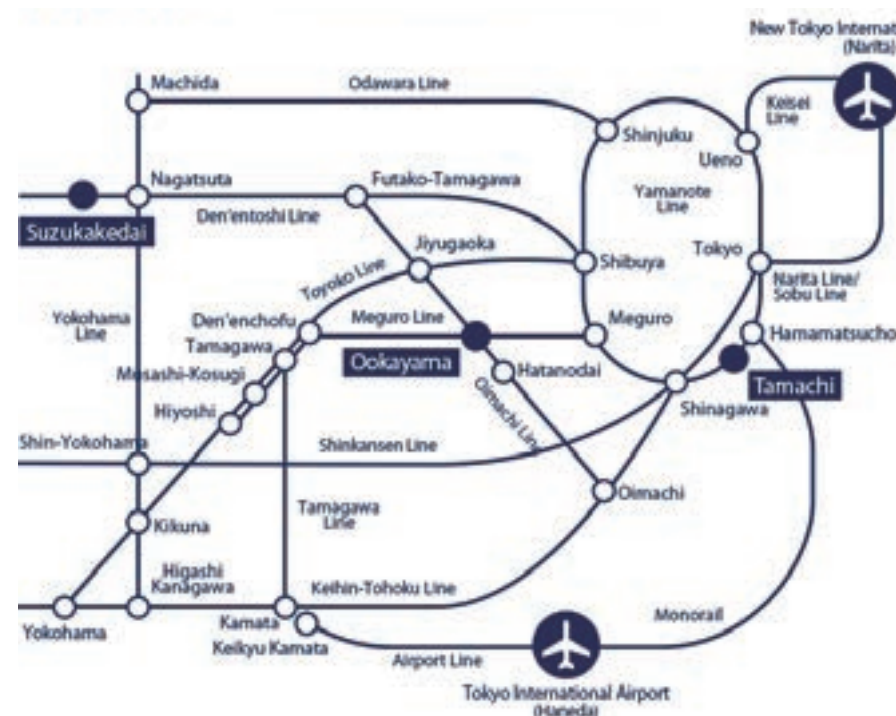




Access



□ Ookayama Campus

The Main Gate is a 1-minute walk from Ookayama Station on the Tokyu Oimachi and Tokyu Meguro Lines.

□ Suzukakedai Campus

The Suzukakedai Campus is a 5-minute walk from Suzukakedai Station on the Tokyu Den'entoshi Line.

Latest information

Official site

<http://www.titech.ac.jp/about/organization/schools/organization05.html>



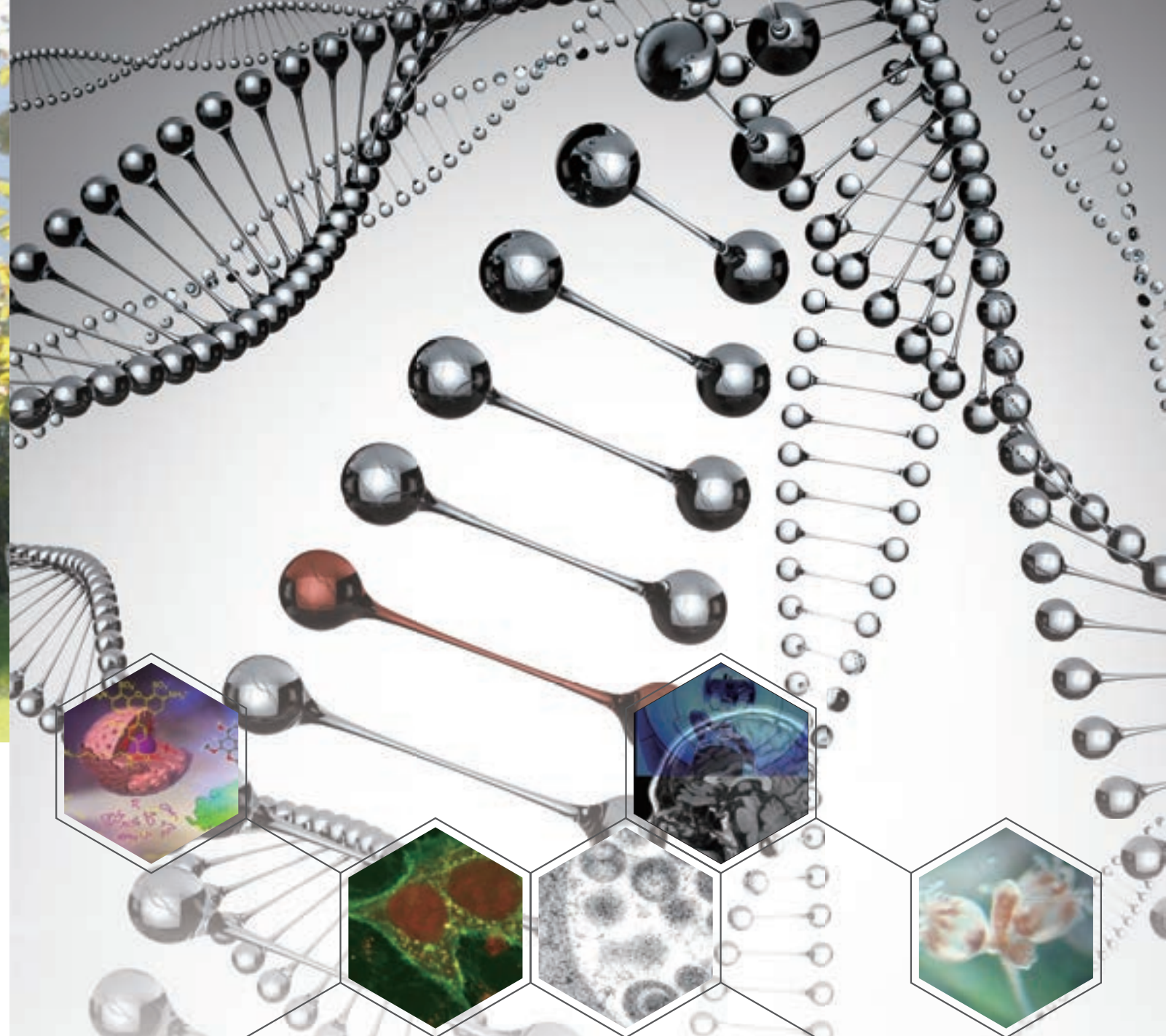
Informations for enrollment

<http://admissions.titech.ac.jp/admission/>



Inquiries

4259 Nagatsuta-cho, Midori-ku, Yokohama, Kanagawa, 226-8503 JAPAN
Office, School of Life Science and Technology, Tokyo Tech.
TEL 045-924-5940 (9:00 - 17:15) E-mail suz.sei@jim.titech.ac.jp



Invitation to Life Science and Technology



Tokyo Institute of Technology
School of Life Science and Technology

<http://educ.titech.ac.jp/bio>

<http://www.titech.ac.jp/about/organization/schools/organization05.html>

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Greeting from Dean

Professor Hisakazu MIHARA, Dean



Invitation to the School of Life Science and Technology

The School of Life Science and Technology was founded in April 2016 by integrating the undergraduate and graduate schools dedicated to the study of bioscience and biotechnology. Our School encompasses approximately 70 research fields with 120 faculty members involved. Through our education, which covers a wide spectrum of specialized knowledge related to this discipline, we aim to develop scientists and engineers who are capable of driving forward world-class research and development and making innovative contributions to science and technology. At the undergraduate level, students are taught broad foundational knowledge in specialized subjects, namely biology, chemistry, and physics. Students also prepare themselves for cutting-edge research through the independent research project. At the graduate level, two majors are offered. The Life Science and Technology Graduate Major focuses on study and research in advanced areas of the discipline. The Human Centered Science and Biomedical Engineering Graduate Major is an interdisciplinary major that integrates life sciences with chemical science and engineering, materials science and engineering, mechanical engineering, electrical and electronic engineering, and information and communications engineering. We are also aware that in this globalized age, having intercultural skills is key to forging a successful career, and we encourage our students to study abroad in order to acquire these skills.

Tokyo Tech was the first university in Japan to create schools dedicated to the area of life sciences and technology. During their two decades of operation, the former undergraduate and graduate schools set precedents in terms of both education and research. Graduates have gone on to establish successful careers in various sectors and professions, with many working as distinguished researchers or assuming leadership positions.

The former graduate school had been involved in the running of the Education Academy of Computational Life Sciences' academic program, which the new School has inherited. The program, which started in 2011, is jointly run with the School of Computing and is funded by MEXT's Program for Leading Graduate Schools. It aims to develop individuals who can leverage proficiency in computer science together with their expertise in life sciences. Also, the new School will continue to be active in admitting outstanding students from overseas through the International Graduate Programs. Furthermore, in alignment with Institute-wide efforts to globalize as a participating member of MEXT's Top Global University Project, the School intends to raise its international standing and develop individuals who are capable of finding success in the world.

Finally, considerable research focusing on the next generation of life sciences and technology has been and will continue to be conducted with outstanding results. The School is committed to continue leading the way in education and research in life sciences and technology.

Vice
Deans

Planning Prof. Satoshi NAKAMURA

Education Prof. Takehiko ITOH

Research Prof. Hiroyuki OHTA

International
Affairs Prof. Susumu KAJIWARA

Councilor

Prof. Hiroyuki OHTA

Fostering global leaders

The School of Life Science and Technology offers a fulfilling curriculum that encourages students become leaders in a variety of fields. The curriculum enables students to systematically acquire the foundational knowledge and expertise of life science and technology. Furthermore, students get an advanced education in the cutting-edge research environment. Emphasis is also placed on our variety of international programs and internships.

History of the School

1929	Foundation of Tokyo Institute of Technology.
June 1990	Foundation of School of Bioscience and Biotechnology.
April 1992	Foundation of Graduate School of Bioscience and Biotechnology.
Autumn 1993	Establishment of Gene Research Center.
March 1997	Establishment of Research Center for Experimental Biology.
1999	Reorganization of the Graduate School Three new departments were opened within the graduate school: Department of Life Science, Department of Biological Information, and Department of Biomolecular Engineering. The undergraduate school was restructured into two departments: Department of Bioscience and Department of Biotechnology.
2000	The graduate schools, Department of Bioscience and Department of Biotechnology, were reorganized and renamed to the Department of Biological Sciences and the Department of Bioengineering, respectively.
2001	Construction of the Radioisotope Research Center.
2003	Three Research Centers were merged to the Center for Biological Resources and Informatics.
2016	Reorganization of the undergraduate and graduate schools to School of Life Science and Technology.

Advanced small-group education



Diverse international exchange programs



Undergraduate Study

The largest education and research organization for life sciences and technology in Japan

The School of Life Science and Technology is one of the largest undergraduate programs of life science in Japan. Students can study the life science from polyphenic perspectives including science, engineering, pharmacological, medical, and agricultural fields.

Creative experience from first year

In their first year, students challenge an active-learning program, in which they create educational materials related to life science. Students' critical thinking and problem-solving skills are developed through collaborative work.

Study abroad and internships

A set of well-established international exchange programs and short-term study programs are available, and undergraduate students are encouraged to use these programs to study overseas. Internships at companies are also encouraged. Credits are given for these activities.

Early enrollment in graduate-level classes

In view of the fact that most students continue to study at the graduate level, the School allows students to take graduate-level classes while they are in undergraduate. Eligible talented students can also graduate earlier.

Graduate Study

Cutting-edge researches extending to chemistry, physics, materials, and computer science

A wide range of cutting-edge research led by approximately 70 professors and associate professors. The research fields are not only limited to biology, but also extended to other fields related to chemistry, physics, materials, and computer science.

