Graduate School of Science and Technology
Degree Programs in Life and Earth Sciences
List of research fields (Master's Programs)

Master's Program in Biology

Field of Research	Faculty	Detailed Description of Research Field
Systematics and Evolutionary Biology	ISHIDA Ken-ichiro	① Classification of micro-and macro-algae based on ultrastructure and molecular phylogenetic analyses ② The endosymbiotic acquisitions and evolution of plastids ③ Searching for new useful algae for algal biomass research
	HONDA Masanao	① Taxonomy of reptiles based on morphological data ② Molecular phylogeny and biogeography of reptiles and birds ③ Conservation genetics of amphibians and reptiles
	WADA Hiroshi	① Evo-Devo research of chordates ② Comparative embryology of marine invertebrates, including bivalves and echinoderms
	DEGAWA Yousuke	① Natural history and biodiversity of the Kingdom Fungi ② Taxonomy and phylogenetic studies of the basal lineage of Fungi (Zygomycota and Chytridiomycota) ③ Fungal ecology focused on their interactions with other organisms and their life cycles
	NAKANO Hiroaki	① Evolution, development, morphology, and ecology of placozoans, xenacoelomorphs, and echinoderms ② Origins and evolution of deuterostomes and metazoans ③ Diversity and evolution of marine invertebrates
	NAKAYAMA Takeshi	① Classification of protists including microalgae based on ultrastructural characters and molecular phylogenetic analyses ② Searching for new useful algae for algal biomass research
	YAHATA Kensuke	① Comparative morphological studies on ovarian structure and mode of oogenesis in arthropods ② Comparative studies on structures for appendage autotomy in arthropods ③ Phylogenetic studies of myriapods based on comparative morphological methods
Ecology	HIROTA Mitsuru	① Plant response to environmental changes, perspective from ecology ② Ecosystem ecology focused on carbon cycling in terrestrial ecosystem
	SHOJI Akiko	① Life-history strategy in birds ② Behavioural ecology and conservation biology in free-ranging animals
	TANAKA Kenta	① Evolutionary ecology focusing on ecological and genetic adaptive mechanisms in wild *Arabidopsis* ② Conservation ecology in mountains, grasslands and forests
	TSUDA Yoshiaki	① Population genetics/genomics and population demographic inference of several species (e.g. trees, fishes, insects, mammals) ② Ecosystem management and conservation using molecular ecology approaches ③ Impact of human activities on forest ecosystems and their history
	TOQUENAGA Yukihiko	① Experimental ecology with field and laboratory populations ② Theoretical biology with mathematical models
	OHASHI Kazuharu	① Foraging behavior of pollinators with special reference to their cognitive abilities ② The evolution of floral phenotypes via ecological interactions with flower visitors
	SATO Yukie	① Behavioral ecology and evolutionary ecology in terrestrial arthropods ② Geographic variation in behavior and ecology, and speciation

	AGOSTINI Sylvain	① Marine ecophysiology, especially of scleractinian corals ② Responses of marine organisms to climate change and anthropogenic stressors
Plant Physiology and Developmental Biology	KIKUCHI Akira	① Study on diversity of environmental stress responses in higher plants ② Study on expression of totipotency in higher plants
	SUZUKI Iwane	① Photosynthetic acclimation and signal perception to environmental stress ② Production of useful metabolites by metabolic engineering in algae ③ Application of quantum beams and nuclear resonance reaction for biological breeding
	IWAI Hiroaki	① Cell wall functions on the plant development and environmental responses ② Mechanisms of plant cell wall cross-linking
	ONO Michiyuki	① Molecular mechanism of photoperiodic induction of flowering ② Studies on genetically modified and genome edited plants
	SUZAKI Takuya	① Molecular genetic studies on root nodule development during legume-*Rhizobium* symbiosis ② Studies on molecular mechanism of nitrogen nutrient response in plants
	MAEDA Yoshiaki	① Functional analyses of genomes and chromosomes in algae ② Production of useful metabolites by metabolic engineering in algae ③ Digital transformation of algal research
	MINODA Ayumi	① Studies on regulation of primary metabolism in algae as unicellular plant model systems ② Studies on metal metabolism in photosynthetic organisms
	IRVING Louis John	① Effect of nutrient status on the host – parasite interaction ② Exploring the influence of abiotic factors on grass plant growth and competition
Animal Physiology and Developmental Biology	KOBAYASHI Satoru	① Common mechanisms regulating germline formation in animals ② Genetic pathway regulating sex determination of germline in *Drosophila* ③ Mechanism regulating germline-stem-cell maintenance in *Drosophila*
	SASAKURA Yasunori	① Developmental mechanisms of animals ② Metamorphosis of ascidians ③ Molecular biology of mimicry ④ Development and Evolution
	CHIBA Chikafumi	① Molecular mechanism of adult newt body-part regeneration ② Molecular mechanisms of injury responses and injury-caused disorders in mammalian tissues ③ Induction and regulatory mechanisms of transdifferentiation
	NIWA Ryusuke	① Mechanisms of interorgan communication in the regulation of development, energy metabolism, stem cell proliferation and environmental tolerance ② Molecular, cellular, and systemic mechanisms of the interaction between insects and parasitoid wasps ③ Structural Biology and Chemical Biology of Insect Growth Control Agents
	YAGUCHI Shunsuke	① Axis specification/formation of the sea urchin embryo ② Development of the serotonergic neurons in the sea urchin embryo ③ Evolution of the anterior neuroectoderm
	OKAMOTO Naoki	① Insect hormones and its regulation during development ② Neuro-endocrine control of physiology and behavior in insects
	SAKURAI Keisuke	① Electrophysiological studies on molecular mechanisms of signal transduction in retinal neurons ② Studies on non-visual photoreceptor cells in CNS

