GRADUATE SCHOOL OF SCIENCE

THE UNIVERSITY OF TOKYO PROSPECTUS 2011-2012
The various departments and laboratories of our School have the common goal of understanding the structure and order of nature. Our primary mission is creating new scientific knowledge and conveying it to our peers through publication and presentations, and to our students through lectures and individual instruction. However, we are also mindful of the multitude of problems faced by humankind in all nations, as many people struggle just to survive from day to day.

It is important that we recognize how fortunate we are, as students, researchers and academics, to be able to dedicate ourselves to the challenging and exciting search for scientific knowledge, which has contributed so much to the progress of human society. This recognition highly motivates us to impart this passion to the rest of human society, and to continue to inspire and to be inspired. It is also our responsibility, whenever possible, to assist human society in using scientific knowledge to help solve the many practical issues now confronting us.

Prerequisite to the creation of knowledge is the ability to adopt a logical approach, which only becomes possible through the development of a strong ability to articulate ideas and a sound foundation of knowledge. We must ensure that newly created knowledge is communicated to others — including researchers in the same field — and that its validity is independently tested and verified. New knowledge can often be revolutionary, and may at times be strongly opposed by some research communities.

Scientists must be as strong emotionally as they are intellectually, because they must be able to persevere when faced with incorrect criticism of their research while at the same time they must always be prepared to accept correct criticism.

We must be as resolute as Galileo Galilei and Mencius. “Eppur si muove,” (“And yet it moves.”) said Galileo. “If I search inwardly and find that I am upright,” said Mencius, “though I face ten million men I will attack.” This is the spirit that we must adopt in the tasks that face us; we are charged with nurturing a new generation of Galileos and Menciuses who can forge strong links with their international colleagues and hone their research through friendly competition and debate.

Through collaboration among individual research groups, laboratories, departments, universities, and countries, we intend to generate exciting opportunities for exchange and innovation that are so vital for the communication and creation of original scientific knowledge.

We invite researchers and students who share our goals to join us in these dynamic and rewarding endeavors.
About the School

Our university was established in 1877 as the first national university in Japan with the name “Imperial University.” This was changed to “Tokyo Imperial University” when Kyoto Imperial University was established. The name was changed to the present “University of Tokyo” after World War II. The full Japanese name of our university, 東京大学 (Tokyo Daigaku) is commonly contracted to 東大 (Todai) in everyday usage.

The undergraduate Faculty of Science was established at the same time as the University. In accordance with the reforms of the postwar education system, the Graduate School of Science was established as an appendage of the Faculty of Science in 1953. In the early 1990s the Faculty of Science was reorganized as the School of Science, which includes both undergraduate and graduate programs in science, with institutional emphasis on the latter. The School provides its students with outstanding opportunities for intellectual development and the acquisition of professional knowledge and skills.

At present, the School offers master’s and doctoral programs in six departments: Physics, Astronomy, Earth and Planetary Science, Chemistry, Biophysics and Biochemistry, and Biological Sciences. These programs are run in close cooperation with other research institutes within the university and with some external institutions. The School also offers undergraduate education in Mathematics and Information Science, but undergraduate education is not discussed further in this Prospectus.

The School has a world-class faculty of more than 260 full-time professors, associate professors, and research associates, and a diverse student body of more than 1,350 graduate students. Students and researchers from many disciplines, backgrounds, and regions collaborate together on multidisciplinary study and research. The School is committed to accepting international students proactively, and intends to expand the number of lectures delivered in English.

The alumni of the School include three Nobel laureates in Physics: Leo Esaki (1973 laureate), Masatoshi Koshiba (2003), and Yoichiro Nambu (2008).

Science, which elucidates universal truths of the natural world and searches for its underlying fundamental laws and principles, forms the foundation of human society and civilization. Science is an essential component of the accumulated wisdom of the human race and of human intellect. Based on these ideals, the School of Science is conducting education and research in advanced science that will open pathways to a prosperous and peaceful future for humankind.

Mission

The School of Science will conduct education and research to further understand the truths of nature, to expand and develop the frontiers of knowledge, and to communicate such new knowledge to future generations.

Non-discrimination

Consistent with the ideals of science, the School of Science will not discriminate on the basis of gender, nationality, race or religion, and will respect academic freedom in education and research.

Fairness

The School of Science will hold fairness and openness to be paramount in all personnel and other organizational decisions, and will maintain the highest standards of education and research through rigorous external evaluation.

Social contribution

The School of Science will make the results of its education and research available to the general public and will make efforts to prevent such results from being used to harm the peace of human society and the global environment and will, in this way, contribute to the development of culture and the continued existence of the human race.

Education

The School of Science will educate young people who will lead the next generation of science and who will contribute to the continuous and peaceful progress of human society by solving new research problems.
At the frontiers of science

Chemistry

Biophysics and Biochemistry

Field work

Observation

Simulation

Theory

Earth and Planetary Science

Astronomy

Physics

Biological Sciences
Voices of international students

Commitment to diversity

That’s why I came to Todai

Seung-Won Choi
South Korea — Entered doctoral program in biological sciences in April 2005

When I was a master’s course student in South Korea, I got a chance to participate in an international conference in Beijing. At that conference, I met many researchers from all around the world, including Japan. I found out about some interesting research being done at Todai, and talked with people making presentations about it. I had lots of interesting topics to talk about, and what is more, passion for the research. It was a nice experience and made me think about studying at Todai.

1. I hope to be a scientist in the field of plant science. Plants are different from us animals. So I believe they hold many secrets for life and could be a hope for us. I want to continue research on a molecular level.
2. There are many chances to meet good people and conduct interesting research at Todai. Have confidence and research what you are interested in.

Quan Chen
China — Entered master’s program in chemistry in October 2008, and advanced to Ph.D. program in October 2010

Since there was a chance for me to get an AKS Scholarship and study at Todai, I decided not to miss this opportunity at that time. Of course, the level of science education and research in Japan, especially at Todai, is very high. This is the main reason why I chose Japan for my graduate study. Also, some aspects of the Japanese culture attract me a lot.

1. I will go back to China and do some research work in the future.
2. Please take some time to study Japanese before going to Japan, even if your major is science or engineering. And never forget your main task is study and research, but don’t live like an otaku (nerd).

Clement Ng
Australia — Entered master’s program in physics in April 2008, and advanced to Ph.D. program in April 2010

Tokyo is an inspirational environment for all kinds of research, and studying at Todai is like being placed at the hub of that vast academic network. There is no greater place for reaching out to top researchers in the country. In science, breakthroughs are heard of almost every week here, and clearly some of the most committed scientists in the world are here working at extraordinary lengths to push the frontiers of knowledge. While the high demands here and stories of limited academic freedom led me to consider a range of other universities, I chose Todai because it suited my research interest.

1. To research and teach at academic institutions.
2. To research and teach at academic institutions.
3. To teach at academic institutions.

Josephine Francoise Galipon
France — Entered doctoral program in biophysics and bioinformatics in April 2009

1. My supervisor in France introduced me to his Japanese colleagues from the University of Tokyo with whom he has been collaborating for many years. Of course, if you end up at a famous university it is even better, but you should always choose your lab carefully according to your research interest and whether you get along well with your supervisor.
2. I want to work on the fundamental aspects of cellular biology to find cures to fight cancer and enhance the quality of life and increase life spans. After graduating from the University of Tokyo, I will most likely continue contributing to science as a post-doctoral researcher in Japan or in another country. If possible, I wish to maintain a strong connection with Japanese researchers throughout my career.
3. If you are planning to take a degree at the Graduate School of Science, make sure you give yourself enough serious time to study for the entrance examinations. Studying Japanese is very important, of course, but getting into the graduate program will most certainly brighten your prospects. Don’t settle for less than what you are fit for. If you get along with your lab and supervision, Japan provides an incredible research environment and enjoyable student life. Please make as many Japanese friends as possible!

