

Master's Program in Geoscience

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
Geoenvironmental Sciences 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	※MATSUOKA Norikazu matsuoka@geoenv.tsukuba.ac.jp IKEDA Atsushi aikeda@geoenv.tsukuba.ac.jp HATTANJI Tsuyoshi hattan@geoenv.tsukuba.ac.jp SEKIGUCHI Tomohiro sekiguchi@ied.tsukuba.ac.jp	Experimental geomorphology, Rock weathering, Slope processes Periglacial 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, Arid-regions, Lakes Tracer hydrology, Groundwater flow and its age in various regions, Rainfall-runoff process in mountainous watershed Water and material cycle, Isotopic tracer, Eco-hydro-meteorology
	Atmospheric Science	UEDA Hiroaki hueda.hiroaki.gm@u.tsukuba.ac.jp TANAKA Hiroshi tanaka@ccs.tsukuba.ac.jp UENO Kenichi ueno.kenichi.fw@un.tsukuba.ac.jp	Atmosphere-ocean-land interaction involved in the climate system General circulation of the atmosphere, Energetics, Low-frequency variability Precipitation system studies, Mountain meteorology, land-atmosphere interaction, Local climate observation
	Geographical Information Science	KUSAKA Hiroyuki kusaka@ccs.tsukuba.ac.jp MORIMOTO Takehiro tmrmt@geoenv.tsukuba.ac.jp	Urban climate, Local wind, Wind power prediction, Dynamical Agricultural and Rural geography, Sustainability of agriculture and rural area, GIS
	Terrestrial Water Cycle System	SHIMOKAWA Shinya simokawa@bosai.go.jp MISUMI Ryohei misumi@bosai.go.jp SHUSSE Yukari shusse@bosai.go.jp	Physical oceanography, Coastal disasters, Marine ecosystem Radar meteorology, Natural disasters Detailed Description of research Field: Clouds and precipitation, Radar meteorology
	Atmosphere-Ocean Interaction System	ISHII Masayoshi maish@mri-jma.go.jp KAJINO Mizuo kajino@mri-jma.go.jp	Oceanography, Atmosphere-Ocean Interactions, Climate Change Atmospheric Chemistry, Aerosol-Cloud-Radiation Interactions
Earth Evolution Science	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, Paleobiology
	Paleogeosphere Science	※1 HISADA Ken-ichiro hisadak@geol.tsukuba.ac.jp KAMATA Yoshihito yoshi_kamata@geol.tsukuba.ac.jp FUJINO Shigehiro shige-fujino@geol.tsukuba.ac.jp	Sedimentary basin analysis and reconstruction Geological evolution of Southeast Asia Sedimentology and stratigraphy, Geological records of tsunamis in Japan and Asian countries

Earth Evolution Science Field	Geodynamics	YAGI Yuji yagi-y@geol.tsukuba.ac.jp UJIIE Kohtaro kujie@geol.tsukuba.ac.jp	Earthquake rupture process and seismicity Structural geology and tectonics
	Petrology	※2 ARAKAWA Yoji varaka@geol.tsukuba.ac.jp TSUNOGAE Toshiaki tsunogae@geol.tsukuba.ac.jp IKEHATA Kei ikkei@geol.tsukuba.ac.jp	Petrology and petrochemistry of igneous rocks Petrology of metamorphic rocks, Collisional orogeny, Gondwana Petrology of igneous rocks, Economic geology, Volcanology, 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
	Planetary Resource Geology	MARUOKA Yeryuki maruoka.teruyuki.fu@u.tsukuba.ac.jp	Isotope geology, Geochemistry
	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

※1 The faculty member marked with ※1 will be retired by March 31,2021.

※2 The faculty member marked with ※2 will be retired by March 31,2022.

Master's Program in Biological Sciences

The chief aim of the Master's Program in Biological Sciences is to produce good scientists and professionals who have the research ability and scholarship necessary to achieve creative study. The core of the Biological Sciences Master's Program is basic biology, but the program also covers applied biology. The Master's Program comprises eight major fields, which are complementary to each other:

- 1) Systematics and Evolutionary Biology
- 2) Ecology
- 3) Plant Physiology and Developmental Biology
- 4) Animal Physiology and Developmental Biology
- 5) Molecular and Cellular Biology
- 6) Genomics and Bioinformatics
- 7) Advanced Cellular Biology
- 8) Advanced Molecular Biology

Degrees to be awarded in the program are Master of Science and Master of Biological Science. To receive a Master's degree, students are required to take a minimum of 30 credits, write a research thesis, and pass a final examination. All of the compulsory subjects and part of the elective subjects will be held in English (or bilingually) on demand.