Researches in an international environment

We welcome many outstanding researchers from abroad to visit and participate in researches and seminars. Many of our labs have a number of international students. There is a general international atmosphere across the campus. Students are encouraged to attend conferences and internships abroad using the institution's study abroad programs. Credits are also given for these activities.

Broad and diverse studies lead to employments in a variety of fields

Studies at School of Life Science and Technology are related not only to scientific fields such as biology, chemistry, and physics, but also to engineering fields such as applied chemistry, materials, mechanical engineering, and computer science. Our alumni work in a variety of companies in different fields.

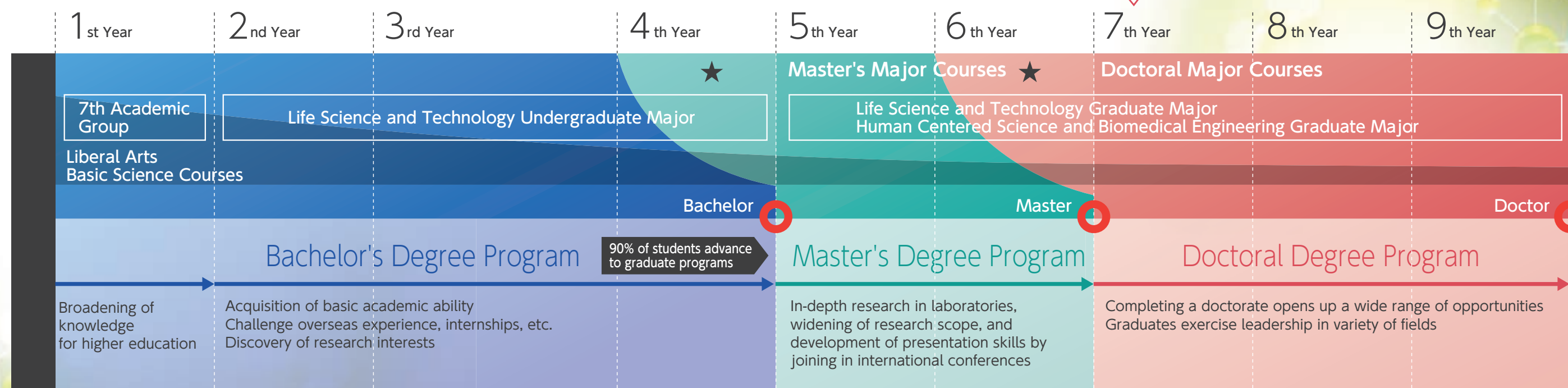
Pursuing new forms of learning

Our new curriculum allows smooth transition between degree programs. At the undergraduate level, students acquire basic knowledge in life science and technology by the 3rd year and get ready to conduct the Independent Research Project (graduation research) in the final year.

■ Quarter system

Our curriculum adopts the quarter system, in which a year is divided into quarters. The system allows a flexible course planning, thus making it easier for students to study abroad or internships.

Financial aid is available for PhD students.
Scholarships are also available for some doctoral programs.



★ Progress is measured by the achievement level. Those who attain the level may take higher-degree courses.

Bachelor's Degree Program

1st Year	2nd Year	3rd ~ 4th Year
Fundamental Life Science Basic Chemical Thermodynamics Basic Quantum Chemistry Basic Organic Chemistry Basic Inorganic Chemistry Linear Algebra /Recitation Calculus /Recitation Fundamentals of Mechanics Fundamental Life Science Laboratory Introduction to Bio-Frontier Research Processes for Creation in Science and Technology Bio-Creative Design International Bio-Creative Design	Physical Chemistry Organic Chemistry Biochemistry Molecular Biology Biological Inorganic Chemistry Bioinformatics Biostatistics Instrumental Analysis in Bioscience Basic Laboratory Exercise Advanced Bio-Creative Design	Biophysical Chemistry Structural Biology Genome Informatics Bioorganic Chemistry Biopolymer Engineering Biomedical Materials Pharmaceutical Chemistry Plant Physiology Photosynthesis and photobiology Animal Physiology Evolution and Developmental Biology Molecular Genetics Microbiology Cell Engineering Environmental Bioengineering Genetic Engineering Basic Neuroscience Biochemical Engineering Enzyme Engineering Bioethics and Law Graduation Thesis Internship Overseas Training

List of lectures (partial list)

Master's Degree Program

Learn by engaging in cutting-edge research

By joining a laboratory and conducting cutting-edge research, students gain a deeper understanding of their field and develop scientific skills.

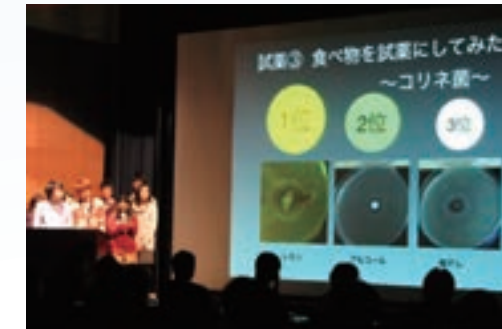


Doctoral Degree Program

Making an impact on the future of the life sciences

Advanced doctoral research provides opportunities for students to take active parts in the life sciences fields in and outside Japan.



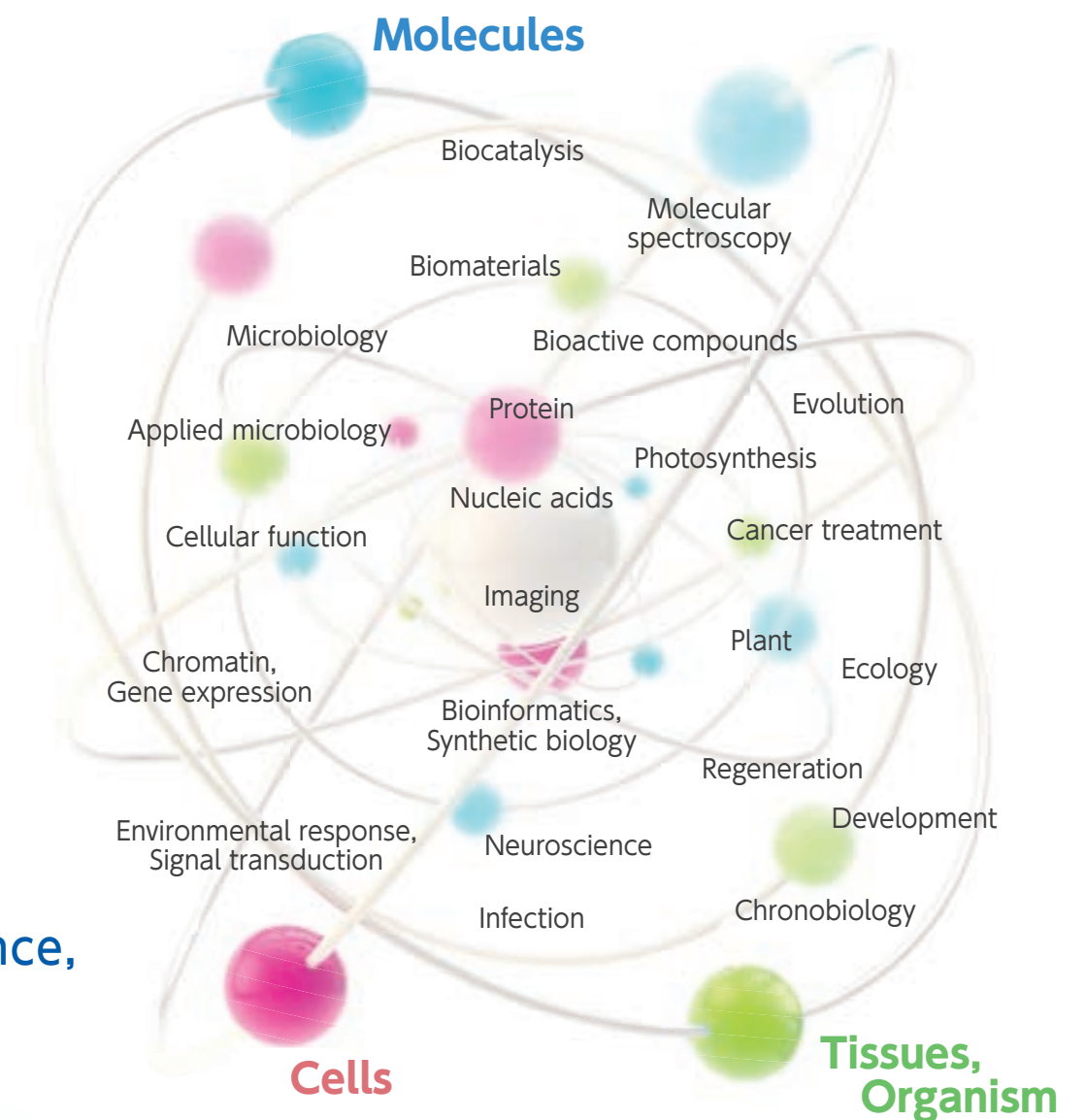


Interdisciplinary Researches

The School is composed of two majors, the Life Science and Technology and the Human Centered Science and Biomedical Engineering.

The School is actively engaged in a wide spectrum of research that covers the life from the micro to the macro and from the basics to the applications.

Interdisciplinary interactions encompassing science, engineering, pharmacology, agriculture, medical science, computer science, and systems engineering.





Professor
Hirokazu Urabe Assistant Professor
Masayuki Shigeta

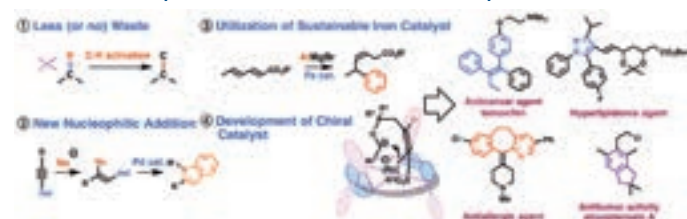
Organic chemistry – The area leading biosciences

Our projects are the development of new, economical, or environmentally benign organic reactions and their applications to the synthesis of bioactive compounds and pharmaceuticals.

Keywords organic chemistry, synthetic chemistry, pharmaceutical chemistry, natural products chemistry

Bioactive compounds

Chemical synthesis of biomolecules and pharmaceuticals



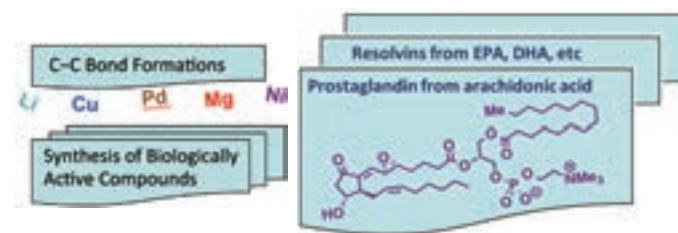
Professor
Yuichi Kobayashi

Organic synthesis toward biologically active compounds

We study efficient synthesis of biologically active compounds. We are also focusing on developing new C-C bond forming reactions.

Keywords organic synthesis, drug design, metal-assisted reactions

Bioactive compounds



Professor
Hiroyuki Nakamura Assistant Professor
Shinichi Sato

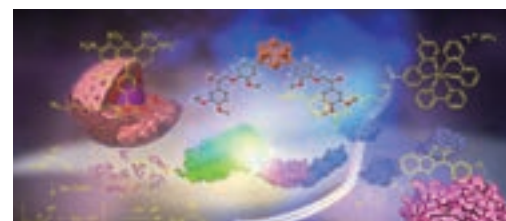
Elucidation of biological functions and drug development by organic synthesis

We are developing new drugs for cancer therapy and new methodology for chemical biology based on synthetic organic chemistry.