David Miles Kahl
U.S.A. — Entered doctoral program in physics in October 2008

1. My master’s thesis work at McMast- er University in Canada was all done in Japan in collaboration with the University of Tokyo. As I was interested in continuing the same work, I thought it would make more sense to have direct access to the laboratory (Riken). I knew all the members of the group I would be joining in Tokyo, so this made the choice much easier.
2. I was also accepted to the Universi- ty of Notre Dame in the US and Mc- Master University in Canada. I found that the University of Tokyo had the most attractive program in terms of graduation requirements and would enable me to focus on only the research for my Ph.D.
3. Although I plan to continue doing some research in experimental nu- clear physics (as opposed to watching it), I do not have a clear plan in mind. The obvious path would be to get a post-doctoral fellowship, and I am not particular about the location, although I have thought of moving to Europe since I have never lived there. However, I have thought a better experience may be to be an ion source and beam accelerator technician for a few years at a similar facility. Ideally I’d like to open a private nuclear labo- ratory (or possibly research and fund it with the sale of medical isop- totes). If you are planning to take a degree at the Graduate School of Science, make sure you give yourself enough serious time to study for the entrance examinations. Studying Japanese is very important, of course, but getting into the graduate program will most certainly brighten your prospects. Don’t settle for less than what you are fit for. If you get along with your lab and supervision, Japan provides an incredible research environment and enjoyable student life. Please make as many Japanese friends as possible!

Today, respect for cultural and eth- nic diversity on campus is one of the most important core values for the world’s foremost universities. Academic research activities cannot now be conducted effectively if re- searchers do not interact with peers having different socio-cultural backgrounds. Internationalization is part of everyday academic life for researchers.

The Graduate School of Science at Todai has included in its educa- tional objectives enhancing cross- cultural interactions with diverse peers in order to stimulate the minds of students to make their academic work more professional and creative.

The School has widely opened its doors to students and research- ers from around the world with the aim of establishing world-leading academic standards. The School offers a variety of internationalization programs designed to promote mutual understanding through ex- changes of views between Japanese students and researchers and their counterparts having non-Japanese backgrounds about their research and recent scientific developments.

These programs will help the School to foster wider perspectives and maintain the competitive edge required for the next-generation leaders by bringing together a multiplicity of experiences and inter- ests.

The School endeavors to enhance the richness of the background, both scientific and cultural, it pro- vides, and to promote a wider range of talents and interests by inviting students and researchers from all over the world. And our ultimate goal is to increase our academic contributions to the global society.

The School of Science strives for academic excellence through its ev- er-increasing diversity. Our com- mitment to diversity is stronger than ever.

Hiroaki Aihara
Associate Dean
***Voices of Alumni***

**To me, Todai is…**

1. **Nobuaki Fuji**  
   Japan  
   Ph.D. Earth and Planetary Science 2010

   > When I was a Todai student, I had a lot of wonderful experiences, such as attending lectures of Nobel Prize winners, learning how to ski, joining student tours, and so on. I want to continue my research on plant biology and to become a faculty member in a university or other academic institution in the future. I think that having studied at Todai will help me to make relationships with the leading scholars in my field.

   > Studying Japanese is very important. Because most Japanese people are reluctant to speak English, learning Japanese will help you to understand them better and also make your life convenient in Japan. Working hard on research is also important, but it is not the only thing in your life. Learning how to balance study and leisure is important for the people who want to get a Ph.D. degree and pursue a career in science.

2. **Hui-Yu Yang**  
   China  
   Ph.D. Biological Sciences 2010

   > Choosing Todai came to me naturally. The initial reason is that my supervisor during my Master’s degree work is a good friend of Professor Tabus QJ, now at Nagoya University but previously associate professor in the Earth and Planetary Science Department, who supervised me for the Ph.D. Being a paleobiologist specializing in Cambrian (c.a. 540 Ma) plankton, I investigate how these organisms lived in very old ecosystems. Therefore, an essential component of my work consists of understanding the rules that are underlying modern animal communities, and the facilities (marine laboratories and sampling cruises) provided by Todai supported my research irrevocably.

   > I am currently an Adjunct Postdoctoral Fellow at Todai (Komaba Campus) until March 2011. I hope to pursue my research abroad and find a permanent academic position in a good institution.

3. **David Casenove**  
   France  
   Ph.D. Earth and Planetary Science 2010

   > I enjoyed a lot of intercultural experiences, because Todai is, without any doubt, situated at the academic center of Japan. It was not difficult to find and involve excellent Japanese and foreign researchers to our seminar on Friday morning (which began at 8:30!), and they encouraged me very much in my thesis work as well. I also found it very interesting to talk with researchers at Todai in fields from literature to medicine. But remember, it’s up to you to get the most out of your Todai experience.

   > I strongly recommend that you study Japanese in advance; unfortunately there may not so many people who are willing to talk with you in a foreign language at Todai, and there may be even fewer outside Todai. Think of it positively—you will benefit by improving your Japanese. In my case, since I moved to Toulouse in April 2010 just after having obtained my Ph.D. degree from Todai I have spoken and discussed science only in the French language, and I find my progress has been very rapid. However, my French is still far from the level of a native speaker. So learning Japanese is the best way to make your Todai life comfortable and enjoyable.

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**Nobel Laureates**

**Leo Esaki**  
(B.S., Physics, 1947; Ph.D., 1959)

> For experimental discoveries regarding tunneling phenomena in semiconductors.

**Masatoshi Koshiba**  
(B.S., Physics, 1951; Ph.D., 1959; Faculty member, 1963-1987; Professor Emeritus, 1987-present; Special University Professor Emeritus, 2005-present)

> 2002 Nobel Laureate, Physics  
> For pioneering contributions to astrophysics, in particular for the detection of cosmic neutrinos.

**Yoichiro Nambu**  
(B.S., Physics, 1942; Ph.D., 1952)

> 2006 Nobel Laureate, Physics

> For the discovery of the mechanism of spontaneous broken symmetry in subatomic physics.

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**Nobel Laureates from Other Schools of the University**

- **Yasunari Kawabata**  
  (B.A., Literature, 1931)
  > 1968 Nobel Laureate, Literature  
  > For his narrative mastery, which with great sensibility expresses the essence of the Japanese mind.

- **Eisaku Sato**  
  (B.A., Law, 1944)
  > 1974 Nobel Peace Prize  
  > For contributions to human rights, arms control and disarmament.

- **Kenzaburo Oe**  
  (B.A., Literature, 1959)
  > 1994 Nobel Laureate, Literature
  > Who with poetic force creates an imagined world, where life and myth come together in a picture of the human predicament today.

- **Ei-ichi Negishi**  
  (B.S., Applied Chemistry, 1954)
  > 2010 Nobel Laureate, Chemistry  
  > For palladium-catalyzed cross couplings in organic synthesis.
The Department of Physics covers almost all of the frontier areas of physics including condensed matter physics, astrophysics and cosmology, particle physics, nuclear physics, and general physics. The department has the longest history among Japanese universities for education and research in physics, and has educated many outstanding physicists, including three Nobel Prize laureates, Leo Esaki (1973 laureate), Masatoshi Koshiba (2002 laureate), and Yoichiro Nambu (2008 laureate). Faculty and students are based at both the Hongo Campus and also affiliated institutes, which enables them to conduct diverse and advanced research. For example, in the field of experimental physics, experiments are carried out at major domestic and international facilities such as particle accelerators.

**Condensed matter**

The experimental condensed-matter physics group covers a wide range of materials and phenomena that include strongly-correlated electron systems, exemplified by high-Tc superconductors, superfluid helium, quantum Hall systems, Tera-Hertz photons, and physics of surfaces. The theoretical condensed-matter physics group covers a wide spectrum as well, ranging from fundamental aspects to realistic analysis of diverse materials. The experimental and theoretical groups collaborate actively.