Molecular and Cellular Biology	INABA Kazuo	① Structure, motility, and regulation of cilia and flagella ② Diversity of cilia and eukaryotic evolution ③ Mechanism of fertilization and reproduction of marine organisms (protists, marine invertebrates and fishes)
	CHIBA Tomoki	① Genetic analysis of selective protein degradation ② Cell biology of the ubiquitin family ③ Knockout mice analysis of the ubiquitin system
	NAKANO Kentaro	① Investigation of signal transduction controlling cytoskeleton and membrane dynamics ② Studies on the molecular diversity and evolution of cytoskeleton and its regulatory systems ③ Molecular biology of the mechanisms of cell division using yeast and protist
	MIURA Kenji	① Signaling mechanisms for abiotic stress response and sugar accumulation in plants ② Production of useful proteins (pharmaceutical proteins, etc.) with plant biotechnology ③ Production and evaluation of genome editing crops
	※MIYAMURA Shinichi	① Cell biological studies on evolution of sex in eukaryotic algae ② Studies on sexual reproduction of marine green algae
	ISHIKAWA Kaori	① Analyses of influences by mutations of mitochondrial DNA on cellular and physiological functions ② Studies on the interactions between nuclear-coded genes and mitochondrial functions ③ Investigation of disease mechanisms of mitochondria-related diseases using model animals
	SHIBA Kogiku	① Studies on regulatory mechanism of sperm motility in marine organisms ② Studies on regulatory mechanism of flagellar and ciliary motility in marine organisms
	TSURUTA Fuminori	① Molecular basis of the developing brain regulated by microglia ② Neuron-glia communication coordinating the brain environment in the neonatal period ③ Mechanisms of the architecture of neural circuits influenced by environmental stresses
	HIRAKAWA Yoshihisa	① Plastid evolution via secondary endosymbioses ② Plastid division machinery in microalgae ③ Genome evolution in microalgae
Genomics and Bioinformatics	INAGAKI Yuji	① Molecular phylogeny of eukaryotes ② Evaluation of the impact of lateral gene transfer to genome evolution ③ Estimation of protein functions combining evolutionary parameters and tertiary structures
	KUWAYAMA Hidekazu	① Molecular analysis of biological soliton in multicellular movement ② Functional analysis of a genetic disease in intracellular signaling pathway ③ Memory of cell and spatio-temporal pattern recognition ④ Analyses of a novel anti-tumor factor and the mechanism of caffeine-dependent enhancement of anticancer drugs
	NAKADA Kazuto	① Functional morphology of mammalian mito-chondria ② Generation of mouse models for mitochondrial DNA-based diseases ③ Therapeutics for mitochondrial DNA-based diseases
	NAKAMURA Kouji	① Biochemical and molecular biological analysis of many roles of bacteriophages, ranging from fundamental biological research to their use medical and industrial biotechnologies ② Novel physiological functions of non-coding small RNAs and their mechanisms of regulation of gene expressions ③ Identification of novel RNA-binding proteins and analysis of their physiological functions

	SAWAMURA Kyoichi	① Evolutionary Genetics ② Genetic analysis of hybrid inviability and sterility in Drosophila ③ Genetic analysis of sexual isolation in Drosophila ④ Interspecific introgression in natural populations of Drosophila
	HARADA Ryuhei	① Computational Biophysics and Theoretical Biology ② Molecular dynamics simulations for analyzing biological functions ③ *In silico* drug design based on molecular simulations
	NAKAYAMA Takuro	① Symbiogenesis in unicellular organisms ② Genomic research on evolution and diversity of protists
Advanced Cellular Biology	ITO Yuzuru	① Basic technology of the regenerative medicine using human iPS/somatic stem cells ② Mechanisms of organ development and regeneration
	*NAGAMUNE Kisaburo (NIH, Tokyo)	① Understanding the infectious mechanism of parasitic protozoa ② Study about the unusual organelle of parasitic protozoa ③ Basic research for the development of anti-parasitic drug
	*MARUYAMA Kyonoshin (JIRCAS, Tsukuba)	① Comparative genomic research in crop plants ② Transcriptional and metabolic network research in crop plants ③ Development of improved crop varieties
	*SHITARA Hiroshi (IGAKUKEN, Tokyo)	① Molecular genetics of mitochondrial DNA in mammals ② Generation of new mouse strains using transgenic technology ③ Imaging techniques for visualizing mitochondria in mammals
	*MATSUI Hisanori (Takeda Pharmaceutical Company, Ltd. Fujisawa)	① Drug discovery research in the field of neuroscience, endocrinology (particularly neuroendocrinology and reproductive endocrinology, and drug repurposing ② Translational research for drug discovery
Advanced Molecular Biology	* KAWACHI Masanobu (National Institute for Environmental Studies)	① Biodiversity and ecology of microalgae concerning environmental issues. ② Studies on potential biodiversity of microorganisms ③ Development of preservation techniques for microalgae and endangered algae ④ Screening of useful microalgae and its application
	*HOSAKA Kentaro (National Museum of Nature and Science)	① Taxonomy, phylogenetics and biogeography of fungi, especially mushrooms ② Fungal diversity in the environment (soil, water and air) ③ Natural history of fungi based on museum specimens, DNA and other metadata
	*MASAKI Takashi (FFPRI, Tsukuba)	① Population ecology of woody plans ② Structure and dynamics of forest ecosystem ③ Growth management of forests
	*TAJIMA Yuko (National Museum of Nature and Science)	① Life history on marine mammals ② Comparative morphology on marine mammals ③ Health assessments on marine mammals
	*CHIBA Youko (RIKEN, Wako)	① Search for novel metabolisms in microorganisms.(Prokaryote) ② Diversity of CO2 fixation and amino acid synthetic pathways ③ Analysis of metabolic evolutionary by physical chemistry
	*FUJIWARA Sumire (AIST, Tsukuba)	① Basic studies of transcriptional regulation mechanisms in higher plants ② Research and development of useful plants by modifications of transcription factors or genes ③ Functional analyses of transcription factors in higher plants
	*MORIYA shigeharu (RIKEN, Yokohama)	① Research and development of biomass utilization process ② Research and development of symbiosis based biotechnology ③ meta- and single-cell transcriptome analysis

※ The faculty member marked with ※ will be retired by March 31,2024.

