Titles

- 2011 (11th) Topology and Analysis of Foliation
- 2010 (10th) Representation Theory of Algebraic Groups and Quantum Groups'10
- 2009 (9th) Harmonic Analysis and Partial Differential Equations
- 2008 (8th) Combinatorics and Representation Theory
- 2007 (7th) Spectral Analysis in Geometry and Number Theory
- 2006 (6th) Representation Theory of Algebraic Groups and Quantum Groups'06

The Global 30 Project - Bringing Nagoya University to the World

In July 2009, the selection results of the 2009 Project for Establishing Core Universities for Internationalization (Global 30) were announced, with Nagoya University standing out as one of the Global 30 leaders.

The objectives of Global 30 are to strengthen the international competitiveness of Japanese higher education and to offer an education with standards that appeal to foreign students while, through creating an environment where Japanese students work together with international students, fostering highly educated individuals who can be active internationally. The project comprehensively supports a plan to create universities that act as bases for internationalization by providing both the high level of education expected from universities and environments that make studying in Japan more accessible for overseas students.

To lead Japan's universities toward internationalization, Nagoya University must transform itself into a "university of the world". This means building a new environment in which Japanese and international students work side by side. In this way, the high standards of undergraduate and graduate education Nagoya University has achieved will be more widely accessible to students from overseas, and the University will be able to educate individuals with the ability to interact on the world stage.

Here are some of the strategic measures being taken to realize this goal.

from http://www.nagoya-u.ac.jp/en/international/edu-act/g30/

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, in 2004 we established a formal academic alliance between Korean Institute for Advanced Study (KIAS) and Paris 7 Denis Diderot University. With them we have conducted cooperative research workshops and the exchange of graduate students as research assistants.

Exchange beyond Fields

Mathematics has historically influenced other fields, and at the same time evolved itself, from the influence of other research fields. Nowadays, working towards a goal of broad global exchange is not enough. Conducting research with a vision beyond our own narrow fields is also required. Our department makes a unique effort to strive towards working with scholars of interdisciplinary research, and also with the Graduate School of Information Science, in order to further this goal.

International Lounge

International Lounge is now open, which is a room specially arranged
to activate international exchanges and partnership in various occasions.

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:

(1) Exchange of faculty and students.
(2) Exchange of publications and other academic materials.
(3) Bilateral symposia and workshops.
(4) Meetings to improve mutual research and educational programs.
(5) Mutual student managed projects.

Here is the list of institutions in cooperation agreement as of May 2012:

- Department of Mathematics, Nanjing University since 2012.
- Department of Mathematical Sciences, Soel National University since 2012.
- Faculty of Mathematics, Ruhr Universit ät Bochum since 2011.
- Universite Paris 7 -Denis Diderot since 2004.
- The Korean Institute for Advanced Study (KIAS) since 2004.

SIGNING CEREMONY Memorandum of Understanding on Academic Cooperation

Department of Mathematics, NANJING UNIVERSITY andGraduate School of Mathematics, NAGOYA UNIVERSITY

March 2, 2012, Graduate School of Mathematics, Nagoya University

Mathematicians shouldering a tradition

K. Yosida : 1942 - 1953 at Nagoya University
Created the theory of semi-groups of operators. His book "Functional Analysis" is read all over the world.

T. Nakayama : 1942 - 1964 at Nagoya University
One of the original members of the department of mathematics, his studies on modular representation theory of symmetric groups and non-commutative rings are world-famous.

K. Ito : 1943 - 1952 at Nagoya University, and then to Kyoto University
His formula on stochastic differential equations, applied to mathematical finance, is world-famous. He received the first Gauss Prize on 2006.

M. Kuranishi : Graduated from Nagoya University then was on our staff from 1949 - 1963, and from there, went to Columbia University (U.S.).
Decisive work on deformation theory of complex structures is his area of focus.

M. Nagata : Graduated from Nagoya University and was on our staff from 1950 - 1953, then moved on to Kyoto University.
He did world-famous work on the theory of commutative rings and the foundation of algebraic geometry.

T. Kubota : Graduated from Nagoya University then worked here from 1952 - 1993.
He created the theory of p-adic zeta-functions with Leopoldt.

M. Kashiwara : 1974 - 1977 at Nagoya University, then to RIMS, Kyoto University
Decisive work on the theory of D-modules and its application to representation theory.