Students who are interested in the program should study the research fields of faculty members listed in the table below, and contact a possible supervisor beforehand; the e-mail addresses of the faculty members are available at <http://www.mbs.life.tsukuba.ac.jp/e/index.html>. In addition, the program promotes collaboration with various national and private research institutes and laboratories located in and around Tsukuba (the Cooperative Graduate School System).

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
	NAKANO Hiroaki	① Evolution, development, morphology, and ecology of placozoans, <i>Xenoturbella</i> , and echinoderms ② Origins and evolution of deuterostomes and metazoans ③ Diversity and evolution of marine invertebrates
	NAKAYAMA TAKESI	① Classification of protists including microalgae based on ultrastructural characters and molecular phylogenetic analyses ② Searching for new useful algae for algal biomass research
	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
Ecology	TANAKA Kenta	① Ecological and genetic mechanism of survival, reproduction and adaptive evolution of field plants ② Evolutionary biology focusing adaptive genes of wild Arabidopsis in the natural fields ③ Population and community ecology of tropical rain-forest, cool temperate forest, sub-alpine grassland and alpine region
	TSUDA Yoshiaki	① Population genetics and inference of past and future demographic dynamics of forest trees 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

Ecology	OHASHI KAZUHARU	① Foraging behavior of pollinators with special reference to their cognitive abilities ② Ecological and evolutionary interactions between angiosperms and their pollinators
	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
	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
	WATANABE Kazuo	① Evaluation, conservation and use of genetic diversity ② Environmental biosafety risk assessment and risk communication on genetically engineered organisms (LMOs), Biodiplomacy ③ Plant polyploid genetics
	ONO Michiyuki	① Molecular mechanism of photoperiodic induction of flowering ② Plant Biotechnology
	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
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 ascidians ② Metamorphosis of ascidians ③ Evolution of chordates
	※FURUKUBO-TOKUNAGA, Katsuo	① Molecular genetics of brain development in <i>Drosophila</i> ② Molecular genetics of learning and memory in <i>Drosophila</i> ③ Molecular genetics of human psychiatric diseases in <i>Drosophila</i>
	CHIBA Chikafumi	① Molecular mechanism of adult newt body-part regeneration ② Induction and regulatory mechanisms of transdifferentiation
	NIWA Ryusuke	① Studies of insect steroid hormone biosynthesis and its roles in development, reproduction, and aging ② Studies of neuro-endocrine control of germline stem cell proliferation in the fruit fly <i>Drosophila melanogaster</i> ③ Structure biology and chemical biology of insecticides
	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
	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
	MIURA Kenji	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	① Molecular and physiological analysis of anti-ageing (skin, hair, muscle, locomotion, 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)
	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
	MIYAMURA Shinichi	① Cell biological studies on evolution of sex in eukaryotic algae ② Studies on sexual reproduction of marine green algae
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
	NAKADA Kazuto	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	① Biochemical and molecular biological analysis of many roles of bacteriophages, ranging from fundamental biological research to their use in 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	① Molecular phylogeny of eukaryotic micro-organisms ② Molecular evolutionary studies on the origin and early divergences of eukaryotes
	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

Genomics and Bioinformatics	SAWAMURA Kyoichi	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>
Advanced Cellular Biology	*ABE Kuniya (RIKEN, Tsukuba)	① Systematic analyses of gene expression, epigenetic regulation and genomic reprogramming processes during development of embryonic stem cells and primordial germ cells ② Developmental genetics of early mammalian embryogenesis
	*ITO Yuzuru (AIST, Tsukuba)	① Basic technology of the regenerative medicine using human iPS/ES/somatic stem cells ② Mechanisms of organ development and regeneration about model organisms
	*OHNISHI Kazuo (NIH, Tokyo)	① Immunity to infectious diseases ② Antibody producing B cell differentiation ③ Function of cadherin-family molecules in immune system
	*OHNISHI Makoto (NIH, Tokyo)	① Comparative study of genomic diversities of enteric bacterial pathogens ② Study on genomic diversification by DNA transformation
	*HIROSE Keiko (AIST, Tsukuba)	① Structural studies of protein molecules using electron microscopy and computer image analysis ② Motile mechanism of molecular motor proteins
	*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
	*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
	*MATUI 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	*TANIGUCHI Akiyoshi (National Institute for Materials Science, NIMS, Tsukuba)	① Study of interactions between nanoparticles and cells ② Development of cellular functional nanobiomaterials
	*HOSINO TAMOTU (AIST, Tsukuba)	① Ecological adaptation of fungi in cold environments ② Industrial application of cold-adapted fungi
	*HOSOYA Tsuyoshi (National Museum of Nature and Science)	① Phylogeny, taxonomy, and evolution of inoperculate discomycetes ② Biodiversity of plant-fungus relationship
	*HOSOYA Masaki (Fujifilm Corporation, Kanagawa)	① Basic studies for drug discovery/development with human iPS cells ② Controlling cellular differentiation with low-molecular compounds ③ Characterization of the cells to be used for regenerative medicine and /or drug discovery/development
	*MASAKI TAKASHI (FFPRI, Tsukuba)	① Population ecology of woody plants ② Structure and dynamics of forest ecosystem ③ Growth management of forests
	*TAJIMA Yuko	① Life history on marine mammals ② Comparative morphology on marine mammals ③ Health assessments on marine mammals

Advanced Molecular Biology	*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 SIGEHARU (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 31,2021.

