

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 Chtridiomycota) 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	SHOJI Akiko	① Behavioural ecology and ecophysiology in free-ranging animals ② Biotransport by top predators from marine to terrestrial ecosystems
	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 Yukihiro	① Experimental ecology with field and laboratory populations ② Theoretical biology with mathematical models
	HIROTA Mitsuru	① Plant response to environmental changes, perspective from ecology ② Ecosystem ecology focused on carbon cycling in terrestrial ecosystem
	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
	KON Koetsu	① Species interactions of marine organisms ② Human-impacts on faunal communities in coastal habitats
	SATO Yukie	① Behavioral ecology and evolutionary ecology in terrestrial arthropods ② Geographic variation in behavior and ecology, and speciation

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
	SATOH Shinobu	① Studies on the molecular mechanism of recovery from injury and tissue reunion in incised stems ② Studies on the regulation of root functions by environment & hormones and roles of organic substances in xylem sap
	SUZUKI Iwane	① Acclimation of photosynthetic apparatus to environmental stress ② Mechanisms of perception of the environmental signals in photosynthetic organisms ③ Basic research for the production of useful metabolites by metabolic engineering of algae
	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- <i>Rhizobium</i> symbiosis ② Studies on molecular mechanism of nitrogen nutrient response in plants
	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 <i>Drosophila</i> ③ Mechanism regulating germline-stem-cell maintenance in <i>Drosophila</i>
	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	<ul style="list-style-type: none"> ① Genetic analysis of selective protein degradation ② Cell biology of the ubiquitin family ③ Knockout mice analysis of the ubiquitin system
	NAKANO Kentaro	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> ① Perception and signaling mechanisms for abiotic stress response and sugar accumulation in plants ② Production of pharmaceutical proteins with plant biotechnology ③ Production and evaluation of genome editing crops
	SAKAMOTO Kazuichi	<ul style="list-style-type: none"> ① Molecular and physiological analysis of anti-ageing (skin, hair, muscle, loco, longevity, behavior, etc) by using model animals ② Molecular and physiological analysis of preventive medicine (obesity, diabetes, stress tolerance, etc) by using model animals ③ Application studies for anti-aging and wellness by using bioactive substances (phytochemicals, fermented materials, etc)
	MIYAMURA Shinichi	<ul style="list-style-type: none"> ① Cell biological studies on evolution of sex in eukaryotic algae ② Studies on sexual reproduction of marine green algae
	ISHIKAWA Kaori	<ul style="list-style-type: none"> 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
	TSURUTA Fuminori	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> ① Plastid evolution via secondary endosymbioses ② Plastid division machinery in microalgae ③ Genome evolution in microalgae
Genomics and Bioinformatics	INAGAKI Yuji	<ul style="list-style-type: none"> 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
	NAKADA Kazuto	<ul style="list-style-type: none"> ① Functional morphology of mammalian mitochondria ② Generation of mouse models for mitochondrial DNA-based diseases ③ Therapeutics for mitochondrial DNA-based diseases
	NAKAMURA Kouji	<ul style="list-style-type: none"> 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
	HASHIMOTO Tetsuo	<ul style="list-style-type: none"> ① Molecular phylogeny of eukaryotic micro-organisms ② Molecular evolutionary studies on mitochondria and mitochondrion-related organelles
	KUWAYAMA Hidekazu	<ul style="list-style-type: none"> 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