Keywords organic chemistry, medicinal chemistry, chemical biology, boron neutron capture therapy

Bioactive compounds

Control of target protein functions by small molecules



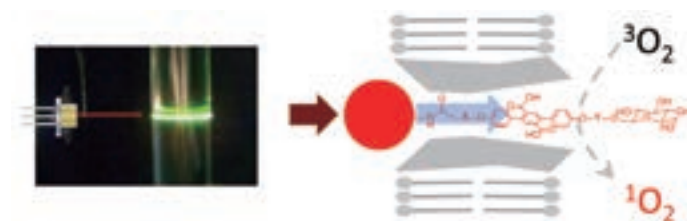
Professor
Hideya Yuasa Assistant Professor
Takashi Kanamori

Photosensitizers and photodynamic therapy of cancer

We are studying photodynamic therapy of cancer using up-conversion nanoparticles and photosensitizers we developed on our own.

Keywords photodynamic therapy, photosensitizer, lanthanide nanoparticle

Bioactive compounds



Associate Professor
Akihiro Ohkubo

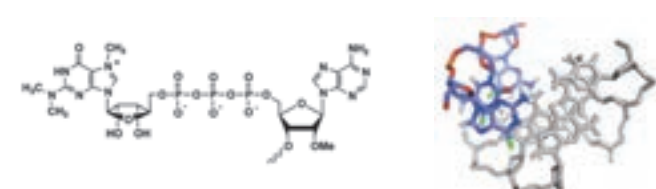
Development of new nucleic acid drugs for gene therapy

We develop new bioactive molecules including nucleic acids drugs for accurate regulation of biochemical reactions (transcription, splicing, translation) based on organic chemistry.

Keywords bioorganic chemistry, nucleic acid chemistry, nucleic acid drugs

Bioactive compounds

Nucleic acid drugs for accurate regulation of biochemical reactions



Associate Professor
Shun-ichiro Ogura

Development of new biochemistry for medical applications

We develop the new biochemistry based on the analysis of metabolite from human and aim for the medical applications including cancer.

Keywords cancer diagnosis, cancer therapy, biomarker, cell physiological engineering

Bioactive compounds

Visualized cancer cells



Biomarker analytical system



Associate Professor
Takeshi Hata

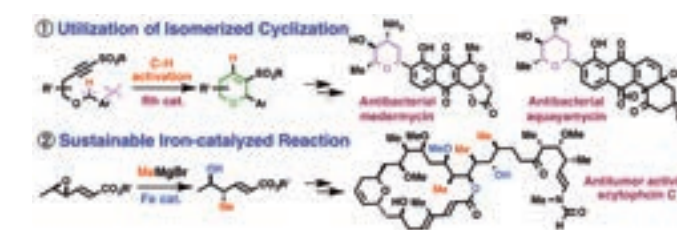
Synthesis of bioactive compounds by sustainable molecular transformation

We are developing new sustainable synthetic methods for manipulation of organic molecules and also making natural products and pharmaceuticals by those methods.

Keywords organic chemistry, synthetic chemistry, pharmaceutical chemistry, natural products chemistry

Bioactive compounds

Sustainable synthesis of bioactive compounds



Associate Professor
Shinichiro Fuse

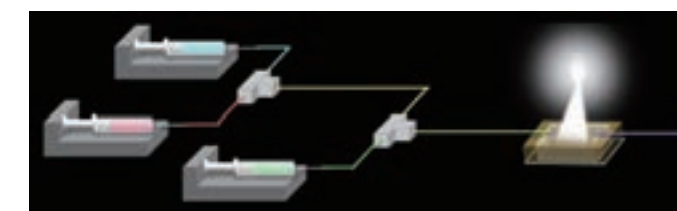
Natural product synthesis & micro- flow synthesis for drug discovery

We develop efficient synthetic methodology of bioactive natural products using micro-flow technology toward drug discovery.

Keywords natural product synthesis, micro-flow synthesis, medicinal chemistry

Bioactive compounds

Efficient micro-flow synthesis of natural products



Professor
Takafumi Ueno Assistant Professor
Satoshi Abe

Development of artificial metalloproteins and biosupramolecular materials

Our interests are chemistry of protein assembly based on synthetic chemistry and structural biology to elucidate chemical reactions in living cells and develop biomaterials.

Keywords protein engineering, bioinorganic chemistry, chemical biology

Biomaterials

Functionalized protein crystal and artificial needle protein



Professor
Kazushi Kinbara Assistant Professor
Takahiro Muraoka

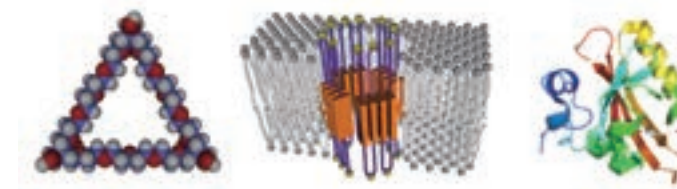
Developing functional molecules inspired by biological systems

Inspired by the sophisticated biological systems, we are developing synthetic functional molecules which mimic or control biomacromolecules.

Keywords organic chemistry, molecular devices, self assembly, biomimetics

Biomaterials

Structured PEG Ion channel Photoactive protein



Life Science and Technology

Professor **Eiry Kobatake** Assistant Professor **Yasumasa Mashimo**

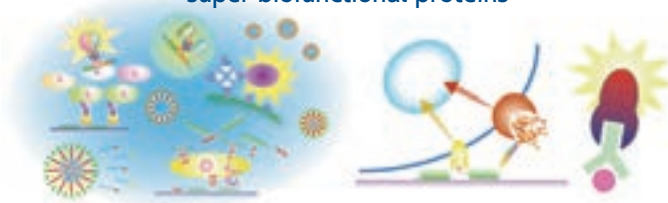
Construction of super biofunctional protein materials

We have created various super biofunctional protein materials for controlling cellular functions and biosensing.

Keywords: protein engineering, cellular and tissue engineering, biomaterial, biosensing

Biomaterials

Construction and application of super biofunctional proteins



Human Centered Science and Biomedical Engineering

Professor **Nobuhiro Nishiyama** Assistant Professor **Hiroyasu Takemoto** **Takahiro Nomoto**

Development of smart nanomedicine based on polymer nanotechnology


We are developing synthetic polymer-based nanomedicines towards realization of future medicine such as treatment of intractable diseases including cancers and diagnostic imaging.

Keywords: nanomedicine, DDS, polymer chemistry

Biomaterials

MR imaging of small metastatic tumors in liver

From polymer synthesis to *in vitro* & *in vivo* evaluations



Life Science and Technology

Professor **Atsushi Maruyama** Assistant Professor **Naohiko Shimada**

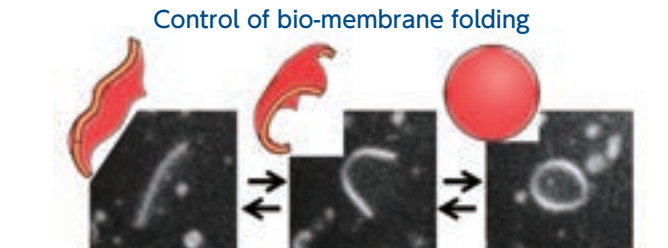
Design of bio-functional and bio-conjugate materials

Our research interests involve design of biofunctional materials capable of enhancing function of biopolymers and cells for nanomedicines, tissue engineering and diagnosis.

Keywords: drug delivery/ nucleic acids, proteins, lipids/ stimuli responsive polymers

Biomaterials

Control of bio-membrane folding



Life Science and Technology

Professor **Hisakazu Mihara** Assistant Professor **Hiroshi Tsutsumi**

Peptide engineering and chemical biology


We design and construct supramolecular systems composed of peptides, glycosides and proteins using peptide engineering techniques for chemical biology research.

Keywords: peptide, synthesis, phage-display library, cell analysis

Biomaterials

Design of functional peptides

Drug delivery by peptide-gold nanoparticle hybrids



Life Science and Technology

Associate Professor **Masayasu Mie**

Development of biomolecular tools

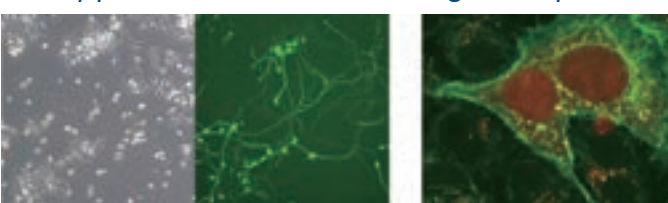
We are trying to develop molecular tools consist of biomolecules such as proteins and DNA for bioimaging, biosensing and regulation of cellular functions.

Keywords: biomaterials, protein engineering, cellular engineering

Biomaterials

Induction of neural differentiation by protein transduction

Bioimaging with engineered protein tag



Human Centered Science and Biomedical Engineering

Associate Professor **Toshiaki Mori**

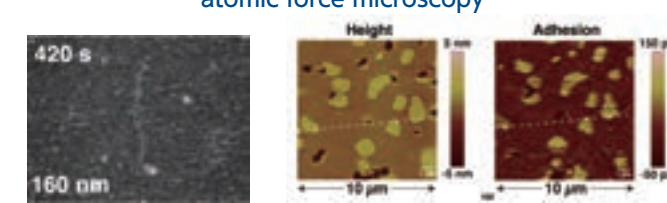
Interaction analyses of glycoconjugate on cell surface and its application for medical engineering

We investigate the interaction analyses of glycoconjugates on cell surface at single molecule level and aim at the preparation of biomedical materials.

Keywords: glycoconjugates, lectin, glycosyltransferase, single molecular analysis

Biomaterials

Single molecular observation of glycoconjugates by atomic force microscopy



Human Centered Science and Biomedical Engineering

Professor **Hiroshi Ueda** Assistant Professor **Jinhua Dong**

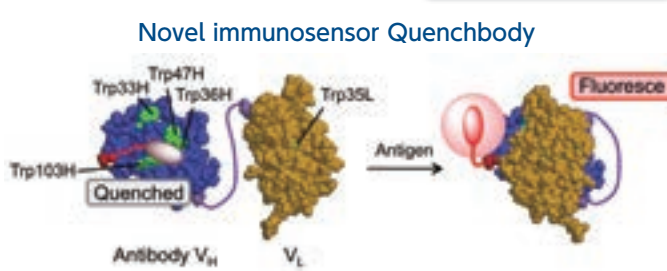
Creation of novel biosystems by antibody/enzyme engineering

We are trying to create superior detection/diagnosis/therapy systems by transforming natural functional proteins to better ones for human beings.

Keywords: antibody engineering, enzyme engineering, biosensor

Protein

Novel immunosensor Quenchbody



Life Science and Technology

Professor **Minoru Sakurai** Assistant Professor **Tadaomi Furuta**

Biophysical elucidation of biomolecular functions

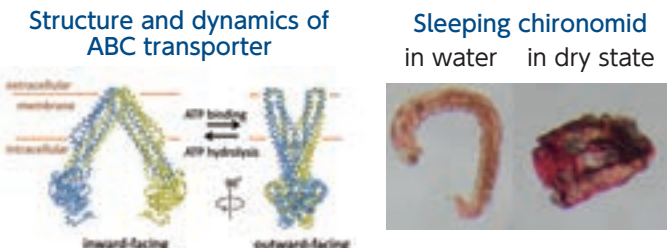
Theoretical and experimental elucidation of the structure-function relationships of biomolecules from the first principles of physical chemistry.

Keywords: protein, sugar, computer simulation, biopreservation

Protein

Structure and dynamics of ABC transporter

Sleeping chironomid in water in dry state



Life Science and Technology

Professor **Hideki Taguchi** Assistant Professor **Tatsuya Niwa**

Elucidation of molecular mechanisms of chaperone and prion/amyloid


We are studying molecular mechanism of chaperones and protein aggregates such as yeast prions/amyloids.