Note: *Adjunct Professor of the Cooperative Graduate School

Master's Program in Agro-Bioresources Science and Technology

The two-year Master's Program in Agro-Bioresources Science and Technology is comprised of four main research fields covering of a wide range of disciplines, with as many as 66 individual specialties. The four main research fields are Agro-biological Sciences, Agricultural Economics and Sociology, Bioresource Environmental Engineering, Applied Biochemistry and the Biosystem Sciences Course.

The program aims both to provide fundamental knowledge of comprehensive life sciences including agriculture, biology, and environmental sciences as a prerequisite for further study in a three-year doctoral course, and to provide the wide spectrum of practical skills in technologies needed to succeed as a professional in the area. The Biosystem Sciences Course was established to train graduates with practical knowledge and skills for success in bio-industry.

In addition, the Professional Training Program in International Agricultural Research was established in August 2010 as part of the Project for Establishing Universities for Internationalization (Global 30). Students involved in this program receive priority for entry into a doctoral program after completion of the master's course. The Biodiplomacy Course requires enrolment in the base courses of the Master's Program together with specialized classes. The course aims at developing human resources who can be competitive in policy, regulatory, and industrial matters related to biotechnology and bioresources; therefore, the course includes international and inter-disciplinary aspects. The course is managed in English within existing programs: the Master's Program in the Biosystem Course of the Master's Program in Agro-bioresources Sciences & Technology. The fields of research of the faculty members are listed in the table below.

(* 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 Genetics and Breeding	OHSAWA Ryo osawa.ryo.gt@ YOSHIOKA Yosuke yoshioka.yosuke.fw@ TSUDA Mai Tsuda.mai.fu@	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
	Crop Science	NOMURA Koji nomura.koji.gb@	① Physiological and ecological research for raising grain yield and quality of crop plants ② Physiological research on the mechanisms and control of stress tolerance in crop plants
	Olericulture and Floriculture	EZURA Hiroshi ezura.hiroshi.fa@ FUKUDA Naoya fukuda.naoya.ka@ MATSUKURA Chiaki matsukura.chiaki.fw@ ARIIZUMI Tohru ariizumi#@#gene.tsukuba.ac.jp KANG Seung Won kang.seungwon.ga@ NONAKA Satoko nonaka#@#gene.tsukuba.ac.j	① Molecular and physiological dissections of useful traits involved in agricultural production in vegetables and ornamentals ② Development of genetic engineering and intensive production technologies for vegetables and ornamentals ③ Genetics and genomics for fleshy fruit (Solanaceae and Cucurbitaceae) research and development
	Pomology and Postharvest Physiology of Fruits	SUGAYA Sumiko sugaya.sumiko.fw@ SEKOZAWA Yoshihiko sekozawa.yoshihik.ga@	① Study on physiological, biochemical, and molecular mechanisms of fruit maturation and bud dormancy of the fruit tree ② Study on postharvest physiology of fruit ③ Study on the effects of environmental stress on reproduction and fruit production of fruit tree
	Animal Science	TAJIMA Atsushi tajima.atsushi.gb@ ASANO Atsushi asano.atsushi.ft@	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.
	Crop Production System	HAYASHI Hisayoshi hayashi.hisayoshi.gt@	① Establishment of sustainable crop production systems with conscious of environment load ② Development and utilization of high level and stable production systems on millets regional special crops ③ Development of production systems in the viewpoint of productivity and quality of forage rice ④ Development and evaluation of food education systems in formal and continuing education
	Plant Molecular Biology	SHIBA Hiroshi shiba.hiroshi.gm@	① Molecular mechanisms of epigenetic regulation in heterosis ② Molecular mechanisms of epigenetic regulation in sexual plant reproduction ③ Epigenetic engineering of plant development