	SAWAMURA Kyoichi	<ul style="list-style-type: none"> ① Evolutionary Genetics ② Genetic analysis of hybrid inviability and sterility in <i>Drosophila</i> ③ Genetic analysis of sexual isolation in <i>Drosophila</i> ④ Interspecific introgression in natural populations of <i>Drosophila</i>
	HARADA Ryuhei	<ul style="list-style-type: none"> ① Computational Biophysics and Theoretical Biology ② Molecular dynamics simulations for analyzing biological functions ③ <i>In silico</i> drug design based on molecular simulations
Advanced Cellular Biology	ITO Yuzuru	<ul style="list-style-type: none"> ① Basic technology of the regenerative medicine using human iPS/ES/somatic stem cells ② Mechanisms of organ development and regeneration
Advanced Cellular Biology	*OHNISHI Makoto (NIH, Tokyo)	<ul style="list-style-type: none"> ① Comparative study of genomic diversities of enteric bacterial pathogens ② Study on genomic diversification by DNA transformation
	*NAGAMUNE Kisaburo (NIH, Tokyo)	<ul style="list-style-type: none"> 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
	*SHITARA Hiroshi (IGAKUKEN, Tokyo)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> 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
	* HOSOYA Tsuyoshi (National Museum of Nature and Science)	<ul style="list-style-type: none"> ① Phylogeny, taxonomy, and evolution of inoperculate discomycetes ② Biodiversity of plant-fungus relationship
	*MASAKI TAKASHI (FFPRI, Tsukuba)	<ul style="list-style-type: none"> ① Population ecology of woody plants ② Structure and dynamics of forest ecosystem ③ Growth management of forests
	*TAJIMA Yuko	<ul style="list-style-type: none"> ① Life history on marine mammals ② Comparative morphology on marine mammals ③ Health assessments on marine mammals
	*FUJIWARA Sumire (AIST, Tsukuba)	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> ① Research and development of biomass utilization process ② Research and development of symbiosis based biotechnology ③ meta- and single-cell transcriptome analysis

*Adjunct Professor of the Cooperative Graduate School

Master's Program in Agro-Bioresources Science and Technology

(* E-mail address: add following domain name: @u.tsukuba.ac.jp . Or replace “#” with “@” .)

	Field of Research	Faculty	Detailed Description of Research Field
Agro-biological Sciences Field	Plant Breeding	OHSAWA Ryo YOSHIOKA Yosuke TSUDA Mai	① Study on conservation 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	HAYASHI Hisayoshi 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	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 Studies on reproduction and their applications for the conservation of animal genetic resources. ② Holistic approaches toward the development of sustainable animal production system. ③ Development of the novel healthy lean meat production system.
	Plant Parasitic Mycology	YAMAOKA Yuichi OKANE Izumi ISHIGA Yasuhiro	① Systematics of plant parasitic fungi including symbiotic fungi, particularly rust fungi, blue stain fungi, endopytes and mycorrhizal fungi. ② Studies on ecology and physiology of these fungi. ③ Functional analysis of genes associated with disease resistance in plant.

Agro-biological Sciences Field	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
	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 Dissection of protein domain function of a novel DNA methylation enzyme. ② Molecular function of cis-acting memory elements in vernalization. ③ Cold-sensing in vernalization. ④ De-vernalisation in annual and perennial 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	SHIGENO Ryuichi shigeno.ryuichi.gb@ SHUTO Hisato shuto.hisato.ke@
Farm Business and Agribusiness Management		UJIE Kiyokazu ujie.kiyokazu.gf@	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 tachibana.satoshi.gn@	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 kohroki.katsuhisa.gu@	<ul style="list-style-type: none"> 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 marcos.neves.ga@	<ul style="list-style-type: none"> 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	ADACHI Yasuhisa adachi.yasuhisa.gu@ KOBAYASHI Motoyoshi kobayashi.moto.fp@	<ul style="list-style-type: none"> 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	NOGUCHI Ryoza noguchi.ryozo.gm@	<ul style="list-style-type: none"> 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 24dakenlo#@gmail.com YAMAKAWA Yosuke yamakawa.yosuke.ga@	<ul style="list-style-type: none"> 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 Astushi ishii.atsushi.fu@	<ul style="list-style-type: none"> ① Development and management of irrigation systems ② Water resources evaluation for development ③ Participatory irrigation management
	Farmland System Engineering	KOBAYASHI Motoyoshi kobayashi.moto.fp@ YAMASHITA Yuji yamashita.yuji.gm@	<ul style="list-style-type: none"> ① Farmland engineering, soil conservation engineering ② Soil Physics, Environmental materials
	Bioproduction and Machinery	NOGUCHI Ryoza noguchi.ryozo.gm@ Tofael AHAMED tofael.ahamed.gp@	<ul style="list-style-type: none"> 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 kitamura.yutaka.fm@	<ul style="list-style-type: none"> 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 nakagawa-izumi.a.gm@	<ul style="list-style-type: none"> 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
	Engineering of Biomaterials	ENOMAE Toshiharu t#@#enomae.com OBATAYA Eiichi obataya.eiichi.fu@ KAJIYAMA Mikio kajiyama.mikio.fp@	<ul style="list-style-type: none"> ① Creation of paper-based electronics and sensors ② Conservation of aging books housed in library 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	<ul style="list-style-type: none"> 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 Biosynthesis of aroma compounds ④ Semiochemicals mediating interactions among insects, plants and animals ⑤ Mechanisms how to accumulate various metals in plants
	Genomic Biology	FUKAMIZU Akiyoshi TANIMOTO Keiji	<ul style="list-style-type: none"> 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 ttanaka#@#tara.tsukuba.ac.jp	<ul style="list-style-type: none"> 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 ichikawa.sosaku.fn@ 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 Microbiology	NOMURA Nobuhiko nomura.nobuhiko.ge@ UTADA, Andrew S. TOYOFUKU Masanori	① Bacterial cell- cell communication and biofilm formation
Cell Cultivation Engineering	AOYAGI Hideki aoyagi.hideki.ge@	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 kashiwabara.shin.fw@	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.