Note: *Adjunct Professor of the Cooperative Graduate School

Master's Program in Agro-Bioresources Science and Technology

	Field of Research	Faculty	Detailed Description of Research Field
Agro-biological Sciences Field	Plant Breeding	YOSHIOKA Yosuke TSUDA Mai	① Study on conversation and efficient utilization of genetic resources ② Genetic analysis of important traits in crops ③ Pollination biology for seed multiplication of crops ④ Development of digital phenotyping method ⑤ Development of environmental risk assessment evaluation methods in biotechnology crops
	Crop Science	NOMURA Koji	① Comparative studies on the efficient crop production systems and its management ② Establishment of sustainable crop production systems and its assessment ③ Physiological and ecological research for raising grain yield and quality of crop plants ④ Physiological research on the mechanisms and control of stress tolerance in crop plants
	Olericulture and Floriculture	EZURA Hiroshi FUKUDA Naoya MATSUKURA Chiaki ARIIZUMI Tohru KANG Seung Won NONAKA Satoko ★LOMBARDO Fabien Claude Renaud SUGIMOTO Koichi	① Molecular and physiological dissections of useful traits involved in agricultural production in vegetables and ornamentals ② Development of new genetic engineering technologies and novel high quality varieties in vegetables and ornamentals ③ Genetic, genomic and physiological researches for high added value and high yield properties in in vegetables and ornamentals ④ Development of information technologies for vegetables and ornamentals production
	Pomology and Postharvest Physiology of Fruits	SUGAYA Sumiko SEKOZAWA Yoshihiko	① Studies on fruit tree physiologies under cultivation and effects of environmental factors on the physiology ② Study on mechanisms of fruit tree flower development and postharvest physiology of the fruit
	Animal Science	ASANO Atsushi	① Integrated physiology of homeostatic functions useful for animal production ② Study on molecular and cellular basis for fertilization and development in model animal ③ Development of reproductive and genomic biotechnologies for livestock production
	Plant Parasitic Mycology	OKANE Izumi ISHIGA Yasuhiro	① Systematics of plant parasitic fungi including symbiotic fungi, particularly rust fungi, blue stain fungi, endophytes and mycorrhizal fungi. ② Studies on ecology and physiology of these fungi. ③ Functional analysis of genes associated with disease resistance in plant.
	Applied Entomology and Zoology	FURUKAWA Seiichi KINOSHITA Natsuko	① Insect immune mechanisms against pathogens and parasitoids ② Elucidation of strategies of parasitoids to survive in the host insect species ③ Improvement of biological control of insect pests ④ Plant-to-Plant communication mediated by smell ⑤ Plant defensive mechanisms to combat insect pests

Agro-biological Sciences Field	Forest Ecotopology	KAMIJO Takashi SAEKI Ikuyo KAWADA Kiyokazu	① Dynamics and function of forest ecosystem ② Vegetation science and management ③ Conservation and restoration of arid and semi-arid Ecosystem ④ Conservation of endangered species
	Conservation of Regional Resources	TSUMURA Yoshihiko SEINO Tatsuyuki TSUDA Yoshiaki	① Genetic diversity of forest tree species ② Evolution and local adaptation of forest tree species ③ Study on conservation of regional resources
	Biological Systems Regulation Science	KUSANO Miyako SHIBA Hiroshi WANG Ning	① Genetic analysis of important agronomic traits in crops and vegetables ② Development of analytical platforms to capture quantitative and qualitative changes of metabolite levels ③ Metabolic network biology using “omics” datasets ④ Molecular mechanisms of epigenetic regulation in heterosis ⑤ Molecular mechanisms of epigenetic regulation in sexual plant reproduction ⑥ Epigenetic engineering of plant development
	Epigenetics	BUZAS Diana Mihaela	① Molecular genetic analysis of the perennial life history in *Arabidopsis halleri gemmifera* ② Molecular ecology analysis of seasonal response in *Wasabi japonica* ③ Dissection of memory DNA function in overwintering in crucifers
	Environmental Soil Chemistry	TAMURA Kenji ASANO Maki	① Environmental chemistry of forest soils ② Soil ecological studies on soil organic matter ③ Soil conservation under grassland in Eurasian steppe
Agricultural Economics and Sociology Field	Agricultural and Bioresource Economics	SHUTO Hisato	① Analysis of food industries with specific attention to issues of productivity, R&D, scale economies, and economics of organization ② Economic analysis of agricultural and food security policies
	Resource Economics and Development Studies	SHUTO Hisato	① International trade analysis of agricultural commodities and resources ② Community development and resource management
	Farm Business and Agribusiness Management	UJIIE Kiyokazu	① Farm production and supply economics under the risk ② Farm and agribusiness firm management and marketing ③ Food consumption and consumer policy
	Forest Economics	TACHIBANA Satoshi	① Study on forest policy and economics ② International comparative study on forest management and forest products market ③ International comparative study on production and marketing of forest products
	Forest Sociology	KOHROKI Katsuhisa	① Historical study of forest management in Japan ② Socioeconomic study on regional forest management in Japan ③ Comparative study on forestry organizations