Keywords: protein, chaperone, prion, amyloid

Protein

"unboiled" egg with chaperone

Yeast prion fibrils



Life Science and Technology

Professor **Satoshi Murakami** Assistant Professor **Ui Okada**


Structure and molecular mechanism of membrane protein complex

We seek to understand the molecular mechanism of key biological processes on the cell membrane and membrane proteins at the level of protein structure, dynamics and molecular biology.

Keywords: membrane protein, structural biology, protein crystallography, membrane transport

Protein

Crystal structures of membrane protein solved in our laboratory





Associate Professor
Hiroyuki Ohtani

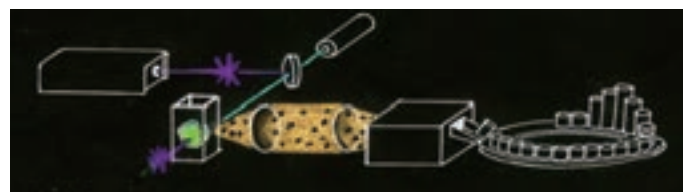
Real-time observation of photoreactions of visual pigments

We are studying retinal photoisomerization and successive thermal reactions of bacteriorhodopsin by using time-resolved spectroscopy in femto-kilo second region.

Keywords bacteriorhodopsin, ultraweak fluorescence, fs-ks time-resolved spectroscopy

Protein

Time-resolved photon counting system for ultraweak emission of bacteria *in vivo*



Associate Professor
Nobuhiro Hayashi

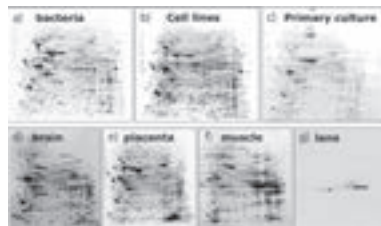
Elucidation of something unknown of the life through high performance proteomics

Using original high sensitive and high throughput 2D-PAGE methodology, we are studying various basic, engineering or clinical researches.

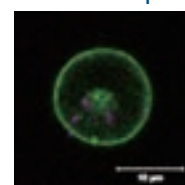
Keywords clinical proteomics, membrane lipid raft, antibody engineering, yeast production system

Protein

2D-PAGE of some tissues



Fluorescence microscopy of membrane lipid raft



Associate Professor
Noriyuki Asakura

Bioelectrochemistry of proteins and hydrogen generation by photoinduced biological electron transfer

We are interested in understanding details of the important biological electron transfer. This provides precise control over enzyme reactions in direct electrochemical and photochemical studies.

Keywords electrochemistry, photochemistry, biological electron transfer, redox proteins

Protein

Photoinduced hydrogen evolution



Associate Professor
Kohji Seio

Nucleic acids chemistry for regulation of genetic information

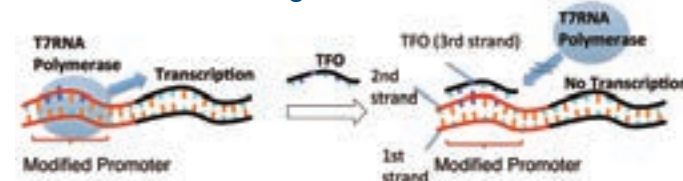
We are trying to establish novel methodologies to regulate nucleic acids related phenomenon, using organic chemistry, physical chemistry, biochemistry, and computational chemistry.

Assistant Professor
Yoshiaki Masaki

Keywords organic chemistry of nucleic acids, transcription regulation, nucleic acid drugs

Nucleic acids

Transcription regulation by triplex forming oligonucleotides



Associate Professor
Tomoko Matsuda

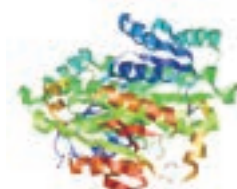
Organic synthesis by enzymes

We have been using enzymes as a catalyst and CO₂ as a solvent for organic synthesis to promote green chemistry.

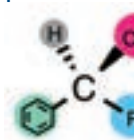
Keywords enzyme, organic synthesis, CO₂, green chemistry

Biocatalysis

Microorganism with useful enzymes as catalysts



Optically pure compounds for intermediates of pharmaceuticals



Professor
Masaaki Fujii

Structure and dynamics of molecules and clusters studied by advanced multicolor laser spectroscopy

We are developing new multi-color laser spectroscopy and studying molecular recognition mechanism of neurotransmitters and revealing chemical reaction mechanism in solvated clusters.

Assistant Professor
Shun-ichi Ishiuchi
Mitsuhiko Miyazaki

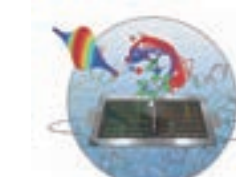
Keywords cluster, molecular recognition, solvation dynamics, proton / H atom transfer

ESI/Cold QIT laser spectrometer



Molecular Spectroscopy

Picosec. time-resolved IR spectroscopy and MD simulations



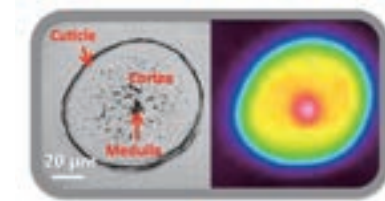
Associate Professor
Makoto Sakai

Structural and orientation-sensitive IR super-resolution imaging of biological molecules

We are developing a newly IR super-resolution micro-spectroscopy and observing structural and orientation-sensitive IR super-resolution images of biological molecules in nano-space.

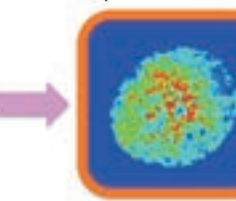
Keywords IR super-resolution, nano-space, molecular structure/orientation, molecular imaging

Traditional microscopic images (Transmittance and IR images)



Molecular Spectroscopy

New IR image (IR super-resolution)

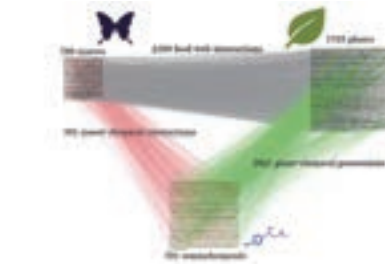


Associate Professor
Masaaki Kotera

Elucidation of molecular mechanisms and physiological roles of natural products

Studying the prediction of natural product biosynthesis, and their effects on the inter-species interactions by the means of cheminformatics and bioinformatics.

Keywords natural products, metabolism prediction, chemical ecology, cheminformatics



Cheminformatics

Food-web interactions between 788 insect species and 1725 plant species mediated by 791 semiochemicals.

★ International Graduate Program for Bioscience and Biotechnology (p 26)
☆ International Program for Interdisciplinary Science and Engineering (p 26)





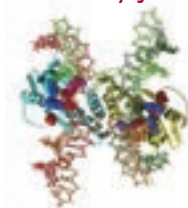
Professor
Hiroshi Iwasaki Assistant Professor
Yasuto Murayama

Temporospatial regulation of chromosome dynamics

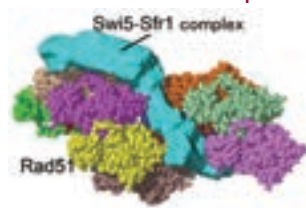
We are studying the molecular basis that underlies temporospatial regulation of chromosome dynamics through various techniques. In particular, we focus on the process of homologous recombination and mating type switching in fission yeast.

Keywords chromosome biology, homologous recombination, DNA repair, genome integrity

A model for RuvC and Holliday junction



A model for Rad51 filament and Swi5-Sfr1 complex



Chromatin, Gene expression



Professor
Hiroshi Kimura Assistant Professor
Hidenori Nishihara

In vivo regulation of epigenetic dynamics

To understand the mechanism of gene expression, we are investigating histone modification dynamics in living cells and organisms.

Keywords epigenetics, cell nucleus, transcription, live cell imaging



Localization of various histone modifications

Chromatin, Gene expression



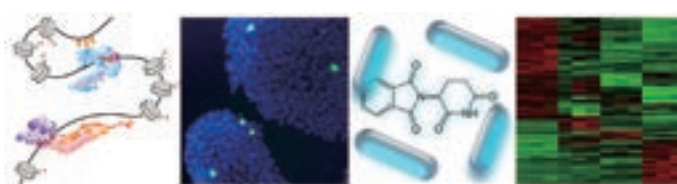
Professor
Yuki Yamaguchi Assistant Professor
Satoshi Sakamoto

Understanding and applying the machinery of life

We are promoting both basic and applied research, focusing on control mechanisms of genome expression and chemical biology using small molecules.

Keywords gene expression, genome, drug development, chemical biology

Collage showing diverse research in the lab. From left, transcription, ES cells, drugs, genome-wide analysis.



Chromatin, Gene expression



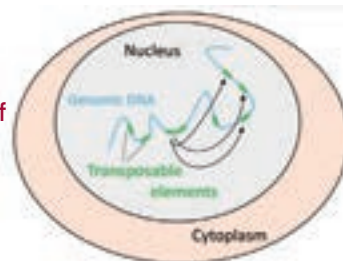
Associate Professor
Masaki Kajikawa

Are transposable elements alive?

There are a huge number of transposable elements (TEs) in the genome of organisms. Our aim is to elucidate the amplification mechanism of TEs.

Keywords transposable element, retrotransposon, genome evolution, epigenetics

Amplification of transposable elements



Chromatin, Gene expression



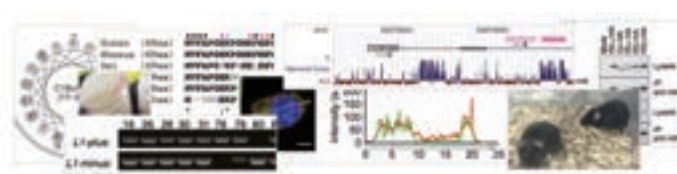
Associate Professor
Yasunori Aizawa

Exploration of coding-potential and functional roles of noncoding DNA

With our discovery of a functional protein encoded in "non-coding" regions in the human genome, we explore significance of this unprecedented layer of human genome, transcriptome and proteome.

Keywords gene, human genome, micro-protein, new proteome technologies

Multidisciplinary approaches to identify and understand new types of human genes



Genomics



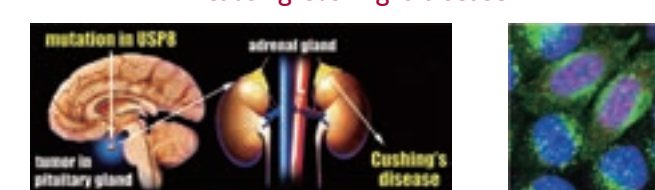
Professor
Masayuki Komada Assistant Professor
Toshiaki Tanaka

Regulation of cell proliferation by degradation of growth factor receptor

We study how cell proliferation is regulated by degradation of growth factor receptor and how its impairment leads to tumorigenesis, with a focus on pituitary tumor causing Cushing's disease.

Keywords cancer, tumor, growth factor receptor, ubiquitin

USP8 mutations in pituitary tumor causing Cushing's disease



Cellular function

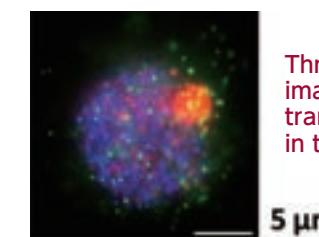


Professor
Makio Tokunaga

Visualization and quantitation of cellular mechanisms

Our goal is the understanding of cellular spatio-temporal dynamics and mechanisms, based on development of techniques in molecular imaging and quantification.

Keywords single molecule, imaging and quantification, super-resolution, chromatin



Three-dimensional multi-color imaging of signaling and transcription factor molecules in the cell nucleus.