Applied Biochemistry Field	Ecological Molecular Microbiology	TAKAYA Naoki NAKAMURA Akira YING Bei-Wen TAKESHITA Norio	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 <i>Thermus thermophilus</i> 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
	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
	Fungal Interaction and Molecular Biology	HAGIWARA Daisuke	① Activating fungal secondary metabolism by biological interactions. ② Elucidating molecular mechanisms underlying the fungal interaction. ③ Investigating fungal physiology and ecology in complex environments.
	Science for Food Functions	MIYAZAKI Hitoshi	① Exploration study on food-derived functional compounds for the prevention and improvement of lifestyle-related disease ② Exploration study on food-derived functional compounds for the prevention and improvement of fertility of livestock and human
	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. Isolation and structure elucidation of new bioactive compounds (antimicrobial, antitumor, etc.) from unexplored microorganisms.
	Plant Physiology	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 about model organisms)
	Ecological and Environmental Systems Engineering	ZHANG Zhen Ya	Production of high functional materials from biomass resources
	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*)	Biomass and food waste conversion and utilization, Post-harvest technologies, Processing of functional foods, Non-destructive analysis of food
	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 yasuf#@@affrc.go.jp (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Molecular elucidation of stress tolerance mechanisms in plants ② Development of environmental stress-tolerant crops
	Biological Regulation in Insects	*SHIMODA Masami (NARO, Institute of Agrobiological Sciences)	① Regulatory mechanisms in insect growth and development ② Optical response in insects and its use in pest management ③ Recycling of organic wastes using insects
	International Food Production and Development Sciences	*MURANAKA Satoru smuranaka#@@affrc.go.jp (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Morphological and physiological characterization of cowpea breeding materials for the development of machine-harvestable varieties. ② Physiological mechanism of tuber initiation and growth of White Guinea yam, <i>Dioscorea rotundata</i> .
Agro-biological Sciences Field	Climate Change Impact Assessment on Vegetation	*MATSUI Tetsuya tematsui#@@affrc.go.jp (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 ntani#@@affrc.go.jp (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

Bioresource Environment Engineering Field	Rural Environment Improvement	*MIYAMOTO Teruhito teruhito@#affrc.go.jp *YOSHIMOTO Shuhei Shuy#@#affrc.go.jp (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
	Biosphere Informatic Control Engineering	*MOTOBAYASHI Kota kmoto#@#affrc.go.jp (NARO)	① Fundamental technologies for agricultural machinery ② Advanced informatic and communication technologies (ICT) for agricultural machinery
	Sustainability of Biomass Resources	*KOSUGI Akihiko akosugi#@#affrc.go.jp (Japan International Res. Center for Agricultural Sci. (JIRCAS))	① Development of biomass utilization technology using microbial function
	Regional Forest Resource Development	*YAMADA Tatsuhiko yamadat#@#affrc.go.jp (Forest & Forest Products Res. Inst)	① Development of lignin based functional bio-materials ② Chemical conversion of cellulosic biomass for preparing useful chemicals, liquid fuels and fuel additives ③ Rapid analysis of lignocellulosics to evaluate potential of forest biomass
Applied Biochemistry Field	Animal Bioresource Engineering	*OGURA Atsuo *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 using microinsemination
	Plant Environmental Genomics	*HABU Yoshiki (NARO)	① Genomics of Plant Responses to Environmental Stresses. ② Epigenomic Engineering of the Plant Genome.
	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	*KIMURA Nobutada (AIST)	① Culturing the uncultured beneficial and fastidious microorganisms from the environment ② Exploration and elucidation of unidentified functions in novel biological and genetic resources and their application for bio-industries ③ Environmental metagenomics-driven discovery of novel microbial genetic resources ④ Ecophysiology of environmental microorganisms contributing to energy production and environmental remediation