Agro-biological Sciences Field	Metabolic Network Biology	KUSANO Miyako kusano.miyako.fp@ WANG Ning wang.ning.fu@	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
	Disease Vector Control	TAYLOR, DeMar taylor.de.mar.ge@	① Hormonal and nutritional regulation of reproduction in ticks and other arthropods ② Immune responses and their regulatory mechanisms in ticks and other arthropods ③ Effects of nutrition and immune regulatory mechanisms on the vector capacity of ticks
	Plant Parasitic Mycology	YAMAOKA Yuichi yamaoka.yuichi.gp@ OKANE Izumi okane.izumi.fw@ ISHIGA Yasuhiro ishiga.yasuhiro.km@	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	※KAINOH Yooichi kainoh.yooichi.gf@ FURUKAWA Seiichi furukawa.seiichi.ew@	① Biological control and chemical ecological approaches in pest management ② Insect immune mechanisms against pathogens and parasitoids ③ Elucidating volatile compound-mediated plant-plant and plant-insect communications using molecular biology approaches
	Forest Ecotopology	KAMIJO Takashi kamiyo.takashi.fw@ KAWADA Kiyokazu kawada.kiyokazu.gu@	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 tsumura.yoshihiko.ke@ SEINO Tatsuyuki seino.tatsuyuki.gw@	① Conservation genetics of tropical tree species, and phylogeography of forest tree species and genetic study of local adaptation ② Study on conservation of regional resources
	Epigenetics	BUZAS Diana Mihaela buzas.mihaela.ka@	① The role of DRE2 in stress responses in Arabidopsis. ② Characterization of the role of iron metabolism and iron-sulfur cluster biogenesis components in maternal gene activation in the central cell gamete. ③ Physiological studies of vernalisation in perennial crucifers.
	Functional Analysis of Agro-forest Microorganisms	*HATTORI Tsutomu hattori#/#affrc.go.jp (Forestry and Forest Products Research Institute(FFPRI))	① Studies on wood decay mechanisms, ecology and physiology of wood decaying fungi ② Studies on effects of forest managements on wood-inhabiting fungi ③ Studies on taxonomy and phylogeny of wood decaying fungi
	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
	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> .
	Functional Utilization of Beneficial Insects	*KIMURA Kiyoshi kimura#/#affrc.go.jp (NARO Institute of Livestock and Grassland Science (NILGS))	① Improvement of Honeybee health for the advancement of apiculture ② Genetic improvement in characteristics of honeybees to contribute to apiculture ③ Research on characterization and utilization of pollinator insects
	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

Agro-biological Sciences Field	Tropical Forestry	*TANI Naoki ntani#u@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
	Agricultural and Bioresource Economics	SHIGENO Ryuichi shigeno.ryuichi.gb#u.tsukuba.ac.jp SHUTO Hisato shuto.hisato.ke#u.tsukuba.ac.jp	① Agricultural policy and economic development in the globalized world economy ② Quantitative analysis of food demand ③ Industrial organization of agribusiness
Agricultural Economics and Sociology Field	Resource Management and Development Studies	MATSUSHITA Shusuke matsushita.shusuk.gb#u.tsukuba.ac.jp	① Development of Decision Support System for Farm Management Agency ② Analysis of Risk Management and Consumers' Behavior on Agricultural Products and Food ③ The Possibility and Extension of Smart Agriculture for Farm Management and Food Distribution System
	Farm Business and Agribusiness Management	NOHGUCHI Ruriko nohguchi.ruriko.fw#u.tsukuba.ac.jp UJIE Kiyokazu ujie.kiyokazu.gf#u.tsukuba.ac.jp	① Farm production and supply economics under the risk ② Farm and agribusiness firm management and marketing ③ Food consumption and consumer policy
	Rural Sociology and Agricultural History	✕KATO Morihiro kato.morihiro.ft#u.tsukuba.ac.jp	① Historical study on agriculture and rural communities of Japan ② Study on 17-19 th centuries manuals of agricultural technology
	Forest Resource Economics	TACHIBANA Satoshi tachibana.satoshi.gn#u.tsukuba.ac.jp	① Study on forest economics and policy ② International comparative study on management and utilization of forest resources ③ International comparative study on production and marketing of forest products
	Forest Resources Sociology	KOHROKI Katsuhisa kohroki.katsuhisa.gu#u.tsukuba.ac.jp	① Historical study of forest management in Japan ② Socioeconomic study on regional forest management in Japan ③ Comparative study on forestry organizations
	Rural Development Study	*FURUYA Jun furuya#u@affrc.go.jp KOBAYASHI Shintaro (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
	Regional Forest Resource Development	*HIRANO Yuichiro hiranoy#u@affrc.go.jp (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
Bioresource Environment Engineering Field	Food Resources Engineering	Marcos Antonio das NEVES marcos.neves.ga#u.tsukuba.ac.jp	① Micro / nano-engineering for advanced bioresource processing ② Micro/ nano-channel 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#u.tsukuba.ac.jp KOBAYASHI Motoyoshi kobayashi.moto.fp#u.tsukuba.ac.jp	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.ryoza.gm#u.tsukuba.ac.jp	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