Cellular function



Professor
Toru Hisabori Assistant Professor
Jiro Nomata
Keisuke Yoshida

Elucidation of energy conversion and redox regulation mechanisms of photosynthetic organisms

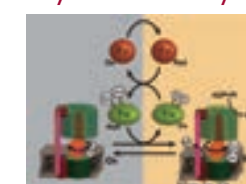
We are focusing on bioenergetics and redox-regulation mechanism of photosynthetic organisms, and the development of application using these basic knowledges.

Keywords ATP synthesis, bioenergetics, redox regulation, photosynthetic micro-organism

Molecular structure of the ε subunit of ATP synthase



Redox regulation of photosynthetic ATP synthesis



Protein function



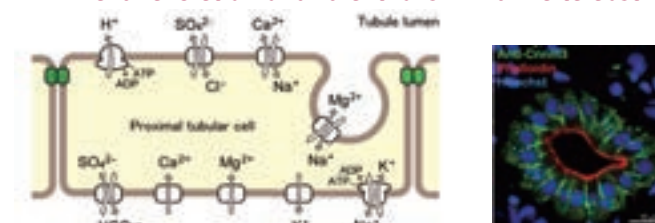
Associate Professor
Akira Kato

Epithelial mechanisms responsible for environmental adaptation

We compare expressions and functions of transporters in various epithelial cell types (kidney, intestine, etc.) among freshwater fishes, seawater fishes, and terrestrial animals.

Keywords electrophysiology, molecular physiology, cell biology, comparative genomics

Renal excretion of divalent ions in marine teleost



Cellular function



Associate Professor
Nobuaki Shiraki

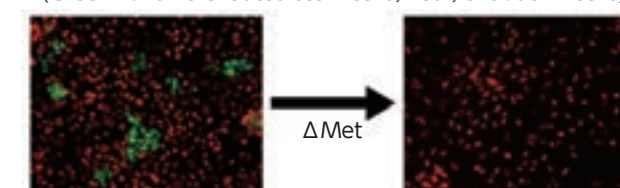
Elucidation of the role of amino acid metabolism in stem cell differentiation

We are studying the role of amino acid metabolism in maintenance and differentiation of stem cells and its application for ES/iPS cell endoderm differentiation.

Keywords ES cells, iPS cells, amino acid metabolism, cell differentiation

Methionine deprivation induced cell death only in undifferentiated cells

(Green : undifferentiated stem cells, Red ; endoderm cells)



Cellular function



Associate Professor
Kumiko Sakata-Sogawa

Elucidation of immune response regulation by live-cell imaging analysis

We are studying regulatory mechanism of immune responses using live-cell imaging and quantitative analysis.

Keywords immune response, fluorescence imaging, transcriptional regulation



Cell signaling image. Stimulation is transduced from the receptor to the nucleus.

Cellular function



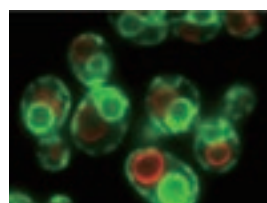
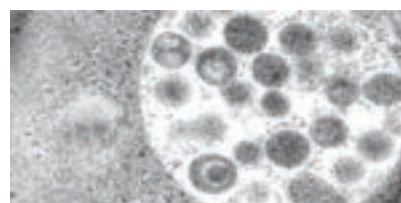
Associate Professor
Hitoshi Nakatogawa

Elucidation of molecular mechanisms and physiological roles of autophagy

We are studying molecular basis and physiological functions of autophagy (self-eating), an intracellular bulk degradation/recycling system, using various techniques.

Keywords yeast, organelles, membrane dynamics, starvation/stress response

Electron and fluorescence microscopy of yeast cells



Cellular function



Associate Professor
Nobuhiro Nakamura

Regulatory mechanism of cell and tissue shape and function

Our research is focusing on the signaling mediators, such as receptors, that regulate the cell and tissue architecture and function and the pathogenesis of related diseases.

Keywords receptor, signal transduction, knockout mice, ubiquitin

Abnormal lung morphology in knockout mice



Cellular function

Mitochondrial morphology



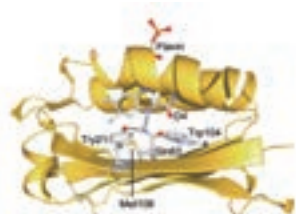
Associate Professor
Shinji Masuda

Elucidation of regulatory mechanisms of photosynthesis, chloroplast, and photoreceptor functions

We are studying molecular mechanisms of how photosynthetic organisms sense and respond to light quality and quantity to control photosynthesis.

Keywords photoreceptor, chloroplast, photosynthesis, photo-oxidative stress

Photoreceptor protein BLUF



A photosynthesis regulatory mutant plant



Photobiology



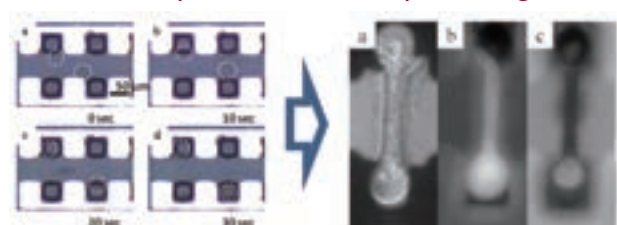
Associate Professor
Yasuko Yanagida

Device innovation by MEMS and bio technology

Development of MEMS tools and devices for biochemistry and bio measurements, micro and nano fabrication technology by biotechnology.

Keywords bio-MEMS, bio-assay, bio-sensing, bio-functional engineering

Bio-chip for individual cell positioning



Cellular function



Associate Professor
Ken-ichi Wakabayashi

Mechanisms of flagellar motility and photomovement of green algae

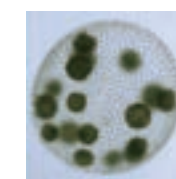
We are studying regulatory mechanisms of eukaryotic flagellar motility, through the analyses of photomovement of green algae (*Chlamydomonas* and *Volvox*).

Keywords flagella, cilia, photomovement, green alga

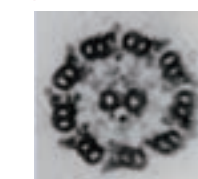
Chlamydomonas reinhardtii



Volvox carteri



Cross-section of flagellum ("9+2" structure)



Cellular function



Professor
Susumu Kajiwara

Molecular mechanisms of microbial infection, development of antimicrobial drugs & design of resource recycle system

We study about applied biochemistry and molecular microbiology for medical care and environmental conservation (notably, infection, drug resistance, host response, renewal resources).

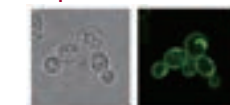
Assistant Professor
Shun Iwatani

Keywords pathogen, immunity, drug discovery, renewal resources

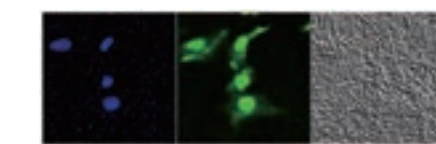


Hemolysis

Drug efflux pump expression



Induction of enzyme activity in human cell by pathogenic fungi



Applied Microbiology & Infection



Professor
Kan Tanaka

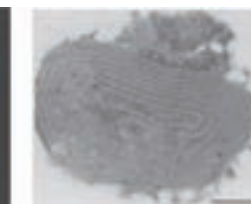
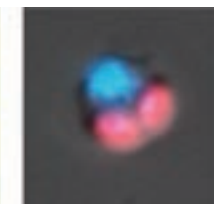
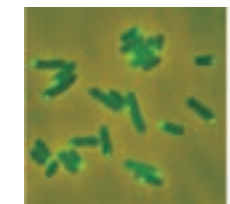
From understanding to design of cell systems

Our researches focus on fundamental architects of both prokaryotic and eukaryotic cells, destined for remodeling and design of cell systems.

Assistant Professor
Yuki Kobayashi
Tomohiro Shimada

Keywords photosynthesis, metabolism, gene expression, symbiosis/evolution

Researches on unicellular model microorganisms



Microbiology



Professor
Yasunori Tanji

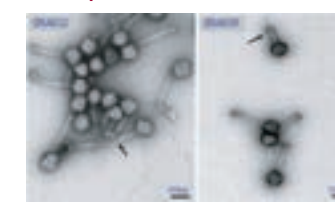
Characterization of bacteriophage and its application

Bacteriophage is a virus specific to bacteria. We are investigating molecular mechanism of phage infection and its application for controlling pathogens.

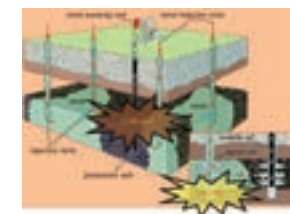
Assistant Professor
Kazuhiko Miyana

Keywords bacteriophage, microbiological corrosion, wastewater treatment

Bacteriophage specific to *S. aureus*



Mechanism of biological corrosion



Microbiology



Professor
Satoshi Nakamura

Extremophiles and extremozymes have limitless possibilities !

We are doing researches on protein engineering of extremozymes (enzymes produced by extremophiles) and metabolic engineering of extremophiles for production of useful materials.

Keywords protein engineering, metabolic engineering, extremophiles, extremozymes

3D-structure of extremozymes



Microbiology



Professor
Toshiaki Fukui

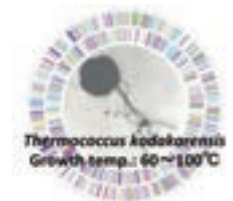
Assistant Professor
Izumi Orita

Analyses and engineering of microbes for production of useful compounds

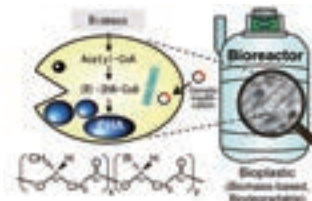
Our lab is studying on analyses and metabolic engineering of microbes (especially hyperthermophiles, bioplastic-producing bacteria, and methylotrophs) aiming efficient production of useful compounds.

Keywords bacteria/archaea, metabolic engineering, hyperthermophiles, bioplastic-producing bacteria

Hyperthermophilic archaeon



Bioplastic-producing bacterium



Microbiology



Professor
Masaaki Wachi

Assistant Professor
Noritaka Iwai

Regulatory mechanism of bacterial cell growth and metabolism

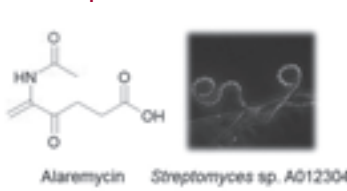
We want to know how bacterial cells perform cellular metabolism, grow, and reproduce. Screening of new antibiotics is also carried out.

Keywords *E. coli*, cell division, metabolism, antibiotics, *Corynebacterium glutamicum*

SEM image of *C. glutamicum* cells



Alaremycin and its producer strain



Microbiology



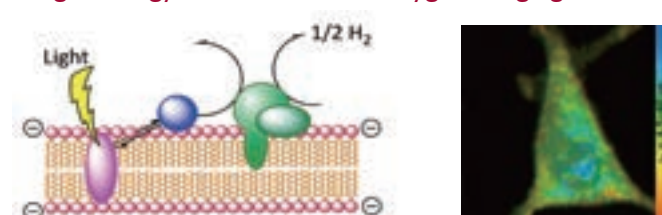
Associate Professor
Toshiaki Kamachi

Elucidation and application of metal ions in biological system

We are studying transduction of light energy into chemical energy by metalloenzyme and elucidation of oxygen dynamics inside a single cell.

Keywords metalloenzyme, oxygen imaging, energy transduction

Light energy transduction and oxygen imaging of cell



Microbiology



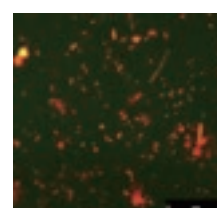
Associate Professor
Nobutaka Nakashima

Analyzing and utilizing microbial population

Our research is focused on genomes which are from viable but non-culturable microbes, sessile cells such as biofilm, and dynamics of a microbial population.