**General physics**

General physics covers the study of nonlinear non-equilibrium physics, quantum information processing, quantum optics, atomic/molecular physics, plasma physics, biophysics, and neuroscience. The group is attempting to expand its conceptual scope to promote truly original and unique research.

**Particle physics**

The particle physics theory group covers model building, phenomenology, string theory, mathematical physics, and particle cosmology. We are conducting experiments at the LHC, an energy frontier collider, in which the origin of mass and physics beyond the Standard Model will be discovered in the near future. Experimental activities for discovering dark energy, dark matter, and the origin of the CP violation are also ongoing in the particle physics group.

**Astrophysics and cosmology**

The theoretical astrophysics group is actively working on a variety of broad topics in astrophysics and cosmology. In particular, our current interests include the following three major research topics: “physics of the early universe,” which aims at describing the birth of the universe within the framework of string theory and brane-world models; “observational cosmology,” which attempts to understand the evolution of the universe based on rapidly accumulating observational data in multiple wavebands; and “particle and nuclear astrophysics,” which considers unexplored aspects of particle and nuclear physics as applied to astrophysical phenomena in regimes of extremely high energy, density, and temperature.

**Nuclear physics**

Nuclear physics now extends its scope to the structure of exotic/unstable nuclei, antimatter, nuclear/hadronic matter under extreme conditions and quark gluon plasma, areas which are intimately linked to atomic physics, elementary particle physics and astrophysics. We also explore fundamental problems such as the dynamical origin of proton mass, precise measurement of antiproton mass, and the EPR paradox.

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The University of Tokyo May Festival, held annually at the Hongo campus, is a lively event attracting more than a hundred thousand people each year. This is a great opportunity for undergraduate students to create their own research projects and present the results to the festival visitors. In 2010, physics students showed the results of their projects in the following seven areas: biophysics, plasma physics, fluid physics, physics of one-dimensional electrons, cosmic ray detection, computational physics, and linear motors. Nearly six months of hard work was rewarded when they won the top MF (May Festival) award for the second year in a row, as well as the award for the best academic project for the third year in a row.
Astronomy

Astronomy education and research at the University of Tokyo began in 1877 when the University was founded and the Department of Astronomy was established together with the Mathematics and Physics Departments in the Faculty of Science. Since then, UT’s Department of Astronomy has been at the forefront of astronomy education and research at both the undergraduate and graduate levels, and has produced many outstanding astronomers.

The astronomy courses develop graduate students to function later as front-line researchers and educators in astronomy and other fields and to play central roles in international and interdisciplinary research projects. Graduate students strive to develop a high level of expertise, a willingness to challenge new tasks, and the ability and sense to open unknown research paths.

Fully mindful of these educational objectives, faculty members provide students with advanced training in astronomy to meet their needs as future researchers. Although the number of faculty members in the Department of Astronomy is small relative to other departments in the Graduate School of Science, it is large by global standards. In addition, the fields covered by the faculty constitute the largest astronomy graduate course in Japan, enabling it to provide astronomy education that is not available at any other universities.

Optical and infrared astronomy

This group covers observational astronomy at optical and infrared wavelengths, ranging from observational cosmology, the formation and evolution of galaxies and galaxy clusters, stellar evolution, star-formation, and circumstellar physics to exoplanets and their formation based on observations with the Subaru telescope and other ground-based telescopes. Another major part of the activities of the group is the hardware development of optical and infrared instruments as well as large telescopes, such as the Tokyo Atacama Observatory (TAO) in Chile, which uses the latest technology.

Teoretical astronomy

This group covers a wide range of research fields of theoretical astronomy, including solar/stellar seismology, stellar astrophysical fluid dynamics, theory of rotating/magnetic stars, evolution of binary systems, formation of planetary systems, supernova explosions, gamma-ray bursts, chemical and dynamical galaxy evolution, formation of star clusters and galaxies, N-body simulation, origin of elements, and cosmology.

Radio astronomy

The major fields of observational radio astronomy this group studies include the formation and evolution of galaxies, active galactic nuclei in galaxy clusters, interstellar physics in our galaxy and other galaxies, the center of our galaxy, and stars and planet formation. This group is also developing a leading role in the hardware development of radio instrumentation, including that for the Atacama Submillimeter Telescope Experiment (ASTE) and the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile, and that for very long baseline interferometry (VLBI) with ground-based radio telescopes and satellites.

Space and gravitational wave astronomy

The space and gravitational wave astronomy group is working actively on space missions, such as the Suzaku (X-ray), AKARI (infrared), and Hinode (solar) satellite missions, as well as studying gravitational wave astronomy. The group's major research topics range from solar physics, interstellar physics, star and planet formation, and high-density objects to black holes. The group is also involved in the hardware development of space telescopes and instrumentation for future space missions.

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http://www.astron.s.u-tokyo.ac.jp/index.html/en
Earth and planetary science covers a wide range of fields, from study of the solid Earth, atmosphere and oceans, and surface environment, including the biosphere, to planets and minor objects in the solar system, as well as space beyond the solar system. Moreover, it covers a wide range of time scales, from the evolution of the solar system to the future of the Earth, and from billions of years to hours or less. Diverse research methods are required to study these diverse research fields, including field work, observation, laboratory experiments, chemical analyses, theoretical modeling, and simulation. Recent research aiming to understand the Earth and planets as a large-scale and complex system requires interdisciplinary research and education based on strong programs in the various disciplines of this field. Another important objective of the department is to contribute directly to society through participation in national and international programs of applied research in areas such as global climate change or mitigating catastrophic damage from earthquakes.

Earth and planetary science

Earth and planetary system science

This group aims to study the Earth as well as other planets as a single system comprising closely interacting multiple subsystems, with interaction times varying from seconds to billions of years and with spatial scales from the atomic scale to the distance between planets. We seek to understand the stability, variability, and evolutionary trends of planetary systems and surface environments.

Solid earth science

The “solid Earth” denotes the Earth’s crust, mantle, outer core (which is actually fluid) and inner core. These regions differ greatly both physically and chemically. This group seeks to reveal the complex structure, composition, state, and evolution of the Earth’s interior. Among the fields covered by this group are the structure and dynamics of the Earth’s interior, magma dynamics, global tectonics, dynamic geomorphology and earthquake physics.

Space and planetary science

We study space physics, magnetospheric physics, observational planetology, comparative planetology, and planetary material science. Japan’s commitment and contributions to planetary/lunar/asteroid scientific missions are expanding, and this group’s members are playing an important role in these efforts.

Atmospheric and oceanic science

This group studies oceanic and atmospheric phenomena on a wide range of space and time scales. Specific topics include small-scale turbulence, internal gravity waves in the troposphere, stratosphere and ocean, eddies and large-scale circulation of the ocean and atmosphere, and their coupling. Our aims are to deepen our understanding of the physical processes and, to the greatest extent possible, to enhance our ability to make predictions of these phenomena.

Geosphere and biosphere science

This group studies the formation of geosphere materials, the evolution of the geosphere, the origin and evolution of life, and the fundamental processes of geosphere-biosphere interactions. This research is based on field observation, analysis of geological, mineralogical, and paleontological samples, and laboratory experiments.

News

Influence of Indian Ocean on El Nino

The El Nino-Southern Oscillation (ENSO) is a large-scale air-sea coupled phenomenon in the tropical Pacific that has a great impact on global climate. We found that a climate mode in the Indian Ocean, known as the Indian Ocean Dipole (IOD), influences the onset of ENSO. The negative phase of IOD in the previous fall causes stronger atmospheric convection around Indonesia and enhances easterly trade winds over the equatorial Pacific. Rapid cessation of the IOD in winter then induces a sudden collapse of anomalous easterly winds over the Pacific, and leads to the development of El Nino in the following year.