Bioresource Environment Engineering Field	Food Resources Engineering	Marcos Antonio das NEVES	① Micro / nano-engineering for advanced bioresource processing ② Microchannel technology for advanced food processing ③ Formulation of food micro /nano-dispersions and evaluation of their gastrointestinal digestion ④ Effective utilization of food processing waste for value addition
	Environmental Colloid and Interface Engineering	KOBAYASHI Motoyoshi	① Water and solute transportation in soil. Salinity and erosion of soil ② Water resource engineering in arid land, water quality control, water treatment ③ Physics and chemistry of soil, soil pollution,colloid and interface
	Bio-resource Process and System Engineering	(＊)	① Resource and energy utilization using agricultural waste, biomass and organic wastewater based on bio-resource recycling system ② LCA, LCC, and simulator development for optimization design of bio-resource conversion process and grasping of biomass potential and its utilization
	Watershed Conservation	NASAHARA (NISHIDA) Kenlo YAMAKAWA Yosuke	① Mechanism of sediment production and transport ② Sabo planning in harmony with natural environment ③ Environmental analysis through remote sensing
	Water Resources Management Engineering	ISHII Atsushi	① Development and management of irrigation systems ② Water resources evaluation for development ③ Participatory irrigation management
	Farmland System Engineering	KOBAYASHI Motoyoshi YAMASHITA Yuji	① Farmland engineering, soil conservation engineering ② Soil Physics, Environmental materials
	Bioproduction and Machinery	Tofael AHAMED	① Intelligent machinery and robotics for agricultural production ② System analysis for bioenergy production and utilization ③ Real-time crop monitoring systems for site-specific management
	Agri-Food Process Engineering	KITAMURA Yutaka	① Removal of food hazard by wet milling ② Milling of components related to health function by spray dry ③ Development of novel food by applying rice slurry
	Chemistry of Biomaterials	NAKAGAWA-IZUMI Akiko	① Chemistry for wood pulping and pulp bleaching ② Chemical utilization of biomaterials and bio-refinery ③ Micro-analysis of wood components (lignin, tannin, carbohydrate and others) and the related compounds

Bioresource Environment Engineering Field	Engineering of Biomaterials	ENOMAE Toshiharu OBATAYA Eiichi KAJIYAMA Mikio	① Creation of paper-based electronics and sensors ② Conservation of aging library collection and paper cultural heritage ③ Forest and marine biomass composites for eco-friendly packaging ④ Synthesis of fluorine containing condensation polymers for composite materials ⑤ Chemical modification of poly (amino acid)s and poly saccharides ⑥ Property enhancement of biomaterials for high-performance musical instruments ⑦ Investigation on the mechanical properties of wood with respect to its fiber-reinforced cellular structure, and development of technology for their effective utilization ⑧ Physical and chemical characterization of natural adhesives such as Japanese lacquer and chitosan, and development of technology for their utilization
Applied Biochemistry Field	Biochemistry of Bioactive Molecules	USUI Takeo SUNOHARA Yukari FURUKAWA Jun MATSUYAMA Shigeru	① Identification of molecular targets of the bioactive compounds in mammalian and plant cells and their action mechanisms ② Antioxidative responses to oxidative stresses ③ Semiochemicals mediating interactions among insects, plants and animals ④ Mechanisms how to accumulate various metals in plants
	Genomic Biology	FUKAMIZU Akiyoshi TANIMOTO Keiji ISHIDA Junji KAKO Koichiro DAITOKU Hiroaki	① Modification and function of methyltransferases ② Aging regulated by methylation and metabolism (C. elegans & mouse) ③ Genomic imprinting ④ Gene expression mechanism for homeostasis
	Structural Biochemistry	TANAKA Toshiyuki	① Analysis of the structure-function relationships of proteins involved in signal transduction and transcription regulation ② Analysis of the chromophore-protein interactions of chromoprotein antitumor antibiotics ③ Protein engineering based on detailed structural information on functional proteins
	Molecular Microbial Bioengineering	KOBAYASHI Michihiko HASHIMOTO Yoshiteru	① Screening of new metabolism of natural and unnatural compounds, and functional analysis of their physiological functions ② Metabolic engineering and screening/analysis/design/remodeling of useful enzymes and genes ③ Functional analysis of enzymes involved in cleavage and synthesis of a C-N bond and their molecular evolution ④ Development of super biological catalysts with novel functions of microorganisms and their enzymes ⑤ Functional analysis of gene promoters and their application to the production of useful compounds.
	Bioreaction Engineering	ICHIKAWA Sosaku HIRAKAWA Hidehiko	① Application of polymolecular aggregates for bioprocesses ② Production of useful materials by enzymes and microorganisms ③ Development of tools for selective protein conjugation ④ Interdisciplinary studies for practical use of cytochrome P450s