K. Aomoto : 1978 - 2002 at Nagoya Unviersity
Created the theory of multi-variable hypergeometric functions, independently of Gel'fand.

S. Mori : 1980 - 1990 at Nagoya University, then on to RIMS, Kyoto University
Completed the classification theory of 3 dimensional algebraic varieties. He also received the Fields Prize in 1990.

Awata, Hidetoshi

keywords

integrable model, conformal field theory

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

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 the modern aspects such as automorphic forms and Shimura varieties (non-commutative class field theory). Algebraic and geometric methods (including cohomology theory) are mainly used in my approach.

Furusho, Hidekazu

keywords

number theory, arithmetic geometry,
motivic fundamental group

I am working on (p-adic) periods and (p-adic) differential equations associated with motivic fundamental groups. I am also working on structures on special types of quantum groups associated with the KZ-equations.

Garrigue, Jacques

keywords

Programming languages, Type theory.

I am studying the theory underlying functional programming languages. For more than 15 years, I have been working at fitting types onto the world, but the job is far from finished.

Geisser, Thomas

keywords

Algebraic K-theory, motivic cohomology, higher
Chow groups

I work on algebraic K-theory and motivic invariants of varieties, and their applications to arithemetic algebraic geometry. This includes class field theory of schemes, the Tate-Beilinson conjectures, and the Beilinson-Soule vanishing conjecture.

Gyoja, Akihiko

keywords

representation theory,
algebraic group

I am working to formulate "(unknown) invariant theory" which should associate to infinite dimensional representations, mainly using algebraic analysis, algebraic geometry, and representation theory.

Hamanaka, Masashi

keywords

mathematical physics, elementary particle physics,
noncommutative solitons

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

Hashimoto, Mitsuyasu

keywords

commutative ring,
invariant theory

I am mainly interested in commutative ring theory. I mainly study commutative rings with group actions such as determinantal rings. In particular, ring theoretic properties of invariant subrings under the action of algebraic groups are very interesting for me.

Hayashi, Masahito

keywords

quantum information, information theory

In order to ravel the mistery of quantum theory, I have studied quantum information teory based on the information theoretical aspect.
My study treats this topic from the view points 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 area 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.

Hishida, Toshiaki

keywords

Partial Differential Equations,
Navier-Stokes Flow

Interests are focussed on the existence, uniqueness, regularity, stability and asymptotic behavior of the Navier-Stokes flow in several unbounded domains. Functional- and real-analytic methods are often employed.

Hora, Akihito

keywords

probability theory, harmonic analysis,
asymptotic representation theory.

I am studying probability theory and harmonic analysis, particularly interested in hierarchies of limit theorems. Such a point of view is applied also to asymptotic theory for group representations.

Inahama, Yuzuru

keywords

Stochastic processes describe random
motions of paticles, etc.

Among them, solutions of stochastic differential equations (SDEs) are most important examples. I am now studying these processes by using rough path theory, which is a generalization of SDE theory.

Ishi, Hideyuki

keywords

homogeneous space,
unitary representation

I study geometry and analysis on a manifold whose symmetry is not so small but not so large. I am interested in how a 'strain' of the manifold is reflected on function spaces over the manifold.

Ito, Kentaro

keywords

Hyperbolic geometry, Kleinian groups

My research interest is the theory of Kleinian groups. In this area, hyperbolic geometry, Riemann surfaces and low-dimensional topology are closely related each other. I am studying deformation spaces of Kleinian groups, which have fractal boundaries.

Ito, Yukari

keywords

crepant resolution, quatient singularity,
McKay correspondence

I am studying quotient singularities by finite groups. I am interested in the geometric and algebraic structure of them and their correspondences. They are also related with the super string theory in physics.

Iyama, Osamu

keywords

Representation theory, Auslander-Reiten theory,
Derived category, Cluster theory

The theory of categorical structure of modules over associative algebras was initiated by Auslander, Gabriel, Ringel and others. This active research area has a strong impact on other fields of mathematics and physics, and requires fresh ideas from young students.

Kanno, Hiroaki

keywords

Quantum Field Theory, Supersymmetric Gauge,
String Theory, Integrable System

I am working on 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.