T. Izumo et al. (2010), Nature Geoscience, 3, 168-172.
Graduate students in our department learn about wide areas of chemistry including physical chemistry, organic chemistry, inorganic and analytical chemistry, and other interdisciplinary areas through both lectures and frontier research projects. Master’s course students are encouraged to learn basic knowledge in chemistry and develop their experimental skills in both their own field of expertise and also in a wide range of research areas in chemistry. In the doctoral course, students are encouraged to conduct frontier research projects with high originality and also to develop their teaching skills by helping to instruct master’s students and undergraduates. In order to encourage graduate students to become top-level international researchers, all lectures in the graduate course are given in English, and international seminars and symposia for graduate students and young researchers are held frequently, with participants including researchers and graduate students from overseas.

Inorganic and analytical chemistry

The research interests of this group encompass not only the traditional areas of inorganic and analytical chemistry but also cover many interdisciplinary areas including materials science, surface science, electrochemistry, study of proteins, bioanalysis and bioinorganic chemistry. Both experimental and theoretical aspects are addressed. Research is carried out in four laboratories, whose common concept is to cultivate and enrich our knowledge of fundamental and applied chemistry through advancing the state-of-the-art in beautiful compounds, functional materials, and analytical methods.

Physical chemistry

A variety of frontier research projects are being conducted in this group. The structural chemistry laboratory explores the structure and dynamics of molecules and molecular systems including living cells; the solid state chemistry laboratory designs and synthesizes novel functionalized molecule-based and metal oxides magnets; and the quantum chemistry laboratory investigates molecules interacting with ultrashort intense laser fields to gain fundamental understanding of the interaction of molecules and light fields.

Organic chemistry

This group covers various fields of organic chemistry such as bioorganic chemistry, including peptide chemistry; synthetic organic chemistry, which is developing environmentally friendly reactions for highly efficient organic synthesis; natural products chemistry, which visualizes cells and marine ecology by precision chemistry; and physical organic chemistry, which is challenging new reactions, new materials, and new principles.

Printable Organic Solar Cells

High-efficiency organic solar cells printed on a plastic sheet can become the ultimate fuel to harvest solar energy, as they are much less expensive than the presently ubiquitous silicon solar cells. However, to develop such cells, one major scientific problem, the “hierarchical ordering” of light-harvesting materials, had to be reached. Researchers in the Department of Chemistry overcame this issue by the clever designing of molecules and related devices. The new solar cells feature meticulously controlled nano-scale crystals and perform at a photos conversion efficiency of better than 6%. Researchers foresee industrial production of the solar cells in the near future in collaboration with a major chemical company in Japan.

The objective of the lectures in the first year of the master’s degree course is to ensure that students acquire essential knowledge of biochemistry and molecular biology, including the principles of biological phenomena, so that they can use this knowledge for the preparation of their thesis and eventually solve the important biological problems that we face today. After successfully completing the doctoral course, students will be prepared and qualified to continue their careers as advanced researchers.

Biophysics and Biochemistry
http://www.biochem.s.u-tokyo.ac.jp/english/

Molecular genetics
Meiosis is the process of forming haploid gametes from diploid germ cells, which is essential to sexual reproduction and the transmission of genetic information to the next generation. This group studies molecular mechanisms that control the cell cycle switch from mitotic proliferation to meiosis by using fission yeast as a model system. The group has found an interesting molecular mechanism, named “selective elimination,” that removes mRNAs required only for meiosis from cells proliferating mitotically. The key regulator of meiosis in fission yeast, the Mei2 protein, inactivates this selective elimination system. Additional cellular and signal-transduction mechanisms that facilitate the execution of meiosis are also extensively studied.

Structural biology
This group’s research aims to determine tertiary structures of proteins and nucleic acids that are crucial for biological processes. The group’s research interest is focused on: 1) how genetic code is translated into protein with high fidelity; 2) how membrane transporters selectively transport cations, sugars, metabolites, proteins and drugs and how their activities are regulated; 3) how the innate immune system protects humans from cancer.

Systems biology of cellular signaling
The ultimate goal of this group’s research is understanding the mechanisms of signal transduction networks that regulate various cellular functions including cell-fate determination, synaptic plasticity, and insulin actions at the systems level. In these biological processes, the same input stimulation elicits distinct outcomes depending on temporal patterns of input, and the group is interested in the quantitative mechanisms of the encoding/decoding systems via signaling networks that underlie this processing. The group uses both experimental and computational approaches; thus they are trying to understand cellular processes in terms of Systems Biology.

Molecular behavioral genetics
This group aims at understanding the operating principles of the nervous system. For this purpose, the popular research model organism C. elegans, a soil nematode, is employed as a platform. On the basis of the knowledge of the entire connection diagram of 302 defined neurons in C. elegans, two complementary approaches are used: forward genetics, in which mutants with behavioral defects are isolated and analyzed, and reverse genetics, in which the gene of interest is overexpressed. Examples of the questions the group is addressing are: 1) How does the nervous system control the movement of the animal as it steers its way? 2) What molecular components direct the switching of the behavior caused by learning? 3) How is behavior affected by interaction with other individuals?

FEAR RESPONSES
Two separate pathways to detect the predator’s smell for fear responses
A predator’s odorant, TMT, activates two sets of glomeruli, one in the D domain and the other in the V domain of the OB. It has been proposed that TMT activates two different neuronal pathways, one for innate fear response (red) and the other for the learned fear response based on memory (green). The photo shows a fearless mutant mouse facing a cat. The mutant mice lack innate responses to aversive odors, even though they are capable of detecting them and could be conditioned for aversion. OE, olfactory bulb; OF, olfactory epithelium; OC, olfactory cortex.


Neuroscience
This group’s research is focused on studies of the molecular basis of odor perception by mice. The mammalian olfactory system mediates various responses, including aversive behaviors to the smells of spoiled food and fear responses to predator odors. The odor information received in the olfactory epithelium is converted to a topographical map of activated glomeruli in the olfactory bulb. The group is currently studying how the olfactory map is formed, and how the map information is processed and interpreted by the brain.

Research groups
Molecular genetics
Biochemistry and Molecular Biology
The Department of Biological Sciences was established in April 1995 by the merger of three separate departments which specialized in zoology, botany and anthropology. An outstanding feature of the research in our department, as a whole, is its variety, as is evident from the presence of four diverse sections described below. The research being carried out in our department covers a wide range of studies at a variety of levels, from gene, protein, cell and organism to the disciplines of molecular biology, cell biology, developmental biology, ecology and evolutionary biology. Despite the wide variety of research topics, a common theme is our emphasis on the basic principles of biology. Graduate education in our department is conducted in part in collaboration with other departments and institutions, including the Marine Biological Station, the Atmosphere and Ocean Research Institute, Botanical Gardens of the University of Tokyo, and the National Science Museum.

Zoological science

All living organisms share many principles in common as to gene expression and cellular metabolism. But why are animals so diverse in appearance, behavior, and mode of life? This group’s major goal is to seek answers to this fundamental question. Students learn the basics of physiology, developmental biology, endocrinology, biochemistry, molecular biology, etc., and then apply this knowledge to their research.

Plant science

Research in the plant science group covers studies on a variety of organisms, from microorganisms to flowering plants, and focuses on multiple hierarchical levels of life — genes, proteins, organelles, cells, tissues, organs, organisms and populations. The group aims at elucidating the mechanisms of living strategies by exchanging information with peers through these studies and attempts to understand the issues of growth, reproduction, differentiation, morphogenesis, response to environment, and ecology with the common language of modern biology.

Anthropology

Research in physical/biological anthropology is conducted at the molecular, organismal, and population levels. Graduate students are engaged in research in molecular evolution, human genetics, morphological anthropology, population biology, and evolution of human social behaviors.

Evolutionary biology

Evolution and biodiversity are fundamental properties of organisms. This group’s research and training are focused on evolution and biodiversity at the molecular, cellular, individual, and population levels. Their research covers a broad variety of topics in evolutionary biological research, including molecular and organismic evolution, physiology, development, Evo/devo, ecology, speciation, and phylogeny. It also covers a wide range of taxa: fungi, algae, seed plants, sponge, Echinoderms, Chordates, and so on. The group cooperates closely with the National Museum of Nature and Science and several other universities for research and education.