Applied Biochemistry Field	Applied Microbiology	NOMURA Nobuhiko UTADA, Andrew S. TOYOFUKU Masanori YAWATA Yutaka	① Bacterial cell- cell communication and biofilm formation ② Microfluidics for analysis of bacterial communities ③ Biophysical analysis of biofilm formation ④ Bacterial interactions through membrane vesicles ⑤ Molecular microbiology of environmental bacteria and their applications
	Cell Cultivation Engineering	AOYAGI Hideki	① Development of cultivation system for cell and protoplast with novel functional activities and their biotechnological application ② Analysis of naturally-occurring microbial symbiotic association, construction of artificial symbiotic system and their application for various bioprocesses ③ Cell cultivation engineering and development of novel bioreactors ④ Development of cultivation system for uncultured microbes (microbial dark matter), animal cells, and plant cells and their biotechnological application
	Biomimetic Chemistry	(＊)	① Studies on complex of protein and polymer ② Basic and applied technical studies on polyelectrolyte gel
	Molecular and Developmental Biology	KASHIWABARA Shin-ichi	① Transcriptional and translational regulation of genes during gametogenesis ② Functional roles of proteins involved in fertilization, egg activation, and early embryonic development ③ Development of reproductive and developmental technologies for future life
	Biology for Gene Regulation	KIMURA Keiji	① Analysis for dynamics of mitotic chromosomes. ② Analysis for function of condensin complex. ③ Analysis for novel function of the nucleolus.
	Ecological Molecular Microbiology	TAKAYA Naoki NAKAMURA Akira YING Bei-Wen TAKESHITA Norio OHTSU Iwao	① Environmental response and morphogenesis of filamentous fungi ② Enzymology and molecular biology of microbial enzymes ③ Bacterial metabolisms and communication ④ Development and application of host-vector system in *Thermus thermophilus* ⑤ Study on microbial catabolic pathway of L-form sugars ⑥ Multilevel analyses and computational prediction of microbial growth dynamics ⑦ Experimental evolution for investigating the microbial survival strategies ⑧ Physiological functions of sulfur-containing amino acids and its applications
	Functional Foods and Food Chemistry	YOSHIDA Shigeki	① Structure and function of bioactive compounds in food ② Production of bioactive compounds by using bioconversion process ③ Development of industrial enzymes for food production
	Environmental Plant Biochemistry	YAMAJI Keiko	① Effect of endophytic microbes on heavy-metal stress tolerance in plants ② Effect of endophytic microbes on environmental stress tolerance in plants ③ Effect of endophytic microbes on radio Cs accumulation in plants

Biosystem Sciences Field	Bioprocess Engineering	NOMURA Nakao	Development of sustainable agriculture, forestry and fisheries industry using bioengineering technique
	Bioactive Natural Products Chemistry	SHIGEMORI Hideyuki	① Elucidation of the molecular mechanisms of bioactive substances involved in biological phenomena of plant (germination, phototropism, gravitropism, senescence, etc.). ② Search for bioactive compounds related to prevention of diseases (Alzheimer's disease, diabetes, osteoporosis, etc.) from edible and medicinal plants. ③ Isolation and structure elucidation of new bioactive compounds (antimicrobial, antitumor, etc.) from unexplored microorganisms.
	Chemical Biology	MIYAMAE Yusaku	① Small molecule control for cellular protein stability and function ② Development of drug screening systems by focusing on the unique character of target receptor ③ Chemical biology on natural products
	Plant Physiology and Chemistry	YAMADA Kosumi	① Isolation and identification of plant-derived bioactive compounds against abiotic and biotic stimuli ② Evaluation of their biosynthetic pathway and mode of action Application of these compounds to precision crop farming
	Industrial Microbiology and Bioresource Science	NAKAJIMA-KAMBE Toshiaki	Isolation and screening of microorganisms with potential for bioproduction/biotransformation. (plastic degradation, biotransformation of oil/fat-related biomass, and methane conversion)
	Bioindustrial Resources	WATANABE N. Kazuo OGUCHI Taichi	Biodiplomacy, conservation and sustainable use for genetic resources, Biosafety on transgenic plants, Access for bioresources and its appropriation
	Animal Cell Biotechnology	ITO Yuzuru	① Basic technology of the regenerative medicine using human stem cells (Quality control, mass cultivation, differentiation) ② Developmental biology (Mechanisms of organ development and regeneration using the knowledge of model organisms)
	Bio-Environmental Control Engineering	UTSUMI Motoo	Diversity and function analysis of marine and freshwater microorganisms and its role in cycling of matter, Bio eco-engineering
	Food System	KITAMURA Yutaka KOKAWA Mito	Post-harvest technologies, Processing of functional foods, Conversion and utilization of biomass and food waste, Non-destructive analysis of food quality using light
	Biological and Material Cycles	YANG Yingnan	① Photocatalytic technology, Solar light utilization system, ② Bioreactor, High efficiency conversion and effective utilization of bioresources, Renewable energy
Agro-biological Sciences Field	Plant Stress Biology	*FUJITA Yasunari (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Molecular elucidation of stress tolerance mechanisms in plants ② Development of environmental stress-tolerant crops
	Animal Functional Biology	*SAKUMOTO Ryosuke (Institute of Livestock and Grassland Science, NARO)	① Factors involved in the animal productive functions. ② Study on animal reproductive biology, especially on the establishment of pregnancy and its maintenance in ruminants. ③ Development of effective technique to improve reproductive performance of domestic animals

Agro-biological Sciences Field	Insect Functional Regulation	*TABATA Jun (Institute for Plant Protection,NARO)	① Chemical ecology of insects and associated plants ② Development of insect functional regulation techniques based on chemical ecological studies
	Climate Change Impact Assessment on Vegetation	*MATUI Tetsuya (Forestry and Forest Products Research Institute(FFPRI))	① Relations between distributions of forest vegetation and climatic conditions ② Impact assessment and adaptation planning of climate change on forest ecosystem functions and ecosystem services ③ Ecological study on the beech forests at their northern natural range limit
	Tropical Forestry	*TANI Naoki (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Improvement of tropical forestry using indigenous genetic resources in Southeast Asian tropical forest ② Reproductive biology in Southeast Asian tropical forest and its application to sustainable forest management
Agricultural Economics and Sociology Field	International Agriculture and Forestry Development	*IIYAMA Miyuki (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Trends and prospects of international agriculture research agendas on global food systems. ② Sustainable agricultural intensification of smallholder systems.
	Regional Forest Resource Development	*ISHIZAKI Ryoko (Forestry and Forest Products Research Institute(FFPRI))	① Identification of social conflicts over forest resources ② Study on how to lead rural development by utilizing forest resources
source Environment Engineering Field	Rural Environment Improvement	*MIYAMOTO Teruhito *YOSHIMOTO Shuhei (Institute for Rural Engineering,NARO)	① Irrigation and drainage management in farmland ② Modeling, measurement and interpretation of mass and energy flow in soil ③ Hydrological investigations and conservation of groundwater resources in rural areas
	Nano and Micro-scale Food Analysis	*MANO Junichi *GENKAWA Takuma (Institute of Food Research,NARO)	① Microbial control of food with ionizing radiation. ② Quality changes of food components by oxidative stresses.
	Sustainability of Biomass Resources	*KOSUGI Akihiko (Japan International Res. Center for Agricultural Sci. (JIRCAS))	Development of biomass utilization technology using microbial function
	Regional Forest Resource Development	*YAMADA Tatsuhiko (Forestry and Forest Products Research Institute (FFPRI))	① Development of lignin based functional bio-materials ② Chemical conversion of cellulosic biomass for preparing useful chemicals, liquid fuels and fuel additives Rapid analysis of lignocellulosics to evaluate potential of forest biomass