Keywords metagenome, genome analysis, biofilm

Microscopic view of soil bacteria



Next generation sequencer for massive DNA/RNA sequencing



Microbiology



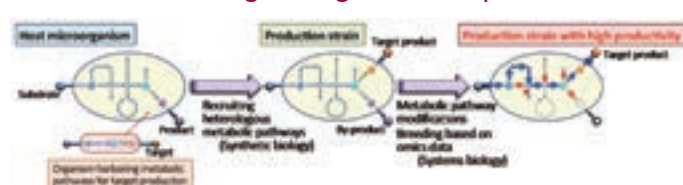
Associate Professor
Takashi Hirasawa

Metabolic engineering toward bioproduction of useful materials

We are studying metabolic engineering of microorganisms for development of key technologies on rational design of microbial cell factories for production of useful materials.

Keywords applied microbiology, metabolic engineering, microbial cell factories, bioproduction

Metabolic engineering toward bioproduction



Microbiology

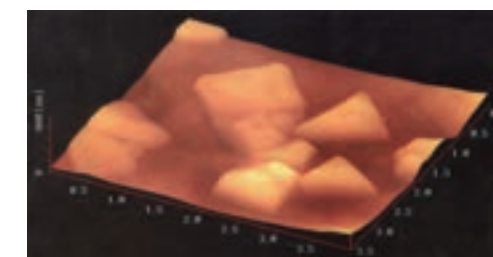


Associate Professor
Rie Yatsunami

Extremophiles and extremozymes have limitless possibilities !

We are doing researches on metabolic engineering of extremely halophilic archaeon *Haloarcula japonica* for production of useful materials.

Keywords protein engineering, metabolic engineering, extremophiles, extremozymes



Microbiology

AFM image of triangular disk-shaped halophilic archaeon



Professor
Takehiko Itoh

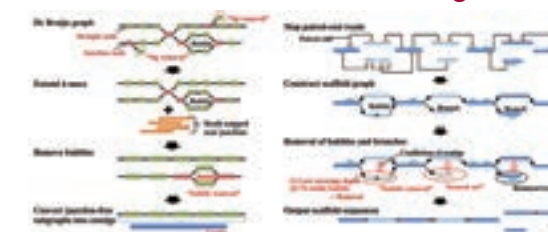
Assistant Professor
Rei Kajitani

Elucidation of biological phenomenon using NGS and bioinformatics

We are studying biological phenomenon, using next generation sequencer and various computational bioinformatics techniques.

Keywords genome informatics, chromosome dynamics

Overview of Platanus assembler algorithm



Bioinformatics



Professor
Ken Kurokawa

Assistant Professor
Hiroshi Mori

Microbial genomics and metagenomics

We are challenging to unravel the dynamics of microbial communities in natural environment based on genomic/metagenomic big data.

Keywords microbes, genomics, metagenomics, bioinformatics

Integrated DB for microbes MicrobeDB.jp



Microbe hunting



Bioinformatics



Associate Professor
Daisuke Kiga

Engineering of genetic code and genetic circuit by synthetic biology

Synthetic biology allows design and construction of systems where proteins and genes are integrated. Such system in a living cell or test tube is free from restrictions in present living systems.

Keywords synthetic biology, genetic code, artificial genetic circuit, origins and early evolution of Life

We have constructed a genetic code without Trp. How about a cell based on the code with 19 amino acids, not 20?



Bioinformatics, Synthetic biology



Associate Professor
Takuji Yamada

Big data for human gut microbiome

We are studying molecular basis and metabolic functions of human gut or skin microbiome, using genomics, metagenomics and bioinformatics.

Keywords gut microbiome, metagenome, metabolic pathway, bioinformatics

Data for human gut microbiomes



Bioinformatics, Synthetic biology



Associate Professor
Hiroyuki Akama

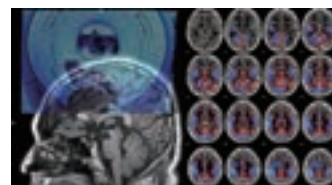
Elucidation of the neural system of human brain by MRI

We are exploring the neural system of human brain by using techniques of fMRI with machine learning (Multi-voxel pattern analysis) and graph-theoretical analysis.

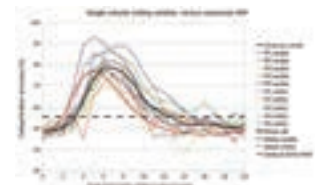
Keywords brain imaging (fMRI), machine learning (MVPA), complex networks

Neuroscience

Distributed neural patterns



MVPA Accuracy functions



Associate Professor
Toshiya Osada

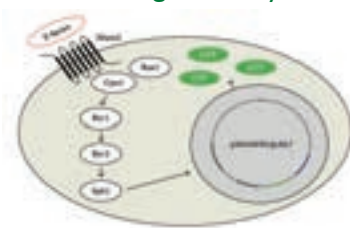
Development of olfactory receptors based chemical sensor

We have developed a chemical sensor using olfactory receptors that are expressed in fission yeast through the endogenous GPCR pathway.

Keywords olfactory receptor, pheromone, fission yeast, sensor

Neuroscience

The ligand assay



Associate Professor
Takashi Suzuki

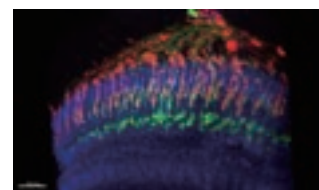
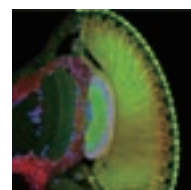
Neuronal circuit formation and its plasticity

Our research goal is to elucidate the molecular mechanisms underlying neuronal circuit formation and function by means of molecular genetics.

Keywords brain, neuron, activity dependent plasticity, cell-cell communication

Neuroscience

Fluorescence microscopy of the *Drosophila* visual system



Associate Professor
Junji Hirota

Molecular neuroscience of a sense of smell

Our laboratory studies on molecular mechanisms underlying the fate determination of olfactory sensory neurons, using mouse genetics and imaging techniques.

Keywords olfaction, chemical sense, neuronal differentiation, genome engineering

Neuroscience

Visualization of neurons in the main olfactory epithelium



Artificial chromosome & genome editing



Associate Professor
Eizo Miyashita

Explore the brain to understand adaptive control mechanisms of the arm

Repeating a verification experiment based on a working hypothesis, we are trying to understand the brain that is called the last frontier around us. Experimental data are collected in multiple levels from behavior to neurons.

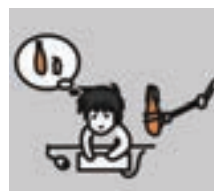
Keywords brain science, neuroscience, motor learning, brain machine interface

Neuroscience

Measuring brain activity during task performance



BMI as a medical application



Professor
Hiroshi Ichinose

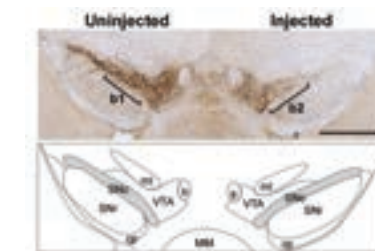
Patho-physiology of neuro-psychiatric disorders in relation to monoamines

We are studying the regulatory mechanism of brain function by monoamines and by tetrahydrobiopterin in order to develop novel drugs and diagnostic tools.

Assistant Professor
Satoshi Hara

Keywords dopamine, Parkinson's disease, developmental disorders

Neurochemistry



Conditional knock-out of the tyrosine hydroxylase gene by AAV-Cre



Professor
Akira Kudo

Bone formation and regeneration in medaka

We are studying the mechanism of bone formation and regeneration in medaka

Assistant Professor
Keiji Inohaya
Masahiro Chatani

Keywords bone biology, medaka

Development, Regeneration

Medaka transgenic line visualizing osteoblasts as red color and osteoclasts as green color



Professor
Shoen Kume

Modeling organ development and homeostasis using human iPS cells

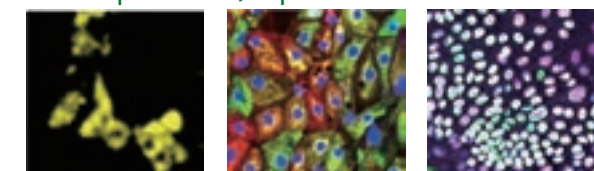
We are using human iPS cells to study the mechanism underlying organ development, differentiation, homeostasis, aiming for drug development and regenerative medicine.

Assistant Professor
Daisuke Sakano

Keywords stem cell, development & differentiation, drug development, regeneration

Development, Regeneration

ES/iPS cell-derived differentiated cells of the pancreatic, hepatic and intestinal cells



Associate Professor
Atsushi Kawakami

Revealing the mechanism of tissue homeostasis

Multi-cellular organisms survive by regenerating the damaged tissues. We are tackling with the mystery of tissue maintenance and regeneration.

Keywords regenerative biology, zebrafish, stem cell, tissue homeostasis

Development, Regeneration

Imaging of stem cells using transgenic zebrafish



Associate Professor
Yoh-ichi Tagawa

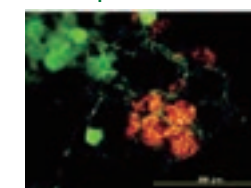
in vitro living models for animal experiment alternatives and pre-clinical studies

We are developing culture systems of ES/iPS cell-derived tissues/organs on micro-fluidic devices closing livings (mouse or human).

Keywords *in vitro* living model, synthetic biology, developmental engineering, regenerative medicine

Development, Regeneration

Mouse ES-derived hepatic tissue



In vitro living system





Associate Professor
Mikiko Tanaka

Developmental basis of the evolution of vertebrate morphology

We are exploring the developmental and molecular mechanisms of how morphology of vertebrates have evolved.

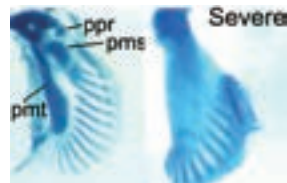
Keywords evolutionary developmental biology

Development

MafB is controlled by BMP in limb bud



Control and "posteriorized" shark fin



Professor
Yuichi Hongoh

Molecular ecology and genome evolution of symbiotic systems

We are aiming to decipher symbiotic mechanisms between microbes and animals such as termites, and among the microbes. We use interdisciplinary approaches: from field studies to single-cell genomics.

Keywords symbiosis, insect, gut microbes, single-cell genomics

Evolution, Ecology

Termite-gut protists and their symbiotic bacteria



Associate Professor
Masato Nikaido

Understanding the molecular mechanism of adaptive and parallel evolution

We are comparing the genomes of various animals to understand molecular mechanisms that generate biological diversity. We mainly focus on cichlids, ancient fish and hedgehogs.

Keywords evolutionary biology, pheromone, cichlids, mammals

Evolution, Ecology

Parallel evolution from hairs to spines (hedgehogs and tenrecs)



Enlarged lip (cichlids)



Associate Professor
Kazunori Tachibana

Elucidation of molecular mechanisms of spawning in jellyfish

We are studying molecular basis and physiological regulations of jellyfish spawning in laboratory and field.

Keywords jellyfish, spawning, photoperiodism

Chronobiology

Jellyfish (*Cladonema pacificum*) and its polyp



Professor
Shinae Kondoh

Development of novel anti-cancer drugs and imaging probes. Novel technology for creating target-specific peptides.

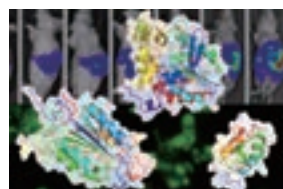
We are aiming at developing novel drugs and diagnostic agents for hypoxic cancers. We are also establishing a novel technology for creating highly target-specific peptide drugs.