Bioresouce Environment Engineering Field	Watershed Conservation	NASAHARA (NISHIDA)Kenlo 24dakenlo#@@gmail.com YAMAKAWA Yosuke yamakawa.yosuke.ga#@@#u.tsukuba.ac.jp	① Mechanism of sediment production and transport ② Sabo planning in harmony with natural environment ③ Watershed management planning
	Water Resources Management Engineering	ISHII Astushi ishii.atsushi.fu#@@#u.tsukuba.ac.jp	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#@@#u.tsukuba.ac.jp YAMASHITA Yuji yamashita.yuji.gm#@@#u.tsukuba.ac.jp	① Farmland engineering, soil conservation engineering ② Soil Physics, Environmental materials
	Bioproduction and Machinery	NOGUCHI Ryoza noguchi.ryoza.gm#@@#u.tsukuba.ac.jp Tofael AHAMED tofael.ahamed.gp#@@#u.tsukuba.ac.jp	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 ④ Process analytical technology for postharvest engineering using spectroscopy
	Protected Area and Wildlife Management	※ITO Taiichi ito.taiichi.ft#@@#u.tsukuba.ac.jp	① Ideas behind protected areas ② Planning methods of natural areas ③ Management of recreational use ④ Wildlife management in protected areas
	Rural Environment Improvement	*TARUYA Hiroyuki taruya#@@#affrc.go.jp (National Inst. for Rural Engineering)	① Planning methodology for improving the productive function and living environment in rural and semi-mountainous areas ② Evaluation technologies for hydrological and ecological environment in rural areas
	Biosphere Informatic Control Engineering	* MOTOBAYASHI Kota kmoto#@@#affrc.go.jp (Institute of Agricultural Machinery, NARO)	① Fundamental technologies for agricultural machinery ② Advanced information and communication technologies (ICT) for agricultural machinery
	Agri-Food Process Engineering	KITAMURA Yutaka kitamura.yutaka.fm#@@#u.tsukuba.ac.jp	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	※OHI Hiroshi oi.hiroshi.gm#@@#u.tsukuba.ac.jp NAKAGAWA-IZUMI Akiko nakagawa-izumi.a.gm#@@#u.tsukuba.ac.jp	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 t#@#enomae.com OBATAYA Eiichi obataya.eiichi.fu#@#u.tsukuba.ac.jp KAJIYAMA Mikio kajiya.mikio.fu#@#u.tsukuba.ac.jp	<ul style="list-style-type: none"> ① Creation of paper-based electronics maintaining general paper functions ② Development of paper sensors by using capillary liquid transport through fiber network ③ Comparison between electronic and paper media in educational effects ④ Synthesis of fluorine containing condensation polymers for composite materials ⑤ Chemical modification of poly (amino acid) 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
	Nano and Micro-scale Food Analysis	*TODORIKI Setsuko setsuko#@#affrc.go.jp (National Food Res. Inst.)	<ul style="list-style-type: none"> ① Microbial control of food with ionizing radiation. ② Quality changes of food components by oxidative stresses.
	Sustainability of Biomass Resources	*KOSUGI Akihiko akosugi#@#affrc.go.jp (Japan International Res. Center for Agricultural Sci. (JIRCAS))	<ul style="list-style-type: none"> ① Development of biomass utilization technology using microbial function
	Regional Forest Resource Development	*YAMADA Tatsuhiro yamadat#@#affrc.go.jp (Forest & Forest Products Res. Inst)	<ul style="list-style-type: none"> 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	Biochemistry of Bioactive Molecules	*MATSUMOTO Hiroshi hmatsu#@#biol.tsukuba.ac.jp 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 photooxidative stresses ③ Biosynthesis of aroma compounds ④ Semiochemicals mediating interactions among insects, plants and animals
	Genomic Biology	FUKAMIZU Akiyoshi TANIMOTO Keiji	<ul style="list-style-type: none"> ① Functional studies on molecular network of transcription factors and chemical modifications ② Aging regulated by nutrition and metabolism ③ Brain function and metabolism ④ Genomic imprinting ⑤ 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

Applied Biochemistry Field	Molecular Microbial Bioengineering	KOBAYASHI Michihiko HASHIMOTO Yoshiteru	① Screening of new metabolism, and functional analysis of 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 nucleic acid-related enzymes and its application to DNA/RNA engineering
	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.
	Bioreaction Engineering	ICHIKAWA Sosaku HIRAKAWA Hidehiko	① Application of polymolecular aggregates for bioprocesses ② Production of useful materials by enzymes and microorganisms
	Applied Microbiology	NOMURA Nobuhiko nomura.nobuhiko.ge#@u.tsukuba.ac.jp Andrew S. UTADA	① Bacterial cell-cell communication and biofilm formation
	Cell Cultivation Engineering	AOYAGI Hideki aoyagi.hideki.ge#@u.tsukuba.ac.jp	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
	Biomimetic Chemistry	()	① Enzyme isomerism leading chiral homogeneity ② Characterization of polyelectrolyte complex ③ Polymer chemistry for exploration and simulation of biological functions
	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.
	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.