Applied Biochemistry Field	Animal Bioresource Engineering	*OGURA Atsuo (RIKEN) *INOUE Kimiko (RIKEN)	① Characterization of the germ cell genome using a nuclear transfer technique ② Analysis of the mechanisms for zygotic gene activation using a nuclear transfer technique ③ Development of techniques for preservation of male germ cells
	Evolutionary Biology of Symbiosis	*FUKATSU Takema (AIST)	① Biological function, evolution and origin of endosymbiotic associations between insects and microorganisms ② Molecular, physiological and regulating mechanisms underlying sophisticated inter-organismal interactions in symbiosis, parasitism, manipulation and sociality
	Molecular Neurobiology	*DOI Motomichi (AIST)	① Molecular analysis of nervous-system formation and maintenance ② Development of screening systems for neuronal dysfunctions and diseases ③ Development of in-vivo imaging methods for neuronal functions
	Applied Bioengineering of Microbial Ecosystems	*TAMAKI Hideyuki (AIST)	① Culturing the uncultured fastidious microorganisms in the environment and exploring their novel biological functions ② Omics-driven discovery of novel microbial and genetic resources ③ Ecophysiology and diversity of uncultured microorganisms in the environments (gut, plants, deep subsurface, etc.)
	Food Molecular Engineering	*KOBORI Toshiro （Institute of Food Research,NARO)	① Screening and utilization of biomolecules for sensing food quality. ② Analyses on structure-function relationship of advanced glycation end products.

*Adjunct professor of the Cooperative Graduate School (not assigned an academic advisor's position for research students [kenkyusei]).

★The faculty member marked with ★ is a dual-role faculty member and cannot be a primary supervisor.

(＊) Please contact the Chair of Doctoral Program in Life and Agricultural Sciences (e-mail: shigemori.hideyuk.fn#@#u.tsukuba.ac.jp）) in regard to this research field. (*Replace "#@#" with "@".)

Master's Program in Geosciences / Geoenvironmental Science Field

The Master's Program in Geoscience provides fundamental knowledge and practical skills as a prerequisite both for further study in doctoral programs and for professional life. This program comprises two major fields: Geoenvironmental Sciences and Earth Evolution Sciences. The former is comprised of eight research fields (human geography, regional geography, geomorphology, hydrological science, atmospheric science, geographical information science, terrestrial water cycle system, and atmosphere-ocean interaction system). The latter is comprised of seven research fields (paleobiological science, paleogeosphere science, geodynamics, planetary resource geology, petrology, mineralogy, and earth historical analysis). The research fields of the faculty members are listed in the table below.

Field of Research	Faculty	Detailed Description of Research Field
Human Geography	MATSUI Keisuke jiji@geoenv.tsukuba.ac.jp	Cultural geography, Geography of tourism and religion, Theory of cultural tourism
Regional Geography	KUREHA Masaaki mkureha@geoenv.tsukuba.ac.jp TSUTSUMI Jun jtsu@geoenv.tsukuba.ac.jp	Regional geography of Europe and Japan, Geography of tourism Regional geography of Australia, Urban geography, GIS
Geomorphology	IKEDA Atsushi aikeda@geoenv.tsukuba.ac.jp HATTANJI Tsuyoshi hattan@geoenv.tsukuba.ac.jp SEKIGUCHI Tomohiro sekiguchi@ied.tsukuba.ac.jp	Cold region geomorphology, Permafrost monitoring, Mountain environments Hydrogeomorphology, Landslides, Rock weathering, Karst geomorphology Sedimentary processes, Bedform, Experiment
Hydrological Science	ASANUMA Jun asanuma@ied.tsukuba.ac.jp SUGITA Michiaki sugita@geoenv.tsukuba.ac.jp TSUJIMURA Maki mktsuji@geoenv.tsukuba.ac.jp YAMANAKA Tsutomu tyam@geoenv.tsukuba.ac.jp	Hydrometeorology, Land-vegetation-atmosphere System, Atmospheric Turbulence Hydrology, Evapotranspiration, Lakes Groundwater hydrology, Groundwater and surface water interaction, Water governance in watershed Water and material cycle, Isotopic tracer, Eco-hydro-meteorology
Atmospheric Science	UEDA Hiroaki hueda.hiroaki.gm@u.tsukuba.ac.jp UENO Kenichi ueno.kenichi.fw@un.tsukuba.ac.jp MATSUEDA Mio mio@ccs.tsukuba.ac.jp	Atmosphere-ocean-land interaction involved in the climate system Precipitation system studies, Mountain meteorology, land-atmosphere interaction, Local climate observation Ensemble prediction, Predictability of weather and climate
Geographical Information Science	KUSAKA Hiroyuki kusaka@ccs.tsukuba.ac.jp Matsushita Bunkei matsushita.bunkei.gn@u.tsukuba.ac.jp MORIMOTO Takehiro tmrmt@geoenv.tsukuba.ac.jp	Urban climatology, Mountain meteorology, Applied meteorology (wind energy prediction, biometeorology) Remote Sensing, GIS, Global Environment, Water Quality of Lakes Agricultural and Rural geography, Sustainability of agriculture and rural area, GIS
Analysis of Environmental Dynamics	ONDA Yuichi onda@geoenv.tsukuba.ac.jp KATO Hiroaki kato.hiroaki.ka@u.tsukuba.ac.jp	Transfer of radionuclides in Environment, Hydro-geomorphology, Forest hydrology Forest hydrology, Soil erosion, Environmental radioactivity