**Biological Sciences**

http://www.biol.s.u-tokyo.ac.jp/english/index.html

The Department of Biological Sciences was established in April 1995 by the merger of three separate departments which specialize in zoology, botany and anthropology. An outstanding feature of the research in our department, as a whole, is its variety, as is evident from the presence of four diverse sections described below.
Affiliated facilities of the School of Science

The Graduate School of Science also includes the units described on this page, which are collectively referred to as "affiliated facilities." Many of the faculty members of these units participate in graduate education in the School through joint appointments in one of the six departments described above on pp.19-21.

Marine Biological Station (MBS)

The Misaki Marine Biological Station (MBS) is located in one of the world’s richest regions in terms of biodiversity. Taking advantage of the abundant marine life available there, extensive research and training are being conducted at MMSB.

In 2009, the Center for Marine Biology, which is an interdisciplinary research organization of the University of Tokyo, was established at MMSB with the aim of creating a frontline research center in biology and promoting international collaboration.

Botanical Gardens (BG)

The University of Tokyo Botanical Gardens consist of the main garden in Tokyo, which originated as the Keishukan Medicinal Herb Garden of the Tokugawa Shogunate in 1684 and was annexed to the University in 1977, and the branch garden in Nikko which was established in 1902. Both gardens have excellent facilities and wild plant collections that contribute to research and education in plant sciences, and together they have been the leading research botanical gardens in Japan. Both are open to the public.

Koishikawa Botanical Gardens (BG)

Affiliated with the Graduate School of Education in the School through joint appointments are the Koishikawa Botanical Gardens (BG), a 30ha area that contributed to research and education in plant sciences, and to that of education in plant sciences. Koishikawa Botanical Gardens (BG), a 30ha area that contributed to research and education in plant sciences, and to that of education in plant sciences. Koishikawa Botanical Gardens (BG), a 30ha area that contributed to research and education in plant sciences, and to that of education in plant sciences.

Research Center for Spectrochemistry (RCS)

Current research at this center mainly covers ultrafast (picosecond to nanoseconds) Raman and synchrotron radiation spectroscopy. Spectroscopic observation of living cells or functional molecules such as liquid is also an undertaking there. This research is related not only to chemistry but also to other scientific disciplines, including clinical diagnosis, and to the development of interdisciplinary and multidisciplinary sciences. The Center also maintains and manages various spectroscopic instruments for common use.

Geochemical Research Center (GRC)

The Geochemical Research Center conducts fundamental research on Earth and planetary materials. GRC research activities cover the chemistry of Earth and planetary materials and the behavior of fluids in volcanic and earthquake activity. To understand the behavior of hydrothermal fluids in the Earth and planetary interiors, GRC has been designated as a core research group for developing neutron diffraction techniques at high pressure. State-of-the-art moose gas mass spectrometry developed by GRC contributes to the understanding of the evolution of the solar system and mantle dynamics of the Earth. GRC’s synergy of fundamental and field research will open up new avenues in geoscience.

Institute of Astronomy (IA)

The Institute of Astronomy promotes both research and educational activities especially in the field of optical, infrared and radio astronomy. A wide spectrum of research is conducted at the Institute, from the origin of the solar system to the birth and death of stars, evolution of galaxies, and cosmology. The Institute operates a 3m infrared telescope at an observatory in Aomori, and a 1.05m Schmidt telescope in Nagano Prefecture, as well as a 10m submillimeter antenna in Chile in collaboration with the National Astronomical Observatory of Japan. Together with other large ground-based facilities and satellite observatories like Subaru and Akari, the Institute is at the cutting-edge of astronomy today.

Center for Nuclear Study (CNS)

The primary emphasis in its current research activity is on heavy-ion science. In close collaboration with RIKEN, where the major facilities of CNS are located, a variety of advanced studies on heavy-ion science are being conducted. CNS has also established itself as an international base for research and training in nuclear science.

Institute of Education (IE)

The Institute of Education is a central organization in the field of education, contributing to exploring through interdisciplinary cooperation the frontiers in the field of education. The Institute of Education is also home to three areas of education: pedagogical sciences, educational sciences, and educational psychology.

Research of the Center for the Early Universe (RCEU)

RESCEU also conducts experimental searches for gravitational waves and dark-matter particles, and carries out balloon observations of cosmic anti-particles. These activities are carried out in close collaboration with the Department of Physics, the Institute of Astronomy, and the Institute of Education.

Center for Ultrafast Intense Laser Science (CULS)

The Center for Ultrafast Intense Laser Science is dedicated to exploring through international research cooperation the frontiers in the interdisciplinary research field of Ultrafast Intense Laser Science. It aims to attract researchers and researcher-exchangees as members of this organization in the international research network, to train young researchers so that they can play a leading role in the international research community. In addition, it also conducts research in the field of optical, infrared and radio astronomy.

Molecular Genetics Research Laboratory (MGRL)

The Molecular Genetics Research Laboratory (MGRL) provides advanced research instruments and lab space for University of Tokyo faculty members in order to assist and promote their research. The research groups in MGRL share a common interest in the molecular basis of life and genetic disorders. Their research aims at understanding how thousands of genes and their encoded proteins serve to bring about the highly coordinated behavior of cells and tissues. The research groups approach this goal from many levels of organization, ranging from individual cells to cellular systems and the whole organism, from mammals to plants.
The following Centers and Institutes participate in graduate education in the School.

### University-wide Centers

**University Museum (UMUT)**

URL: [http://www.um.u-tokyo.ac.jp/index_en.html](http://www.um.u-tokyo.ac.jp/index_en.html)

The University Museum of the University of Tokyo (UMUT) is one of the leading university museums in Japan. The museum holds approximately three million specimens, which are used and are used for academic research, education for students, and exhibition to the public. The museum has three major divisions devoted to geology, biology, and cultural history respectively, which are further divided into seventeen different departments. In the field of natural sciences, the departments of botany, anthropology, mineralogy, and paleontology have particularly large collections of high scientific value. All exhibitions are free of charge, and special exhibitions are opened twice a year on the first floor of the museum.

**Institute for the Physics and Mathematics of the Universe (IPMU)**

URL: [http://www.ipmu.jp/](http://www.ipmu.jp/)

IPMU was launched in October 2007 under the World Premier International Research Center Initiative (WPI) program. The primary mission of the institute is to address deep mysteries of the universe by integrating the foremost knowledge of physics and mathematics. IPMU explores dark energy and dark matter of the universe by fully exploiting astronomical observations, high-energy accelerator experiments, and underground experiments, as well as various theoretical approaches in particle theory, cosmology, and mathematics.

**International Center for Elementary Particle Physics (ICEPP)**

URL: [http://www.icepp.s.u-tokyo.ac.jp/index-e.html](http://www.icepp.s.u-tokyo.ac.jp/index-e.html)

ICEPP studies the most fundamental particles and forces of nature using the world’s most advanced particle accelerators.

**Center for Spatial Information Science (CSIS)**

URL: [http://www.csis.u-tokyo.ac.jp/english/](http://www.csis.u-tokyo.ac.jp/english/)

In 2006, CSIS became a national joint-usage/research center to develop, expand, and spread spatial information science and offer greater support for researchers around the country. It promotes joint research in a variety of fields by providing spatial data and services.