Applied Biochemistry Field	Molecular and Cellular Chronobiology	*() (AIST)	① Mammalian circadian clock genes and application for diseases (sleep abnormality.) ② Molecular Circadian clock of Drosophila (clock and Neurodegeneration) ③ Clock genes, lipid metabolism and torpor ④Molecular Biological model of Parkinson's and Gaucher disease
	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
	Molecular and Developmental Biology	※BABA Tadashi baba.tadashi.g##@#u.tsukuba.ac.jp KASHIWABARA Shin-ichi kashiwabara.shin.fw##@#u.tsukuba.ac.jp	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	① Environmental response and morphogenesis of filamentous fungi ② Enzymology and molecular biology of microbial enzymes ③ Bacterial metabolisms and communication
	Science for Food Functions	MIYAZAKI Hitoshi miyazaki.hitoshi.gb##@#u.tsukuba.ac.jp	① Exploration study on food-derived functional compounds for the prevention and improvement of lifestyle-related disease. ②Exploration study on food-derived functional compounds for the prevention and improvement of fertility of livestock and human.
	Environmental Soil Chemistry	TAMURA Kenji ASANO Maki	① Enviromental chemistry of forest soils ② Soil ecological studies on soil organic mastter ③ Soil conservation under grassland in Eurasian steppe
	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

Graduate School of Life and Environmental Sciences

Course of Biosystem Sciences	Genetic Resource Science and Technology	NOMURA Nakao OGUCHI Taichi	Development of sustainable agriculture, Forestry and fisheries industry using bioengineering technique Transgenic plant design, Environmental risk assessment of transgenic plants, Research on Food safety of transgenic plants
	Bioindustry and Bioscience	SHIGEMORI Hideyuki YAMADA Kosumi NAKAJIMA-KAMBE Toshiaki WATANABE N. Kazuo ITO Yuzuru (AIST)*	Naturally occurring bioactive substances, Phototropism, Gravitropism, Flowering, Apical dominance, Allelopathy, Plant growth regulators, New drugs from unexplored natural resources, Preventive medicines of lifestyle-related disease, Environmental preservation-type functional agents Plant growth regulators, Phytohormones, Environmental response in plants, Chemical communication in plants Isolation and screening of microorganisms with potential for bioproduction/biotransformation. (plastic degradation, biotransformation of oil/fat-related biomass, and methane conversion) Biodiplomacy, Assessment of biodiversity, Sustainable use for genetic resource, Biosafety, Access for bioresources and its appropriation Basic technology of the regenerative medicine using human stem cells (Quality control, mass cultivation, differentiation) Developmental biology (Mechanisms of organ development and regeneration about model organisms)
	Eco-system Technology	ZHANG Zhen Ya UTSUMI Motoo	Production of high functional matters from biomass resources Functional analysis of marine microorganisms and its role in cycling of matter, Bio eco-engineering
	Bioresource Development Technology	KITAMURA Yutaka YANG Yingnan	Biomass and food waste conversion and utilization Photocatalytic technology, Solar light utilization system, Bioreactor, High efficiency conversion and effective utilization of bioresources, Renewable energy
	Environmental Symbiosis Science	YOSHIDA Shigeki	Enzyme engineering, Enzyme kinetics, Enzymatic conversion technology, Immobilized enzyme, Glycotechnology, Protein engineering, Biotechnological production of bioresources, Microbial conversion technology, Microbiological control technology

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

(AIST)=National Institute of Advanced Industrial Science and Technology

※ The faculty member marked with ※ will be retired by March 31, 2021.

Students who are interested in the program should study the research fields of faculty members listed in the table above, and contact a possible supervisor beforehand; the e-mail addresses of the faculty members are also available at <http://www.life.tsukuba.ac.jp/programs/kinou/index.html> and <http://www.life.tsukuba.ac.jp/programs/sangyou/index.html>.

Master's Program in Environmental Sciences

<http://www.envr.tsukuba.ac.jp>

The Master's Program in Environmental Sciences was founded in 1977 to provide opportunities of advanced education for graduates as well as reeducation for professionals. The program shifted to the master's program of the Graduate School of Life and Environmental Sciences in 2007. The program has a distinct program of Sustainability Science, Technology, and Policies (SUSTEP) Program, which includes the fields of water resources, climate change, disaster prevention, ecosystem conservation, waste management, and policy and planning. The program accepts students through various types of entrance examinations, such as general examination, examinations for the cooperative graduate school system, and the special examination for reeducation.