Water-related Disaster Science	IIZUKA Satoshi iizuka@bosai.go.jp SHIMOKAWA Shinya simokawa@bosai.go.jp SHUSSE Yukari shusse@bosai.go.jp	Atmosphere-ocean interaction ,Meteorological disaster, Extreme event Physical oceanography, Coastal disasters, Marine ecosystem Clouds and precipitation meteorology, Rader meteorology
Ocean-Atmosphere Interaction System	ISHII Masayoshi maish@mri-jma.go.jp KAJINO Mizuo kajino@mri-jma.go.jp	Oceanography, Atmosphere-Ocean Interactions, Climate Variations Atmospheric Chemistry, Aerosol-Cloud-Radiation Interactions

Master's Program in Geosciences / Earth Evolition Science Field

Paleobiological Science	AGEMATSU Sachiko agematsu@geol.tsukuba.ac.jp TANAKA Kohei koheitanaka@geol.tsukuba.ac.jp	Conodont, Graptolite, Tentaculite, Paleozoic historical geology of Southeast Asia Vertebrate paleontology and paleoecology
Paleogeosphere Science	SUGIHARA Kaoru sugihara.kaoru.fu@u.tsukuba.ac.jp KAMATA Yoshihito yoshi_kamata@geol.tsukuba.ac.jp FUJINO Shigehiro shige-fujino@geol.tsukuba.ac.jp	Coral reef geology/ecology, Geopark Geological evolution of Southeast Asia Sedimentology and stratigraphy, Geological records of tsunamis in Japan and Asian countries
Geodynamics	YAGI Yuji yagi-y@geol.tsukuba.ac.jp UJIIE Kohtaro kujiie@geol.tsukuba.ac.jp OKUWAKI Ryo rokuwaki@geol.tsukuba.ac.jp	Earthquake rupture process and seismicity Structural geology and tectonics Seismic source processes of earthquakes and non-earthquakes
Petrology	TSUNOGAE Toshiaki tsunogae@geol.tsukuba.ac.jp IKEHATA Kei ikkei@geol.tsukuba.ac.jp	Petrology of metamorphic rocks, Collisional orogeny, Gondwana Volcanology, Geochemistry
Planetary Resource Geology	MARUOKA Teruyuki maruoka.teruyuki.fu@u.tsukuba.ac.jp FUJISAKI Wataru wataru-fujisaki@geol.tsukuba.ac.jp	Isotope geology, Geochemistry History of life on earth, Tectonics
Mineralogy	KUROSAWA Masanori kurosawa@geol.tsukuba.ac.jp KYONO Atsushi kyono@geol.tsukuba.ac.jp	Mineralogy, Fluid inclusion analysis Mineralogy, Crystallography, Mineral physics

Earth Historical Analysis	KOHNO Naoki kohno@kahaku.go.jp SHIGETA Yasunari shigeta@kahaku.go.jp TSUTSUMI Yukiyasu ytsutsu@kahaku.go.jp	Paleobiology of Cenozoic animals (especially for aquatic animals) Paleobiology of cephalopoda Geochronology

Faculty	Detailed Description of Research Field
TSUJIMURA Maki	Age dating of groundwater/ spring water using CFCs/ tritium, Hydrogeological processes by using the isotopes, Rainfall-runoff processes in mountainous catchment
SUGITA Michiaki	Hydrology, Evapotranspiration, Lakes
ASANUMA Jun	Surface hydrology, Evapotranspiration and precipitation, Precipitation sources, Hydrological cycle, flood and flood mitigation
ONDA Yuichi	Transfer of radionuclides in Environment, Hydro-geomorphology, Forest hydrology
KATO Hiroaki	Forest hydrology, Soil erosion, Environmental radioactivity
SAKAGUCHI Aya	Applications of natural/artificial radionuclides as tracers for environmental dynamics
KAMAE Yoichi	Energy balance among atmosphere-ocean-land system
YAMAJI Keiko	Chemical Interaction between Plants and Microorganisms in the Rhizosphere under stress environments
SUNOHARA Yukari	Action mechanisms of bioactive substances that regulate plant growth or biological functions
SUZUKI Iwane	Photosynthetic mechanism of microalgae, Microalgal biomass and carbon-nitrogen metabolism
MAEDA Yoshiaki	Molecular biology, Genome science, Biotechnology, Production of useful compounds and environmental cleanup with microalgae
NOMURA Nobuhiko	Bacterial cell-cell communication and bacterial biofilm
TOYOFUKU Masanori	Microbiology
LEI Zhongfang	Biological waste and wastewater treatment, Biogranulation, Resource and energy recovery
YUAN Tian	Anaerobic digestion for waste and wastewater treatment, Toxicity assessment and remediation of environmental pollutants
UTSUMI Motoo	Aquatic Biogeochemistry and Engineering
ENOMAE Toshiharu	Environmental Materials Science
ISHII Astushi	Development and management of irrigation systems, Water resources evaluation for development, Participatory irrigation management
KAMIJO Takashi	Vegetation dynamics on volcano and revegetation of volcanically devastated sites
KAWADA Kiyokazu	Conservation and restoration of ecosystems
YOKOI Tomoyuki	Insect ecology, Behavior and life history of bees, Pollination service and conservation of flower-visiting insects