Kato, Jun

keywords

Nonlinear Partial Differential Equations,
Fourier Analysis

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

Kawahira, Tomoki

keywords

Complex Dynamics,
Hyperbolic Geometry

Dynamical systems in complex variables, as analogues of Kleinian groups and 3-dimensional hyperbolic geometry

Kawamura, Tomomi

keywords

knot theory, topology

I mainly research 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.

Kimura, Yoshifumi

keywords

Fluid Mechanics, vortex motion,
Turbulence

My research specialty is theoretical and computational fluid mechanics. I am interested in studying various mathematical aspects of flow problems. In particular, I am concerned with the nonlinear dynamics of vortices and waves in flows including turbulence.

Kobayashi, Ryoichi

keywords

Diophantine Geometry

Diophantine geometry of minimal surfaces is a new reserach area which combines two classical subjects. A mysterious geometry emerges from this coupling, in which I am recently most interested in.

Kondo, Shigeyuki

keywords

Algebraic Geometry, Moduli,
Automorphic Forms

I'm studying geometry of the moduli spaces of some varieties by applying the theory of periods of K3 surfaces and Borcherds theory on automorphic forms.

Kubo, Masashi

keywords

source coding, channel coding

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

Ma, Shohei

keywords

Algebraic Geometry / moduli space /
rationality problem

I am interested in moduli spaces of special algebraic varieties.
Especially, I am studying the rationality problem for such moduli spaces.

Matsumoto, Kohji

keywords

Zeta-functions, L-functions

Studying distribution of values and analytic properties of various zeta and L-functions such as the Riemann zeta-function, automorphic L-functions, and multiple zeta-functions.

Matsumoto, Sho

keywords

symmetric function,
representation theory

There are a lot of probability measures derived from representation theory of symmetric groups and classical groups. I study them and their asymptotic behaviour by using symmetric functions and calculus for determinants.

Minami, Kazuhiko

keywords

solvable lattice model, statistical mechanics,
quantum structure

I am mostly working in theories of quantum and statistical structure of lattice models. Within these areas one can work on problems involving solvable lattice models, its algebraic structures, critical phenomena and applications to magnetic materials

Moriyama, Sanefumi

keywords

String Theory, Gauge Theory,
Mathematical Physics

String theory is the most promising candidate for a unified description of all particle interactions. My research concerns the underlying beautiful mathematical structure of string theory and its physical implications.

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.

Nagao, Kentaro

keywords

Algebraic geometry ,Donaldson-Thomas theory

I have been studying 3-dimensional Calabi-Yau categories. Propeties of the category induce various geometric/algebraic phenomena. In this area, you may enjoy harmony of spectacular general theory and rich examples.

Nagao, Taro

keywords

random matrices,
semiclassical theory

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

Naito, Hisashi

keywords

Differential Geometry, Variational Problem,
Computer Network System

My research subject are geometric variational problems and non-linear partial differential equations. Recently, I also research an authentication system of computer network.

Nakanishi, Tomoki

keywords

quantum integrable systems,
quantum groups

I study (i) the integrable systems in quantum dynamics and field theories, (ii) the algebraic structures and their representation theories behind them such as quantum groups and Lie algebras, and (iii) the interplay of (i) and (ii).

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 and geometry of nonpositively curved metric spaces. Recently I study rigidity of actions of discrete groups on such metric spaces using methods of harmonic maps, discrete geometry and random groups.

Ohira, Toru

keywords

Mathematical Biology and Physiology /
Delayed Stochastic Systems

My interest lies in creating mathematical models of various physical, biological and social phenomena. Systems with feedbacks and interactions under the influence of noise / fluctuations and delays are of particular focus.

Ohsawa, Takeo

keywords

L^2 extension theorem

There is a situation where the structure of an equation becomes simpler if one makes a transformation by introducing extra variables. The L^2 extension theorem due to Takegoshi and myself serves as an lemma in performing such a strategy.

Ohta, Hiroshi

keywords

symplectic geometry,
gauge theory, Floer theory

Recently, I am mainly studying two subjects: One is Floer cohomology theory in symplectic geometry based on certain homotopical algebra (so called A -algebra), and the other is to study some relationship between singularity theory and symplectic/contact geometry.

Okada, Soichi

keywords

enumerative and algebraic combinatorics,
combinatorial representation theory

My research interests are in combinatorcs 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.