	Food Molecular Engineering	*KOBORI Toshiro (NARO)	① Screening and utilization of biomolecules for sensing food quality. ② Analyses on structure-function relationship of advanced glycation end products.
Agricultural Economics and	Rural Development Study	*FURUYA Jun furuya#@#affrc.go.jp (Japan International Res. Center for Agricultural Sci.(JIRCAS))	① Identification of the socio-economic factors and conditions for sustainable agriculture development in the Asian and African countries ② World food model analysis, impacts of global warming on agriculture and food security

Faculty members marked by (*) cannot be assigned as thesis director, but can advise the student under the direction of a qualified thesis director within the same research field.

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

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

Water-related Disaster Science	SHIMOKAWA Shinya simokawa@bosai.go.jp MISUMI Ryohei misumi@bosai.go.jp SHUSSE Yukari shusse@bosai.go.jp	Physical oceanography, Coastal disasters, Marine ecosystem Rader meteorology, Natural disasters Clouds and precipitation, Rader meteorology
Ocean-Atmosphere	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 Evolution 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 UJIE Kohtaro kujie@geol.tsukuba.ac.jp	Earthquake rupture process and seismicity Structural geology and tectonics
Petrology	TSUNOGAE Toshiaki tsunogae@geol.tsukuba.ac.jp IKEHATA Kei ikkei@geol.tsukuba.ac.jp	Petrology of metamorphic rocks, Collisional orogeny, Gondwana Petrology of igneous rocks, Economic geology, Volcanology, Geochemistry
Planetary Resource Geology	MARUOKA Teruyuki maruoka.teruyuki.fu@u.tsukuba.ac.jp	Isotope geology, Geochemistry
Mineralogy	KUROSAWA Masanori kurosawa@geol.tsukuba.ac.jp KYONO Atsushi kyono@geol.tsukuba.ac.jp	Composition and behavior of fluid in crust Mineralogy, Crystallography, Mineral physics

Degree Programs in Life and Earth Sciences

<p>Earth Historical Analysis</p>	<p>KOHNO Naoki kohn@kahaku.go.jp</p> <p>SHIGETA Yasunari shigeta@kahaku.go.jp</p> <p>TSUTSUMI Yukiyasu ytsutsu@kahaku.go.jp</p>	<p>Paleobiology of Cenozoic animals (especially for aquatic animals)</p> <p>Paleobiology of cephalopoda</p> <p>Geochronology</p>
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Faculty	Detailed Description of Research Field
TSUJIMUA Maki	Age dating of groundwater/ spring water using CFCs/ tritium, Hydrogeological processes by using the isotopes, Rainfall-runoff processes in mountainous catchment
SUGITA Michiaki	Land surface –atmosphere interactions. Hydrology and meteorology near the surface and in boundary layer, Hydrological processes and environmental changes in arid and semi-arid region
ASANUMA Jun	Surface hydrology, Boundary layer meteorology, Land-atmosphere interaction
ONDA Yuichi	Transfer of radionuclides in Environment, Hydro-geomorphology, Forest hydrology
KAMAE Yoichi	Energy balance among atmosphere-ocean-land system
MATSUSHITA Bunkei	Remote Sensing, Geo-ecology, Modeling
ISHII Astushi	Development and management of irrigation systems, Water resources evaluation for development, Participatory irrigation management
NOMURA Nobuhiko	Bacterial cell-cell communication and bacterial biofilm
TOYOFUKU Masanori	Microbiology
UTSUMI Motoo	Aquatic Biogeochemistry and Engineering
ZHANG Zhenya	Production of highly functional materials from biomass resources
LEI Zhongfang	Development of wastewater treatment technologies based on ecosystem engineering
SHIMIZU Kazuya	Aquatic environmental remediation for sustainable water use Water-purify engineering
YAMAJI Keiko	Chemical Interaction between Plants and Microorganisms in the Rhizosphere
TAMURA Kenji	Promotion of environmental education, Environmental conservation in the semi-arid region, Soil conservation of artificial forest
ADACHI Yasuhisa	Fundamental of colloid science and its application to soil and water
KOBAYASHI Motoyoshi	Farmland engineering, soil conservation engineering
ENOMAE Toshiharu	Environmental Materials Science
KAJIYAMA Mikio	Synthetic study on material sciences, Synthesis and properties of hybrid polymers