Students and faculty in the program carry out interdisciplinary education and research on human environments; these activities are not restricted by the conventions of the student's existing academic fields. No matter whether they are graduates of humanities or science courses, students are welcomed into this program if they have learning ability and have a mind for pursuing environmental sciences with a practical attitude toward social contribution.

This program aims to intensify the students' English communication skills, fuse knowledge and thinking strategies from the humanities and sciences, and foster a practical ability to solve problems. All compulsory common subjects are taught in English; accordingly, students who attend subprograms under SUSTEP would be able to complete the Master's Program in Environmental Sciences through English classes.

Students will be vested with the interdisciplinary fundamental intelligence to identify and resolve environmental problems; this intelligence is composed of the explicable knowledge refined in the natural sciences by analysis and synthesis, the subjective knowledge upon which humanities and sociology are based, the practical intelligence of field science (which is strengthened to make sure of the problems by gazing at the spot), and clinical method (symptoms, diagnosis, and treatment) based on both practical and fused intelligence.

Students are expected to obtain basic analytical skills in natural sciences, humanities, and social science methodologies, practical field work techniques, and experimental skills through a variety of lectures, field exercises, and internship. Students conduct their research under the supervision of an academic mentor, advising instructor, and thesis director; the fields of research of the faculty members are listed in the table below.

Students complete their master's thesis in several phases including approval of the research proposal, announcement of a progress report, and an interim presentation. After passing the review and oral examination by the preliminary examination committee of the program and the final examination by the thesis examination committee of the graduate school, students who have acquired the prescribed credits (more than 30 credits) are awarded the Master's Degree in Environmental Sciences. The standard duration of the program is two years; however, early completion is also available if the student satisfies all the requirements in less than two years.

After completing this program, students are expected to go onto a doctoral program in sustainable environmental studies with the aim of becoming an advanced scholar or practitioner, or to work in an environment-related international organization, company, or civic organization (e.g., NGO or NPO) as a communicator or environmental leader.

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	Land slide mechanism, Remote sensing, Runoff generation mechanism and sediment yield, Soil erosion and environmental issue in forest plantation,
TANAKA Hiroshi	Global circulation, Climate change
UENO Kenichi	Mountain meteorology in the Tibet/Himalayas, Local climate observation, Precipitation system studies,
KUSAKA Hiroyuki	Urbanclimate, Local meteorology, Weather Forecasting, Numerical Simulation
UEDA Hiroaki	Air-sea-land interaction involved in the global climate system
KAMAE Yoichi	Energy balance among atmosphere-ocean-land system
MATSUSHITA Bunkei	Remote Sensing, Geo-ecology, Modeling
NOMURA Nobuhiko	Bacterial cell-cell communication and bacterial biofilm
UTSUMI Motoo	Aquatic Biogeochemistry and Engineering
BETSUYAKU Shigeyuki	Systems understanding of plant-microbe interactions
KUNOU Tatsuki	Microbial control for creating functional materials
Andrew S. UTADA	Applying physics and engineering techniques to understand bacterial behavior and biofilm formation
TOYOFUKU Masanori	Microbiology
ZHANG Zhen Ya	Production of high functional matters 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
MATSUMOTO Hiroshi	Molecular action mechanisms of agrochemicals, Stress responses of plants
YAMAJI Keiko	Chemical Interaction between Plants and Microorganisms in the Rhizosphere

Graduate School of Life and Environmental Sciences

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
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	Physiology of plant adaptation to environmental factors
SUZUKI Iwane	Photosynthetic mechanism of microalgae, Microalgal biomass and carbon-nitrogen metabolism
OMORI Yuko*1	Carbon cycle through marine microorganisms, Dynamics of organic matter in marine environments
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
ADACHI Minaco*1	Carbon cycle of terrestrial ecosystems, process-based model
MATSUI Kenichi	Environmental Ethics
ISODA Hiroko	Mechanisms behind functional food resources for potential applications in food and cosmetics
MIYAMAE Yusaku	Screening and mechanism analysis of bioactive small molecules
VILLAREAL Myra Orlina	Pigment Cell Research (Melanogenesis and Melanoma Research)
KUMAGAI Yoshito	Toxicity of environmental chemicals and biological response against its action
SHINKAI Yasuhiro*1	Environmental toxicology, Cellular defense mechanisms against chemicals
YABAR Helmut	Integrated waste management systems: policy and planning
MIZUNOYA Takeshi	Comprehensive environmental evaluation, Numerical Simulation, Environmental economic policy
NASAHARA Kenlo	Environmental monitoring and monitoring with satellite remote sensing
OHSAWA Yoshiaki	Urban planning, Regional Science, Socio-economic planning
FUJIKAWA Masaki	History of dwelling environment in East Asia, Preservation and renovation of traditional built environment
WATANABE Shun	Architectural planning, Environmental design, CAD,GIS,CG
MURAKAMI Akinobu	Landscape planning, Urban and rural planning
YAMAMOTO Sachiko	Urban planning, Regional planning
KAIDA Naoko	Environmental policy Environmental economic
SHIMPO Naomi	Landscape planning, Urban planning
SUGATA Seiji	Numerical study of regional air pollutants, Material transport in the atmosphere
TAKAMI Akinori	Observation and analysis of air pollution including PM2.3 in East Asia and study of its health and climate impact
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

Faculty members marked with *1 cannot be assigned as thesis director, but they can advise students under the direction of a qualified thesis director within the same research field.