Saito, Hiroshi

keywords

algebraic geometry, algebraic cycle.

My research interest is in algebraic geometry, especially in algebraic cycles such as normal cones as key ingredients of intersection theory in view of Chow bivariant intersection theory and related topological invariants such as vanishing cycles.

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.

Sasahira, Hirofumi

keywords

Topology, Gauge theory

I study three and four dimensional topology using gauge theory. This theory has been developing with relations to various fields. For example, algebraic geometry, knot theory and physics. The geometry of three and four dimensions is very different from higher dimensions and interesting.

Sato, Takeshi

keywords

modular equation / pi / period

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

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.

Suzuki, Hiroshi

keywords

algebraic number theory, capitulation
problem

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

Takahashi, Ryo

keywords

commutative algebra/representation theory of algebras

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

Tanigawa, Yoshio

keywords

analytic number theory, zeta-function

From the point of view of the modular relation, I am trying to generalize the functional equations of the zeta functions and to apply it to the study of arithmetical functions. I am also interested in multiple zeta functions.

Tate, Tatsuya

keywords

Global Analysis,
Geometric Asymptotic Analysis.

I am interested in asymptotic properties of quantities and functions appearing naturally in partial differential equations, geometry and representation theory such as eigenfunctions and eigenvalues of elliptic operators, multiplicities of group representations and matrix integrals.

Tsugawa, Kotaro

keywords

well-posedness, Fourier restriction norm,
I-method

I have interests in partial differential equations. My current focus is on the study of the Cauchy problem of nonlinear dispersive equations by harmonic analysis.

Uzawa, Tohru

keywords

group theory, representation theory,
geometry

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

Yamagami, Shigeru

keywords

operator algebra, tensor category

Main interests are mathematical structures, which have origins in quantum physics, such as representations of quantum algebras, quantum symmetries in operator algebras and quantum analysis in tensor categories. Related fields in functional analysis are also in the research range.

Designated Associate Professor (G30)

Fabien Trihan

keywords

number theory

I am studying arithmetic geometry over function fields of characteristic p.

Martin, Herschend

keywords

Representation theory, Quivers,
Auslander-Reiten theory

My research is in representation theory of finite dimensional algebras. In particular, I'm interested in homological methods and connections to algebraic geometry, such as those appearing in higher dimensional Auslander-Reiten theory.

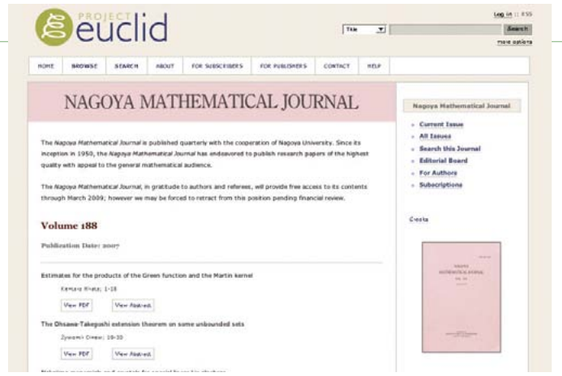
Staff from across many sections and areas are involved in the life and operation of the School of Science and Department of Mathematics.
The sections introduced here are an important part of our support structures.

Mathematics Library

A fully developed library is a quintessential element in providing quality mathematics education, and thus our mathematics 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 1,400 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 equiped for easy access to books and electronic journals, and librarians offer support to users seeking further information.

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 a database called Project Euclid by the library of Cornell University. 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.



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Computers and Networks

Electronic journals and e-mail are part of the modern indispensable tool of computer networking for researchers of mathematical science. Computer laboratories are located in Science Building I (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 various 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.