### Other Related Institutes

<table>
<thead>
<tr>
<th>URL</th>
<th>MAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Earthquake Research Institute (ERI)</td>
<td><a href="http://www.eri.u-tokyo.ac.jp/eng/">http://www.eri.u-tokyo.ac.jp/eng/</a></td>
</tr>
<tr>
<td>Institute of Industrial Science (IIS)</td>
<td><a href="http://www.iis.u-tokyo.ac.jp/index_e.html">http://www.iis.u-tokyo.ac.jp/index_e.html</a></td>
</tr>
<tr>
<td>Institute of Molecular and Cellular Biosciences (IMCB)</td>
<td><a href="http://www.imb.u-tokyo.ac.jp/index.html">http://www.imb.u-tokyo.ac.jp/index.html</a></td>
</tr>
<tr>
<td>Institute for Cosmic Ray Research (ICRR)</td>
<td><a href="http://www.icrr.u-tokyo.ac.jp/index_eng.html">http://www.icrr.u-tokyo.ac.jp/index_eng.html</a></td>
</tr>
<tr>
<td>Institute for Solid State Physics (ISSP)</td>
<td><a href="http://www.issp.u-tokyo.ac.jp/index_en.html">http://www.issp.u-tokyo.ac.jp/index_en.html</a></td>
</tr>
<tr>
<td>Atmosphere and Ocean Research Institute (AORI)</td>
<td><a href="http://www.aori.u-tokyo.ac.jp/index_e.html">http://www.aori.u-tokyo.ac.jp/index_e.html</a></td>
</tr>
<tr>
<td>Research Center for Advanced Science and Technology (RCAST)</td>
<td><a href="http://www.rcast.u-tokyo.ac.jp/en/">http://www.rcast.u-tokyo.ac.jp/en/</a></td>
</tr>
<tr>
<td>The Institute of Medical Science (IMSUT)</td>
<td><a href="http://www.ims.u-tokyo.ac.jp/imsut/en/">http://www.ims.u-tokyo.ac.jp/imsut/en/</a></td>
</tr>
</tbody>
</table>

### Off-campus facilities

The facilities shown in this map are operated by the School of Science or by the institute shown in parentheses.
### Facts and data

The faculty participating in graduate education in the School of Science come from the six core departments of the School, other laboratories and centers affiliated with the School, other Schools and Institutes of the University, and the external institutions listed below. Faculty members from outside the six core departments often serve as advisors for graduate students.

**Graduate School of Science**

<table>
<thead>
<tr>
<th>Departments</th>
<th>Institutes/Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>National Institute of Advanced Industrial Science and Technology (AIST), High Energy Accelerator Research Organization (KEK), Institute of Molecular Science (IMS), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan Aerospace Exploration Agency (JAXA), National Astronomical Observatory of Japan (NAOJ), National Institute of Genetics (NIG), National Museum of Nature and Science (NMNS), RIKEN</td>
</tr>
<tr>
<td>Astronomy</td>
<td>Institute of Astronomy (IA), Research Center for Spectrochemistry (RCS), Botanical Gardens (BG), Marine Biological Station (MBS), Center for Ultrafast Intense Laser Science (CUILS), Molecular Genetics Research Laboratory (MGRL)</td>
</tr>
<tr>
<td>Earth and Planetary Science</td>
<td>Geological Research Center (GRC), Research Center for the Early Universe (RCEU), Institute of Earth and Planetary Science (IIS), Earthquake Research Institute (ERI), Institute of Geochemistry (ICG), Center for Nuclear Study (CNS)</td>
</tr>
<tr>
<td>Chemistry</td>
<td>Institute of Chemistry (IIC), Research Center for Spectrochemistry (RCS), Institute for the Physics and Mathematics of the Universe (IPMU), Center for Ultrafast Intense Laser Science (CUILS), Molecular Genetics Research Laboratory (MGRL)</td>
</tr>
<tr>
<td>Biophysics and Biochemistry</td>
<td>Institute of Molecular and Cellular Biosciences (IMCB), Institute for Solid State Physics (ISSP), Atmosphere and Ocean Research Institute (AORI), Research Center for Advanced Science and Technology (RCAST), Institute for the Physics and Mathematics of the Universe (IPMU)</td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>Biologics Research Institute (BRI), Institute for Molecular and Cellular Biosciences (IMCB), Institute for Solid State Physics (ISSP), Atmosphere and Ocean Research Institute (AORI), Research Center for Advanced Science and Technology (RCAST), Institute for the Physics and Mathematics of the Universe (IPMU)</td>
</tr>
</tbody>
</table>

**Other Todai Schools and Institutes participating in graduate education in the School of Science**

<table>
<thead>
<tr>
<th>Schools</th>
<th>The University Museum (UM), Radiotrace Center (RC), Center for Spatial Information Science (CSIS), International Center for Elementary Particle Physics (ICEPP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>University-wide Centers</td>
<td>The Institute of Medical Science (IMSUT), Earthquake Research Institute (ERI), Institute of Industrial Science (IIS), Institute of Molecular and Cellular Biosciences (IMCB), Institute for Cosmic Ray Research (ICRR), Institute for Solid State Physics (ISSP), Atmosphere and Ocean Research Institute (AORI), Research Center for Advanced Science and Technology (RCAST), Institute for the Physics and Mathematics of the Universe (IPMU)</td>
</tr>
<tr>
<td>Institutes/Organizations</td>
<td>The Institute of Medical Science (IMSUT), Earthquake Research Institute (ERI), Institute of Industrial Science (IIS), Institute of Molecular and Cellular Biosciences (IMCB), Institute for Cosmic Ray Research (ICRR), Institute for Solid State Physics (ISSP), Atmosphere and Ocean Research Institute (AORI), Research Center for Advanced Science and Technology (RCAST), Institute for the Physics and Mathematics of the Universe (IPMU)</td>
</tr>
</tbody>
</table>

**External Institutions participating in graduate education in the School of Science**

| Institutes | National Institute of Advanced Industrial Science and Technology (AIST), High Energy Accelerator Research Organization (KEK), Institute of Molecular Science (IMS), Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan Aerospace Exploration Agency (JAXA), National Astronomical Observatory of Japan (NAOJ), National Institute of Genetics (NIG), National Museum of Nature and Science (NMNS), RIKEN |
| Universities | Chiba University, Kyushu University, Tokyo University of Pharmacy and Life Science, University of Tsukuba, Chuo University |

*For more detailed information, please see our website: [http://](http://)

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### Faculty affiliation for each department (as of Jan. 1, 2011)

<table>
<thead>
<tr>
<th>Department</th>
<th>Core faculty</th>
<th>Other Department/Institutes/Center</th>
<th>Other Schools/Institutes of the University</th>
<th>External institutions</th>
<th>Sub-total (affiliated faculty)</th>
<th>Total</th>
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</thead>
<tbody>
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<td>Physics</td>
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<td>GSE (1/0)</td>
<td>ISEF (2/2)</td>
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<td>RCEU (1/0)</td>
<td>GSAS (4/0)</td>
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<td>GSAS (1/1)</td>
<td>NMNS (9/8)</td>
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<td>Earth and Planetary Science</td>
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<td>GSAM (5/2)</td>
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**Number of graduate students (as of May 1, 2010)**

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>No. of Projects</th>
<th>Amount*</th>
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<tbody>
<tr>
<td>Private companies</td>
<td>40</td>
<td>146,468 ($1,059,753)</td>
</tr>
<tr>
<td>Government organizations</td>
<td>46</td>
<td>578,610 ($7,105,744)</td>
</tr>
<tr>
<td>Inter-university research institutes</td>
<td>2</td>
<td>7,000 ($86,419)</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>1,138,013 ($14,173,617)</td>
</tr>
</tbody>
</table>

**Budget for fiscal year 2009**

<table>
<thead>
<tr>
<th>Sponsor</th>
<th>Amount*</th>
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<tbody>
<tr>
<td>Private companies</td>
<td>146,468 ($1,059,753)</td>
</tr>
<tr>
<td>Government organizations</td>
<td>578,610 ($7,105,744)</td>
</tr>
<tr>
<td>Inter-university research institutes</td>
<td>7,000 ($86,419)</td>
</tr>
<tr>
<td>Total</td>
<td>1,138,013 ($14,173,617)</td>
</tr>
</tbody>
</table>

*For more detailed information, please see our website: [http://](http://)
Your graduate student experience

If you enter the School of Science as a graduate student, your experience will differ depending not only on the research style of your department but also on the research style of the particular group you join. For example, some groups are involved in large-scale international collaborations, while others conduct research on a smaller scale in their own laboratory. Nevertheless, many facets of graduate student life will be common to all students.