Assistant Professor
Tetsuya Kadonosono
Takahiro Kuchimaru

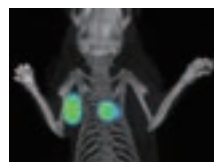
Keywords tumor hypoxia, HIF, *in vivo* optical imaging, drug development

Cancer treatment, Imaging

Innovative biopharmaceuticals development



Visualization of cancers with an optical imaging probe



Professor
Hiroyuki Ohta

Stress responses and oil production in microalgae, Plant colonization of land

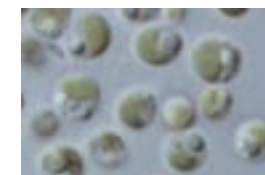
We are studying mechanism of stress responses of microalgae, particularly focusing on oil accumulation under nutrient starvation. We are also studying primary mechanisms for adaptation of plants on terrestrial condition, utilizing a chyarophytic alga, *Klebsormidium flaccidum* as a model organism.

Assistant Professor
Koichi Hori

Keywords microalgae, plants, stress response, oil, bioenergy

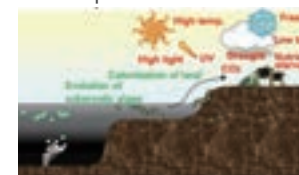
Plant, Microbiology

Oleaginous alga *Nannochloropsis*



Studies on colonization of land by plants

How plant colonized land?



Associate Professor
Sousuke Imamura

Elucidation of molecular mechanisms of plant environmental adaptation

We are studying fundamental molecular mechanisms of environmental responses of plants, especially nutrient signaling pathway, using microalgae.

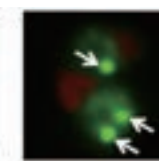
Keywords environmental response, microalga, nitrogen metabolism, biomass production, TOR kinase

Plant

Microalgal culture



TOR-inactivation results in oil accumulation (right picture) (Green : neutral lipid)



Associate Professor
Mie Shimojima

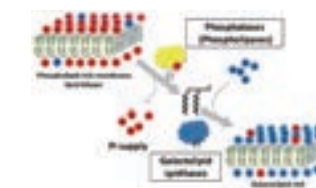
Physiological role of lipid remodeling in plants

We are studying molecular mechanism and physiological function of plant lipid remodeling (membrane lipids, storage lipids, and surface lipids) in response to environmental stress.

Keywords plant, lipid, oil, stress response

Plant

Lack of phosphate (Pi) starvation-induced lipid remodeling increases tolerance to drought stress



Wild type Mutant



★ International Graduate Program for Bioscience and Biotechnology (p 26)
☆ International Program for Interdisciplinary Science and Engineering (p 26)

(Other Professor)

Masayuki Yamamura : Computational Modeling Collective Function and Morphogenesis

(Assistant Professors)

Shinya Kaneko : Novel genome technology and fruiting-body formation of mushroom

Shuji Kanamaru : Structural study of assembly and infection of phages

Takao Sato : Protein structure analysis and elucidation of mechanism

Masaki Tamori : Physiology and morphology of echinoderms

Kimitoshi Denda : Molecular physiology of cell growth and development during embryogenesis

Eiichi Okumura : Cell cycle control and signal transduction

Hiroshi Ikeda : Biomimetic materials science

Sumio Ishijima : Ciliary and flagellar movement

International Graduate Program (IGP)

http://www.titech.ac.jp/english/graduate_school/international/index.html

International Graduate Program for Bioscience and Biotechnology

Responsible PIs :
p10 ~ 25 (★)

Since 2007, the School of Life Science and Technology (the former Graduate School of Bioscience and Biotechnology) has established an international graduate course for foreign students, especially excellent students from East Asian countries. In this course, master's and doctoral education are integrated.



Snap shot of new members in this program in 2014.

In 2013, as making advances in this graduate course, we have launched a new international education program. In this program, foreign students and Japanese students learn together and study hard through friendly rivalry. This program includes master, doctoral and integrated master's and doctoral curricula designed to help students cultivate their creativity, learn practical working skills, and improve their English and Japanese capabilities. In this program, we foster international leaders able to develop leading-edge R&D in innovation of science and technology and construct a bridge between Japan and other nations in the future.

This program includes three bio-oriented R&D fields, Environmental & Chemical Biotechnology (ECB), Medical Life Sciences & Biotechnology (MLB), and Computational Life Sciences & Biotechnology (CLB). Many specialized subjects are prepared in each R&D field. All lectures in this program are performed in English.

International Program for Interdisciplinary Science and Engineering

Responsible PIs :
p10 ~ 25 (☆)

The School of Life Science and Technology will accept the students adopted by the IPISE IGP1 as Integrated Doctoral Education Program. This program is designed to produce researchers and engineers capable of solving the highly technical and complex real-world problems relating to materials, the environment, and information systems, through science and engineering. The IPISE IGP offers the curricula composed of Internship, International Communication, Modern Japan, and other special subjects. A number of academic advisors can accept the IPISE IGP students. Students who wish to apply IPISE program are requested to refer to Application Guide (http://www.titech.ac.jp/english/graduate_school/admissions/guide.html) for details.

For graduation, the students are required to satisfy both requirements by LST and IPISE IGP.

Tokyo Institute of Technology – Tsinghua University Joint Graduate School Program

<http://www.ipo.titech.ac.jp/tsinghua>

Tokyo Tech and Tsinghua University (TSU) carry out Joint a Graduate School Program of Master and Doctor Courses. The main objective of this strategic program is the training of personnel who can use three languages (Japanese Chinese and English) and are versed in both cultures. The Bio-course (Bioscience and Biotechnology course) has historically played a central role between three courses: Bio-course, Nano-course (Nanotechnology course), and Decision Science & Technology course. Staff, students, and industry representatives deepen their mutual understanding through two symposia held in Beijing and Tokyo every year. This program provides an ideal opportunity to improve international relations and educate a young generation who will contribute to the industrial and cultural development of both countries.



Educational Academy of Computational Life Sciences

<http://www.acls.titech.ac.jp/>

Education Academy of Computational Life Sciences (ACLS) is an educational program established at the Tokyo Institute of Technology in FY 2011 aiming to train potential leaders who will play an active role internationally in multiple fields in life science and computer science. The faculty from School of Life Science and Technology and School of Computing work closely together to provide this interdisciplinary educational program. Students can enroll in the program without leaving their main curriculum courses. Students who complete this 5-year combined master's and doctoral program will receive a doctoral degree with "Completed the Computational Life Science Doctors Education Program" indicated on the degree certificate.



Until now, life science and computer science have developed independently, and a lack of mutual understanding has impeded attempts to resolve issues collaboratively. However, flexible collaboration in these two fields is inevitable to strongly drive research and development in the field of life and health care science, which should provide crucial science and technology in the society of 21st century.

For these reasons, we are focused on training potential leaders to build knowledge and skills in both of these fields to equip them to excel in a global environment.

Currently, new types of specialists are required: specialists who can employ leading-edge computer science approaches, such as data-driven methodologies to derive valuable knowledge from massive data sources and high-speed simulation on supercomputing environments, in life science researches.

Responding to these emerging trends, ACLS provides the interdisciplinary education program across multiple fields to produce specialists who possess not only the expertise in their major fields but also the knowledge and experience in their subspecialty fields. Specifically, ACLS produces the following Γ (Gamma) Type specialists:

- (1) Distinguished life science specialists with abilities to utilize leading-edge computer science technologies
- (2) Distinguished computer science specialists with abilities to comprehend life science methodology and concepts

Sponsored by the Ministry of Education, Culture, Sports, Science and Technology as part of the Program for Leading Graduate Schools (FY2011-2017), this educational program provides an ideal environment to our potential global leaders with financial support for international/domestic conference participation and internship, scholarships, and career path support.

International Summer School 2015 in The University of Oxford



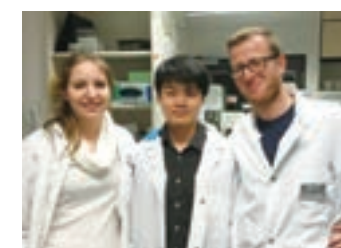
Short-term Internship



Global Communication Contest 2015



International Internship



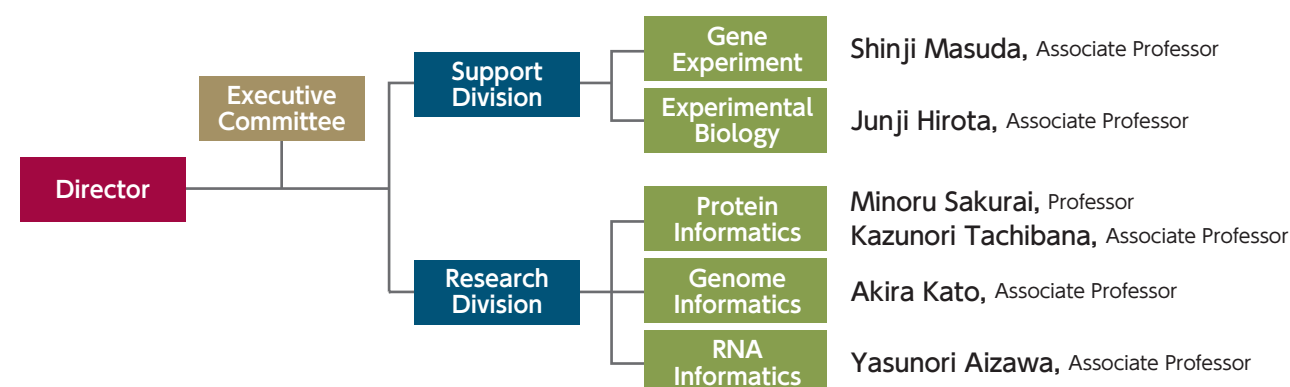
Global Career Seminar



Center for Biological Resources and Informatics

<http://www.grc.bio.titech.ac.jp/>

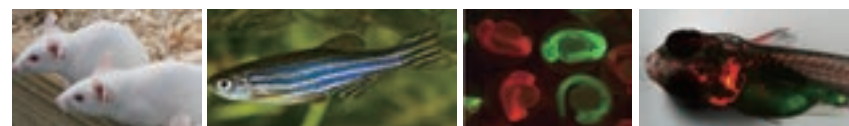
The Center for Biological Resources and Informatics (Bio-Center) was established in 2003 as a facility for genetic and animal experiments by merging Gene Research Center (established in 1989), Research Center for Experimental Biology (established in 1994) and Radioisotope Research Center (established in 2001). In 2011, the Radioisotope Division was separated as Radiation Research and Management Center. The renewed Bio-center consists of 5 sections (Sections of Gene Experiment, Experimental Biology, Protein Informatics, Genome Informatics, and RNA Informatics). The sections of Gene Experiment and Experimental Biology are mainly in charge for (i) education, training and safety management of recombinant DNA and experimental animals, (ii) technical support and maintenance of core equipments, and (iii) maintenance of animal and plant facilities. The main mission of sections of Protein Informatics, Genome Informatics, and RNA Informatics is to carry out leading-edge bioinformatics research on protein, DNA, and RNA in the post sequence era.