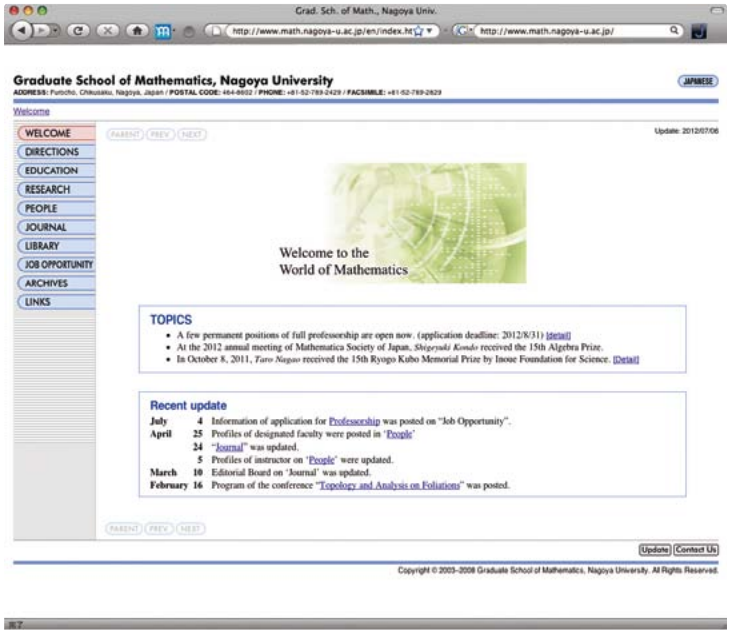
Office of Academic Affair

The Office of Academic Affairs was established in 2003, in order to provide specific services 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 edits mathematical journals, publishes information in the form of brochures and 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.

Office of Mathematics Department

The Office of Mathematics 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.

Graduate School of Mathematics
NAGOYA UNIVERSITY

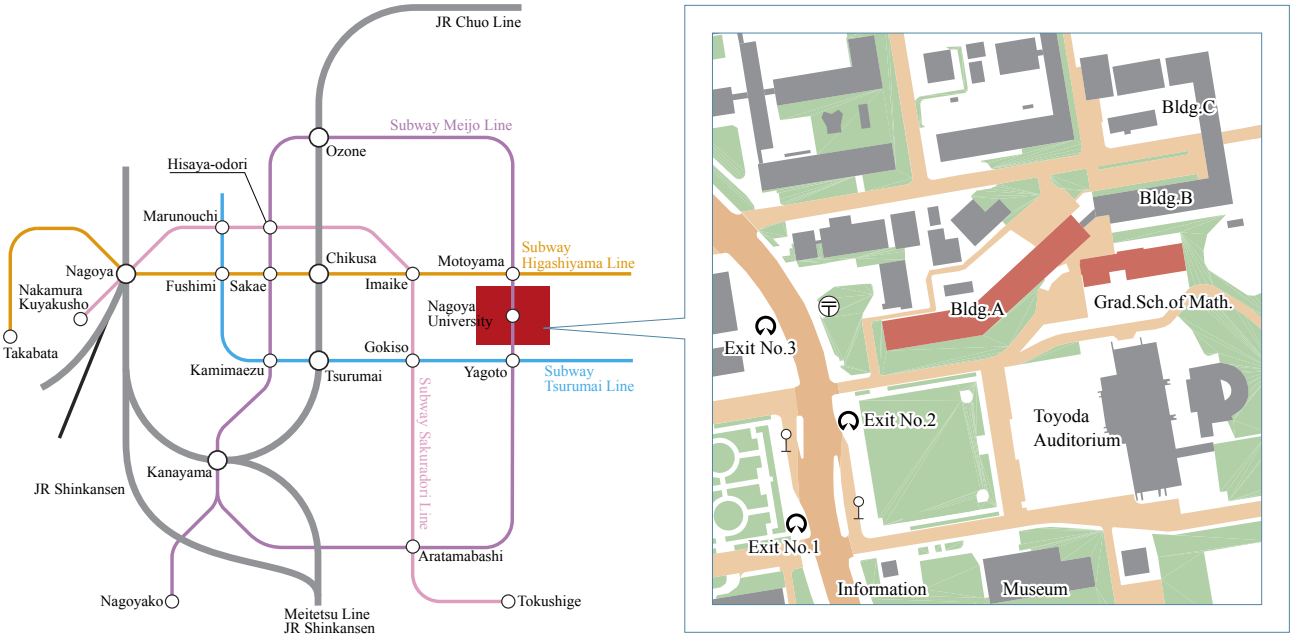


Updated information can be found at the department's web page.

http://www.math.nagoya-u.ac.jp/en/index.html

Particularly for up to date information regarding entrance exams, please see the link below.

http://www.math.nagoya-u.ac.jp/en/education/index.html



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