The purpose of graduate education

The purpose of graduate education in science at any leading research university anywhere in the world, including the University of Tokyo, is to train graduate students to become leading-edge researchers at an international level. Students who enter the master's degree course complete a two-year program of coursework and research for their master's degree thesis. Some students will choose to leave academia at this point, and pursue careers in business, government, education, and so on. The skills learned as a Todai student will prove valuable in these professions.

Master's and Doctoral Programs

Most master's degree students, particularly those from overseas, will opt to continue for a doctoral degree. A student's master's degree thesis, and the student's oral presentation of the results, serve as the basis for judging whether the student is admissible to candidacy as a Ph.D. student. Some students also may apply directly for admission as a Ph.D. student, in which case they must take a series of examinations (which may include GRE general and subject tests, TOEFL, and an oral examination based on their master's degree). Details may be found in this booklet and on the website of each department. Successful candidates usually spend at least three years (up to five years is allowed) after receiving their M.S. degree to complete their Ph.D. research.

Research and Education

You will expect, and be expected, to work as a team member with your advisor and the other members of your research group. This will include participation in seminars and joint research projects. As you gain experience and knowledge, you will be expected to gradually but steadily develop your talents as an independent researcher.

Your Doctoral Degree

The award of the Ph.D. degree is based on original research described in the Ph.D. thesis, which the student must also present orally and defend at an oral examination. We expect our students to publish their research in leading international journals (usually in collaboration with their advisor and/or other members of their research group) in accordance with their department's detailed regulations. Ph.D. recipients may follow a variety of career paths. The most common position after the Ph.D. is as a post-doctoral researcher, following which students may go into academia, industry, or government research positions, or may, in some cases, apply their skills in business. In all of these cases the ability developed by our Ph.D. students to carry out projects and to clearly and logically present the results orally and in writing is a valuable asset for a successful career.

Japanese Language Ability

International students in the School of Science can in most cases function in English in their academic work, but enjoyment of everyday life in Japan will probably increase in proportion to your Japanese language ability. Developing your Japanese language ability can also enhance career prospects for academic or industrial positions in Japan after you receive your Ph.D.
Application Procedures

The Graduate School of Science offers advanced graduate study in a wide range of scientific fields to international students. The School has already established a system to provide international students with full support in English. In this regard, the School has introduced a special admissions procedure for international students. This application procedure enables students to apply for admission to the School from outside of Japan, making the application process more flexible than the ordinary procedure. The selection of graduate students is based on the applicants’ academic records, letters of recommendations, statement of purpose, and GRE (Graduate Record Examination) Subject or General Test score is required.

A. Master’s/Doctoral degree candidates

1. Documents required for application
   a) Completed School Application Form
   b) Graduate Record Examination (GRE) General Test scores
   c) Graduate Record Examination (GRE) Subject Test scores
   d) Test of English as a Foreign Language (TOEFL) score
   e) Two recommendation letters
   f) Transcripts (academic records of undergraduate and graduate education)
   g) Statement of Purpose
   h) In the case of application to the Doctoral program: copy of master’s thesis, and copies of any papers or scientific publications
   i) Any other documents (or conditions) required by the department. (Access the websites below for more information on application to specific departments.)

Astronomy: http://www.astron.s.u-tokyo.ac.jp/index.html.en
Earth & Planetary Science: http://www.eps.s.u-tokyo.ac.jp/
Chemistry: http://www.chem.s.u-tokyo.ac.jp/english/admissions.html
Biophysics & Biochemistry: http://www.biochem.s.u-tokyo.ac.jp/index.html
Biological Sciences: http://www.bio.s.u-tokyo.ac.jp/english/information.html

*For only those applying to the Department of Physics, write an essay on studies or research that you are currently engaged in, or on college education in a foreign country.

2. Applicant qualifications
   a) You must have completed 16 years of education abroad and have, or will have, graduated from an undergraduate program before entering the Master’s program at the University of Tokyo, OR
   b) If you are applying as an Embassy Recommended Mombusho Scholarship Student, you must be considered as belonging to one of the two categories (a-b) above and also must have passed the preliminary selection by a Japanese Embassy/Consulate General.

   ©) Doctoral program
   a) You must have one of the following: Master’s Degree, a Professional Degree, or a degree equivalent to either degree mentioned above, OR
   b) If you are applying as an Embassy Recommended Mombusho Scholarship Student, you must be considered as belonging to one of the two categories (a-b) above and also must have passed the preliminary selection by a Japanese Embassy/Consulate General.

3. Other information for prospective students
   a) Examination fee and payment
      The examination fee is 10,000 yen. (Japanese government-funded students are exempted from paying the application fee.)
      *The fee is non-refundable and must be paid before the relevant application deadline.
   b) School expenses
      1. Entrance fee: 282,000 yen
      2. Tuition fee:
         - Master’s program: 267,900 yen per semester (535,800 yen/year)
         - Doctoral program: 260,400 yen per semester (520,800 yen/year)
   c) Japanese Students can apply if they have completed both their high school and college education in a foreign country.
   d) Students are required to pay tuition for a six-month period in May and November each year, via the Tuition Bank Transfer Program (a direct debit from your bank account).

B. International research students (Kenkyu-sei)

Graduate International Research Students (“Kenkyu-sei”) are admitted to the Graduate School of Science to study a specific subject under the supervision of a professor. Note that a “Kenkyu-sei” is not entitled to receive any degree or qualification on completion of the program. Applications for this status are not encouraged, except for students who receive Japanese government scholarships.

*For more information about the program, please visit our website: http://www.s.u-tokyo.ac.jp/kenkyu-sei

C. Special auditor

A graduate student enrolled in a university that has an exchange program with the University of Tokyo in accordance with the Agreement on Academic Exchange for Cooperation with the University of Tokyo is eligible to audit classes at the Graduate School of Science of the University of Tokyo.

*Applications should be mailed to: Graduate School Office, Graduate School of Science, the University of Tokyo 7-3-1, Hongo Bunkyo-ku Tokyo 113-0033 JAPAN
Tel: +81-3-5841-4009
Email: daigakuin@adm.s.u-tokyo.ac.jp
The University of Tokyo provides international students with access to many financial aid options that span various forms and purposes, including school expense exemptions, scholarships, emergency loans, and student discounts. Further details are available at the following website:
International Student Support Group: http://www.u-tokyo.ac.jp/res03/122_e.html
Japan Student Services Organization (JASSO) http://www.jasso.go.jp/study_j/scholarships_sfinj_e.html

**A. Scholarships funded by the University of Tokyo**

1. **Graduate School of Science Scholarship for International Students**
   This program aims to support their academic research at the Graduate School of Science of the University of Tokyo privately financed international students with excellent academic achievement by granting scholarships to promote the acceptance of international students from various countries.
   - Amount of the Scholarship: 150,000 yen per month
   - Applying for the Scholarship: An applicant shall submit his/her application to the Dean at the time of application to the graduate school.
   - Payment Period: Limited to the standard duration of study as prescribed in Article 2 of Regulations of the University of Tokyo Graduate Schools.

   *University of Tokyo Research Internship Program (UTRIP) participants will be given priority for the scholarship when and if the participant applies to the Graduate School of Science for the following year.