KAMIJO Takashi	Vegetation dynamics on volcano and revegetation of volcanically devastated sites
SATOH Shinobu	Adaptation mechanism of plant to environmental factors
SUZUKI Iwane	Photosynthetic mechanism of microalgae, Microalgal biomass and carbon-nitrogen metabolism
YOKOI Tomoyuki	Evolutionary ecology of flower visiting insects
HIROTA Mitsuru	Carbon cycle and greenhouse gases (GHGs) dynamics in terrestrial ecosystem, Response to environmental change in alpine ecosystem: species, community and ecosystem components
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
YABAR Helmut	Integrated waste management systems: policy and planning, GIS based environmental modeling, environmental impact assessment
MIZUNOYA Takeshi	Comprehensive environmental evaluation, Numerical Simulation, Environmental economic policy
NASAHARA Kenlo	Environmental monitoring and monitoring with satellite remote sensing
MURAKAMI Akinobu	Landscape planning, Urban and rural planning
KAI DA Naoko	Environmental psychology, environmental economics, pro-environmental behavior, environmental decision-making
YAMAMOTO Sachiko	Architectural planning, Regional planning
ISODA Hiroko	Mechanisms behind functional food resources for potential applications in food and cosmetics
MIYAMAE Yusaku	Mechanism analysis of bioactive substances that modulate intracellular metabolism Chemical control of cellular protein stability and its biological function
VILLAREAL Myra Orlina	Natural products functional analysis including effects on pigment cells (Melanogenesis and Melanoma Research)
SAKAGUCHI Aya	Applications of natural/artificial radionuclides as tracers for environmental dynamics
UCHIDA Taro	Policy of natural disaster prevention, Strategy for natural disaster prevention, Risk management against natural disaster Risk assessment and mitigation for Natural disasters Crisis management for natural Disasters
KATO Hiroaki	Forest hydrology, Soil erosion, Environmental radioactivity
KUMAGAI Yoshito	Toxicity of environmental chemicals and biological response against its action
TAKAMI Akinori	Observation and analysis of air pollution including PM2.3 in East Asia and study of its health and climate impact
SUGATA Seiji	Simulation and analysis of regional air pollutants and related analyses including observation and meteorology

Degree Programs in Life and Earth Sciences

NAGASHIMA Tatsuya	Studies on Asian air pollution and its effects using chemical transport model
TIN Tin Win Shwe	Environmental medicine, Air pollution and behavioral assessment, Air pollution and behavioral assessment
KOIKE Eiko	Biological analysis for the effects of environmental pollutants on immune system
AKITSU Tomoko	Environmental dynamic analysis
Asano Maki	Soil Science
OMORI Yuko	Environmental dynamic analysis
KAWADA Kiyokazu	Conservation and restoration of ecosystems
TAKAHASHI Shinya	Risk sciences of radiation and chemicals, Plant molecular biology/Plant physiology, Environmental impact assessment
YAMAKAWA Yosuke	Forest science, Risk assessment and mitigation for natural disasters

Master's Program in Mountain Studies

<http://mountain-studies.tsukuba.ac.jp/en/toppage/>

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
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
OHAHI 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

Degree Programs in Life and Earth Sciences

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
HIRANO Yuichiro (Forest Research and Management Organization)	Forest Policy, Natural Resource Management