HIROTA Mitsuru	Ecosystem Ecology, Plant Physiological Ecology, Carbon cycle and greenhouse gases (GHGs) dynamics in terrestrial ecosystem, Response to environmental change in alpine ecosystem: species, community and ecosystem components
OMORI Yuko	Marine Biogeochemistry, Oceanic carbon cycle and sea-air interaction
MURAKAMI Akinobu	Landscape planning, Urban and rural planning
YAMAMOTO Sachiko	Architectural planning, Regional planning
YABAR Helmut	Integrated waste management systems: policy and planning; environmental impact assessment; GIS for environmental management: applications in flood analysis, air pollution analysis, waste and wastewater management, renewable energy potential
MIZUNOYA Takeshi	Environmental economics, Environmental policy, Comprehensive evaluation of environmental policy and technology, Socio-environmental system simulation
KAIDA Naoko	Environmental psychology, environmental economics, pro-environmental behavior, environmental decision-making
NASAHARA Kenlo	Environmental monitoring and disaster prevention using satellite remote sensing
MATSUSHITA Bunkei	Remote Sensing, Geo-ecology, Modeling
※ ADACHI Yasuhisa	Fundamental of colloid science and its application to soil and water
KOBAYASHI Motoyoshi	Environmental and Colloidal Engineering、Aggregation and Dispersion of Colloids, Electrokinetics
YAMASHITA Yuji	Colloid facilitated Transportation. Colloidal Aspects of Humicsubstances.
KAJIYAMA Mikio	Synthetic study on material sciences, Synthesis and properties of hybrid polymers
MATSUI Kenichi	Environmental dispute resolution and diplomacy; rural development and sustainability; environmental/water ethics and law; environmental and agricultural policies for sustainability; environmental disaster policies
ISODA Hiroko	Mechanisms behind functional food resources for potential applications in food and cosmetics
MIYAMAE Yusaku	Chemical control of cellular protein stability and its biological function Screening and mechanism analysis of bioactive substances that modulate intracellular metabolism
TAKAHASHI Shinya	Risk sciences of radiation and chemicals, Plant molecular biology/Plant physiology, Environmental impact assessment
TAMURA Kenji	Promotion of environmental education, Environmental conservation in the semi-arid region, Soil conservation of artificial forest
ASANO Maki	Soil Science
UCHIDA Taro	Policy and planning of natural disaster prevention, Sediment disaster mitigation, Watershed management
YAMAKAWA Yosuke	Forest science, Risk assessment and mitigation for natural disasters

TAKAMI Akinori [National Institute for Environmental Studies]	Observation and analysis of air pollution including PM2.3 in East Asia and study of its health and climate impact
SUGATA Seiji [National Institute for Environmental Studies]	Simulation and analysis of regional air pollutants and related analyses including observation and meteorology
NAGASHIMA Tatsuya [National Institute for Environmental Studies]	Studies on Asian air pollution and its effects using chemical transport model
TIN Tin Win Shwe [National Institute for Environmental Studies]	Environmental medicine, Air pollution and behavioral assessment, Air pollution and behavioral assessment

※ The faculty member marked with ※ will be retired by March 31,2024.

Faculty	Detailed Description of Research Field
KUREHA Masaaki	Geography of Tourism
MATSUI Keisuke	Human Geography
IKEDA Atsushi	Geomorphology
UENO Kenichi	Atmospheric Science
YAMANAKA Tsutomu	Hydrologic Science
HATTANJI Tsuyoshi	Geomorphology
YAGI Yuji	Seismology
OKUWAKI Ryo	Seismology, Earthquake and non-earthquake source processes, Seismic array processing, Environmental seismology
KAMATA Yoshihito	Paleogeosphere Science, Accretionary Geology, Micro-biostratigraphy
NAKAYAMA Takeshi	Plant Systematic Taxonomy
ISHIDA Kenichiro	Plant and Protist Phylogeny and Systematics
DEGAWA Yousuke	Mycology, Plant Systematic Taxonomy
TANAKA Kenta	Population Biology, Plant Reproductive Ecology
TOQUENAGA Yukihiko	Theoretical Ecology
OHASHI Kazuharu	Plant Evolutionary Ecology
SATO Yukie	Behavioral Ecology, Evolutionary Ecology
ENOMAE Toshiharu	Environmental Materials Science
KAMIJO Takashi	Plant Ecology
TAMURA Kenji	Soil Science
TSUMURA Yoshihiko	Forest Genetics, Molecular Ecology
SEINO Tatsuyuki	Forest Ecology
KOHOROKI Katsuhisa	Forest Resource Sociology
TACHIBANA Satoshi	Forest Resource Economics
OBATAYA Eiichi	Wood Materials Engineering
NAKAGAWA-IZUMI Akiko	Wood Science
TSUDA Yoshiaki	Molecular Ecology, Population Genetics
KAWADA Kiyokazu	Plant Ecology
YAMAKAWA Yosuke	Erosion Control Engineering, Forest Hydrology
TSUJIMURA Maki	Aquatic Environmental Science
HIROTA Mitsuru	Ecosystem Ecology
MATSUI Kenichi	Environmental Policy
YOKOI Tomoyuki	Insect Ecology, Behavioral Ecology, Conservation Ecology
YAHATA Kensuke	Arthropod Systematics and Comparative Morphology

MORIYA Shigeharu （RIKEN）	Biomass Utilization ,Biological Symbiosis, Microbial Ecology, Molecular Evolution
TANI Naoki （JIRCAS: Japan International Research Center for Agricultural Sciences）	Tropical Forest Management, Molecular Ecology
MASAKI Takashi （Forest Research and Management Organization）	Forest Ecology
MATSUI Tetsuya （Forest Research and Management Organization）	Vegetation Science, Impact of Climate Change