   *For more information about the scholarship, please see the website: http://www.s.u-tokyo.ac.jp/ilo/en/scholarship.html

2. **The University of Tokyo Special Scholarship for International Students**
   The University of Tokyo Special Scholarship for International Students, or University of Tokyo Fellowship, is a research grant offered to privately financed international students who have demonstrated academic excellence.
   - Monthly research grant: 150,000 yen
   - For details, see the website below: http://www.u-tokyo.ac.jp/stu02/i04_03_e.html

3. **Scholarship for International Students, the University of Tokyo Foundation**
   This program is a fund designed to financially assist international students through donations made by University of Tokyo employees and alumni.
   - Scholarship amount: 50,000 yen/month
   - Eligibility: privately financed international students

   * For more information about the scholarship, please see the website below: http://www.u-tokyo.ac.jp/res03/122_e.html

**B. Japanese Government Scholarships**

The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) administers a scholarship program for international students.
- Monthly amounts vary: 155,000 ~ 156,000 yen (Ph.D. program), 154,000 ~ 155,000 yen (master's program)

   *For more information about the MEXT scholarship program, please visit the website below:
   Scholarship for International Students in Japan http://www.jasso.go.jp/study_j/scholarships_sfinj_e.html

**C. JASSO Scholarships**

Japan Student Services Organization (JASSO) offers honors scholarships for privately financed international students who attend a university or graduate school in Japan, are of good character, have a good academic record, and require financial assistance to continue their studies as an international student. Applications will be accepted every April.
- Scholarship amount: 65,000 yen per month (graduate/research student)
- Eligibility: Students enrolled at the University of Tokyo (including research students).
  - GPA at least 2.3/3.0

   *For more information about the JASSO scholarship program, please visit the following website:
   • Scholarship for International Students in Japan (JASSO)
     http://www.jasso.go.jp/study_j/scholarships_sfinj_e.html
   • Application procedure
     http://www.u-tokyo.ac.jp/res03/i22_e.html

**D. School Fee Exemptions**

Students who face difficulty in paying the admission fee/tuition can apply for an exemption, which is granted to those who pass a screening process. Applications are accepted twice a year.

   *For details, see the website: http://www.u-tokyo.ac.jp/stu02/04_01_02_e.html

**E. The University of Tokyo Foundation for supporting international students**

This assistance is provided mainly in the form of condolence money and emergency loans.
- Condolence Money: up to 100,000 yen
- Emergency Loans: up to 200,000 yen

   * For more information about the program, please see the following website:
Support and facilities for students

**Graduate School Office**
There are about 1,300 students, including international students, currently pursuing graduate degrees at the Graduate School of Science. To assist them, in cooperation with the six graduate department offices, we handle graduate admissions, course registration, procedures for school registration and overseas traveling while in graduate school, obtaining of certificates, renewal/reissue of student ID cards, and doctoral dissertation-related procedures. For more information about the Office’s services, please visit the following website: https://www.s.u-tokyo.ac.jp/jimu/

**Libraries**
The Graduate School of Science has six departmental libraries on the Hongo Campus. In addition, the University of Tokyo Library system encompasses the General Libraries at the Hongo, Komaba, and Kashiwa campuses. The entire collection includes more than 8.8 million books, subscriptions to nearly 30,000 journals and periodicals, and various digital resources. For detailed information about the libraries, please visit the following website: http://www.lib.u-tokyo.ac.jp/index-e.html

**Tutoring**
For new students: A tutor will be appointed for each newly arrived international student to help him/her get used to the first year on campus. Tutors will help international students with registration matters at the very beginning of their academic stay to ensure they start their life in Japan smoothly. Arrangements for a tutor will be made by the student’s supervisor.

Study & research support: Besides the campus life support, there is another special tutoring system at the School of Science to support international students in their study and research. Arrangements will be made at the request of the supervisor.

**International Liaison Office**
The International Liaison Office of the School of Science supports about 80 international students enrolled in the School. The Office deals with matters such as arrival orientation, arrangements of scholarships, housing, and visas. The Office also provides advice for students’ daily lives and organizes various intercultural events to enhance mutual understanding. For details about the Office, please visit the website below: http://www.s.u-tokyo.ac.jp/ilo/en/

Other sources of information for international students

The University of Tokyo provides a diverse array of support to international students to help them enjoy a pleasant, rewarding experience while at Todai.

***Further details are available in the International Students Guidebook 2010.***

**Computing Facilities**
The University of Tokyo has established the Educational Campus-wide Computing System (ECCS), which is operated by the Information Technology Center, to support the university’s academic activities through information media. All of the students of the university can use the computer system; to obtain a computer account, see the online manual: http://www.ecc.u-tokyo.ac.jp/ENGLISH/tebiki-2010e.pdf

**International Student Advising Room**
The International Student Advising Room provides a variety of consultation services to support currently enrolled students. Advisors, who are experts in dealing with problems international students and foreigners often face, are able to provide advice about most issues, including psychological problems.

Languages supported: Japanese, English, Chinese, and Korean
http://www.ic.u-tokyo.ac.jp/adv/a00_e.html

**International Student Associations**
International students at the University of Tokyo have formed various associations for promoting fellowship among students from the same country or region. For detailed information about each association, please visit the website below:
http://www.ic.u-tokyo.ac.jp/ic/party/index_e.html

**Japanese Language Course**
The Center for Japanese Language Education at the University of Tokyo provides various Japanese language courses for international students. The Japanese language courses consist of the "General Course," "Intensive Course," "Academic Japanese Course," and "Short-term course." The courses are available at the Center, which is located on the Hongo campus. For detailed information about the program, please visit the website below:
http://www.nkc.u-tokyo.ac.jp/index_e.html

**Health Service Center**
http://www.hs.u-tokyo.ac.jp/index-e.html

**Office of Gender Equality**
http://kyodo-sankaku.u-tokyo.ac.jp/en/

**Disability Services Office**
http://ds.adm.u-tokyo.ac.jp/en/contact/index.html

**Todai Hongo Keyaki Nursery**
Notes:
(1) The Hongo Campus can be reached on foot (15 min.) or by taxi (about 1,000 yen) from Ueno station.
(2) The Hongo Campus can also be reached from the following stations:
Tokyo Metro: Nezu or Yushima (Chiyoda Line) 8 min walk, Todai-mae (Nanboku Line) 5 min walk
Toei Subway: Kasuga (Mita Line) 10 min walk, Hongo Sanchome (Oedo Line) 7 min walk
Tokyo Monorail:
Hamamatsu-cho 20 min/150 yen
Akihabara 20 min/450 yen
Kashiwa-cho 20 min/450 yen
Todai-mae 20 min/450 yen

Rail Access from Narita Airport

To Hongo Campus
Keisei Express "Skyliner" 44 min/2400 yen
Narita Airport Terminal 1 or 2
Keisei Ueno
15 min walk
Keisei Ueno
1 min walk
Keisei Ueno
5 min/200 yen
To Hongo Campus

To Komaba Campus
Keisei Express "Skyliner" 41 min/2400 yen
Narita Airport Terminal 1 or 2
Keisei Ueno
Keisei Ueno
Keisei Ueno
Narita
Kita-senju

To Kashiwa Campus
Narita Airport Terminal 1 or 2
Kita-senju

Rail Access from Haneda Airport

To Hongo Campus
Keisei Express "Skyliner" 41 min/2400 yen
Keisei Ueno
15 min walk
Keisei Ueno
1 min walk
Keisei Ueno
5 min/200 yen
To Hongo Campus

To Komaba Campus
Keisei Express "Skyliner" 39 min/190 yen
Keisei Ueno
Keisei Ueno
Keisei Ueno
Narita

To Kashiwa Campus
Kashiwa

Tsukuba Express
19 min/550 yen
Kashiwanoha-campus

Notes:
(1) The Hongo Campus can be reached on foot (15 min.) or by taxi (about 1,000 yen) from Ueno station.
(2) The Hongo Campus can also be reached from the following stations:
Tokyo Metro: Nezu or Yushima (Chiyoda Line) 8 min walk, Todai-mae (Nanboku Line) 5 min walk
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