Animal Facilities

- 1) Maintenance and management of animal facilities
- 2) Offer of equipments for animal experiments
- 3) Higher research and education

Rabbit, Guinea pig, Mouse, Rat
Freshwater organisms (Zebrafish, Medaka, *Xenopus* frog etc.)
Seawater organisms (Puffer fish, Starfish etc.)
Services of mouse germ cell operation
(*in vitro* fertilization, Embryo/sperm freezing, Transplantation)



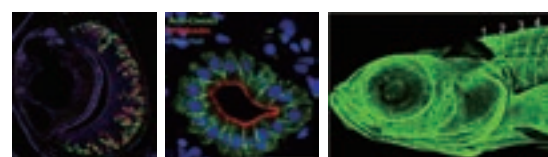
Safety Managements

- 1) Safety managements and education of recombinant DNA experiments in Tokyo Institute of Technology
- 2) Offer of equipments for molecular biology experiments
- 3) Innovation of technologies for gene research
- 4) Research and education of proteins and genes using computer simulation



Core Equipment Service

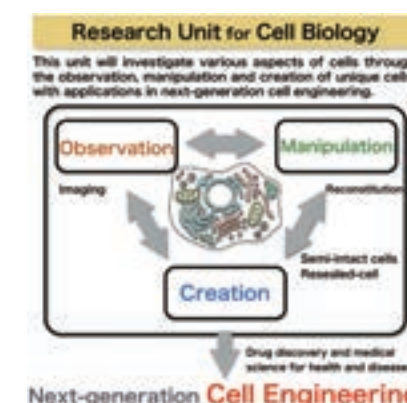
- Microscope systems (Confocal microscopes, Light microscopes, Zoom microscopes etc.)
- Electron microscope
- Scanning electron microscope
- Cryostat
- Spectrophotofluorometer etc.




Research Unit for Cell Biology

The Research Unit for Cell Biology (RCB), led by honorary professor Dr. Yoshinori Ohsumi, is a new cell biology consortium that will unite a diverse range of investigators from basic to applied backgrounds. The unit aims to investigate the structure and function of cells through the *observation* and hands-on *manipulation* of cells, and to use this improved understanding in the *creation* of cells with unique functions. Through these interdependent investigations, the unit will elucidate the fundamental principles of cells through world-class research employing state-of-the-art techniques, ultimately contributing to next-generation cell engineering, human health and the treatment of diseases.

The unit will be composed of Yoshinori Ohsumi, 6 faculty members from our institute and 2 additional researchers from other institutes.





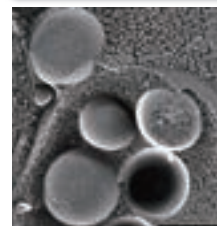
Honorary Professor
Yoshinori Ohsumi

Keywords yeast, autophagy, vacuole, starvation, growth control

Comprehensive studies of physiological roles of autophagy in yeast.

We try to understand the induction mechanism and various modes of autophagy under various conditions. By biochemical analysis we have been studying degradation process of protein and RNA via autophagy and selective targets of autophagy.

Cellular Function



Autophagosome by microscopy

Earth-Life Science Institute (ELSI)



<http://www.elsi.jp/>

The Earth-Life Science Institute (ELSI) was launched on December 7, 2012 after being selected by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) to participate in its World Premier International Research Center Initiative (WPI). This initiative reflects the Japanese government's effort to build globally outstanding science research centers in Japan.

Exploring the Origins of the Earth-Life System

ELSI's aim is to answer the fundamental question that has long captured humanity's imagination: when and where did life originate, and how did it evolve? Until recently, discussions about the origin and evolution of life have mainly been limited to the biochemistry of proto-life forms. We at ELSI will broaden the discussion to focus equally on the relationship between Earth and Life. Life is a phenomenon that is sustained through the exchange of energies and matters with the surrounding environment, thus the origin of life question cannot be separated from the study of the origin and evolution of the Earth.

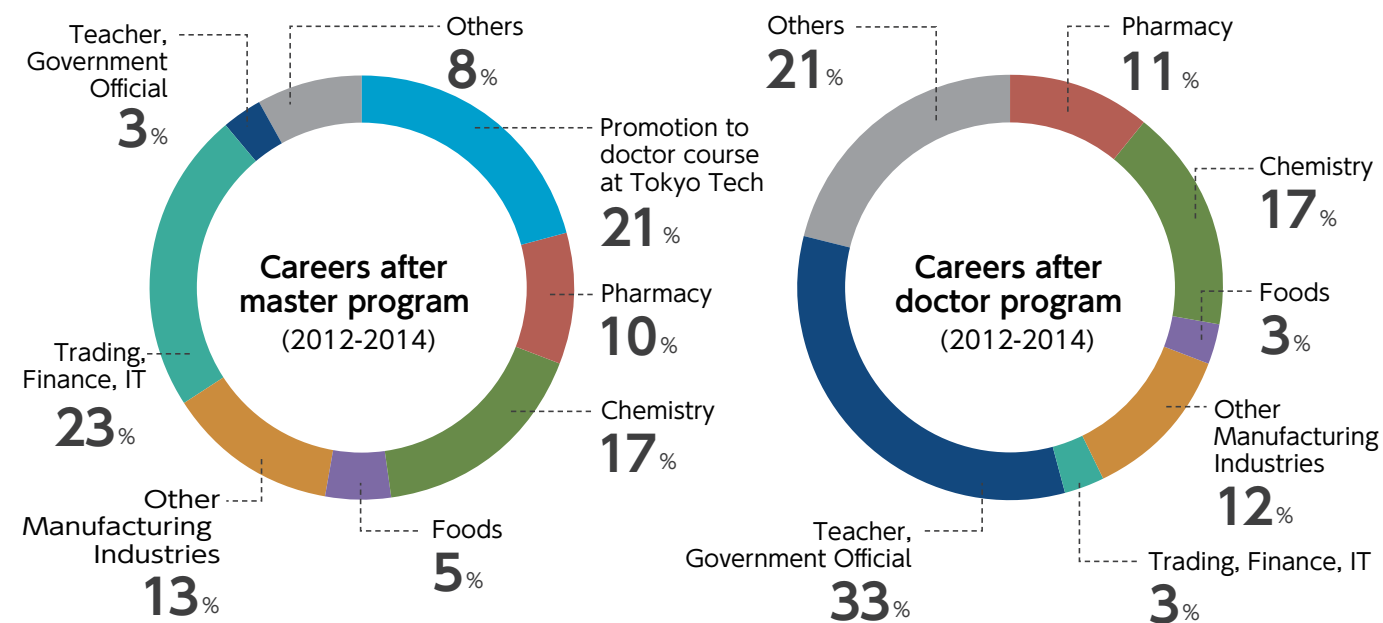
... and Life in the Universe

By elucidating the origins of life in the context of the Earth, we will learn about both the unique and universal aspects of our planet that allowed life to emerge and evolve. Our research will therefore shed light upon the possibility and characteristics of life elsewhere.



Working globally

90% of the undergraduate students will proceed to the graduate school of Tokyo Tech. The undergraduate and graduate schools of Life Science and Technology will be joined, and start the new education programs from the 2016 academic year.



Places of the employment

Pharmacy

Astellas Pharma, Kyowa Hakko Kirin, Takeda Pharmaceutical, Mitsubishi Tanabe Pharma, Chugai Pharmaceutical, Mochida Pharmaceutical, Medical and Biological Laboratories, Asubio Pharma, Sumitomo Dainippon Pharma, Taisho Pharmaceutical, Pfizer Japan, Nihon Generic, Japan Blood Products Organization, etc.

Chemistry

Asahi Kasei, Kao, Fujifilm, Kuraray, Shiseido Japan, Sekisui Chemical, Teijin, Toyobo, Toray Industries, Lion, Kanto Chemical, Idemitsu Kosan, Kansai Paint, Du Pont, Nippon Shokubai, Mitsubishi Pencil, etc.

Foods

Ajinomoto, Ezaki Glico, Kagome, Kirin, Sapporo Breweries, Asahi Breweries, Suntory Holdings, Kewpie, Nissui, Meiji, Yakult, Lotte, Calpis, Itoham Foods, Myojo Foods, etc.

Other Manufacturing Industries

Kobe Steel, Shimadzu, Canon, Konica Minolta, Toyota Motor, Mazda Motor, Japan IBM, Panasonic, Hitachi, Fujitsu, Toshiba, Tokyo Gas, JGC, Dai Nippon Printing, Showa Denko, etc.

Trading, Finance, IT

NTT, Softbank, Goldman Sachs, Daiwa Securities, The Bank of Tokyo-Mitsubishi UFJ, Mizuho Bank, Bank of Yokohama, Tokio Marine & Nichido Fire Insurance, Sumitomo, Toyota Tsusho, etc.

Teacher, Government Official

Tokyo Tech., Tokyo Univ., Kyoto Prefectural Univ. of Med., Yamanashi Univ., Ochanomizu Univ., National Center of Neurology and Psychiatry, National Institute of Advanced Industrial Science and Technology, National Institute of Physiological Sciences, RIKEN, National Research Institute of Police Science, Ministry of Health, Labor and Welfare, Cabinet Office, NHK, etc.

Others

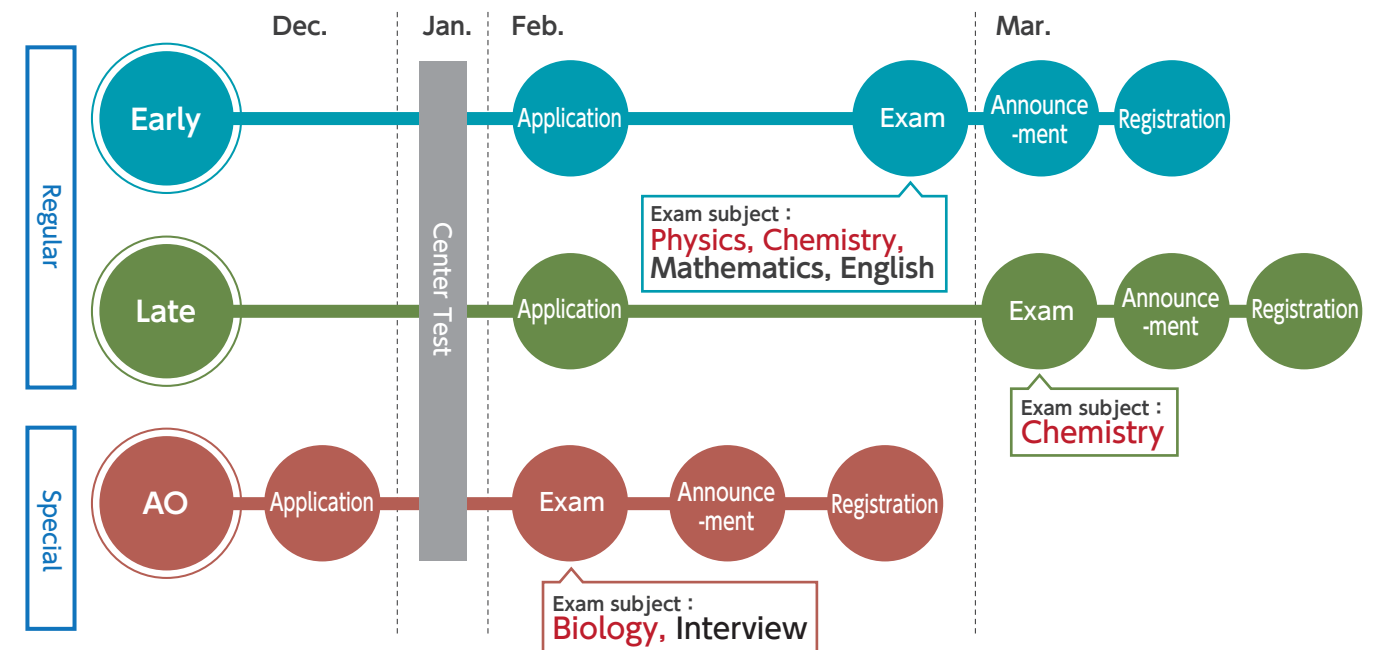
Dentsu, Hakuho, Mori Building, East Japan Railway, Z-kai, etc.

Schedule for admission

For details and newest information, see <http://admissions.titech.ac.jp/admission/>



Undergraduate school	Capacity	Examination category		
	150	Early	Late	AO
		95	35	20



Graduate school	Capacity
	Master : 168 Doctor : 52