Faculty members marked with *2 will be retired by March 31, 2021.

E-mail addresses of the faculty members are available at <http://www2.envr.tsukuba.ac.jp/eng/>.

Master Degree Program of Mountain Studies

<http://www.life.tsukuba.ac.jp/~sangaku/>

Faculty	Detailed Description of Research Field
MATSUOKA Norikazu	Geomorphology
KUREHA Masaaki	Tourism Geography
MATSUI Keisuke	Human Geography
IKEDA Ttsushi	Geomorphology
UENO Kenichi	Atmospheric Science
YAMANAKA Tsutom	Hydrologic Science
HATTANJI Tsuyoshi	Geomorphology
※HISADA Kenichiro	Stratigraphy
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	Hydrogeomorphology, Geomorphic development
SEINO Tatsuyuki	Forest Ecology
KOHOROKI Katsuhisa	Forest Resource Sociology
TACHIBANA Satoshi	Forest Resource Economics
OBATAYA Eiichi	Wood Materials Engineering
NAKAGAWA 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	Human Geography
YOKOI Tomoyuki	Insect Ecology, Behavioral Ecology, Conservation Ecology

MORIYA Shigeharu (RIKEN)	Biomass utilization ,Biological symbiosis, Microbial ecology, Molecular evolution
TANI Naoki (JIRCAS: Japan International Research Center for Agricultural	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

※The faculty member marked with ※will be retired by March 31,2020

Doctoral Program in Integrative Environment and Biomass Science

The global environment is the common heritage of humankind; all life is dependent upon it. In the 21st century, the fate of the global environment has become a critical issue in both developed and developing countries. To sustain this environment we need to solve two main issues. First, to counter global warming, it is crucial to produce carbon-neutral and renewable energy resources: for instance, biodiesel produced from microalgae has raised the interest of economists and scientists. Second, to conserve high-quality water resources, it is necessary to develop effective techniques (e.g., water purification systems) and management policies (e.g., land management policies). The Integrative Environment and Biomass Science program aims to tackle both of these targets in parallel and harmonically to help create sustainable global and local societies.

To this end, we need to train specialized technical experts and constructive researchers who (a) can perform frontier research on fields related to water, biomass or both, (b) possess broad perspectives on both the environment and biomass energy, (c) have a sense of social responsibility, and (d) can take on an international leadership role. To achieve these goals, the curriculum of the doctoral program includes practical training with our existing project team and an internship in one of the world's leading research institutes.

To widen the background and views of all program participants, the curriculum covers a wide range of specialties. We guide the students' selection of courses through our course advisor system and a multiple tutoring system. We encourage students to join an internship and implement a project in private enterprise, so they become accustomed to project management and the atmosphere of private enterprise. By encouraging students to study in leading foreign institutes, we train people who can work internationally; the entrance exam can be taken in either Japanese or English. We welcome foreign students and people who already work in society. We encourage people with high capacity and ability to obtain a doctoral degree in less than 5 years.

Our objective is to train people who will play an active role in international society, as scientists and policy makers. The faculty members and their major research fields are listed in the table below.

Field of Research	Faculty	Detailed Description of Research Field
Environment and Phycology	(WATANABE Makoto) makoto@biol.tsukuba.ac.jp NAKAYAMA Takeshi algae@biol.tsukuba.ac.jp (YOSHIDA Masaki) yoshida.masaki.gb@u.tsukuba.ac.jp KAWACHI Masanobu* (National Institute for Environmental Studies) kawachi.masanobu@nies.go.jp	① Systematics, phylogeny, cell biology, physiology and ecology of algae ② Collection, culture, screening and mass cultivation of microalgae ③ Bioorganic chemistry of microalgal components related with a renewable energy and bioactive compounds of microalgae ④ Engineering research of oil extraction process from microalgae and process energy balance evaluation and LCA analysis ⑤ Molecular and ecological diversity of environmental microbes and its high-degree application to algal biomass production ⑥ Algal culture collection and the utilization
Regulation of Photosynthetic Metabolism	SUZUKI Iwane iwan6803@biol.tsukuba.ac.jp (MINODA Ayumi) minoda.ayumi.gb@u.tsukuba.ac.jp NAKAJIMA Nobuyoshi* (National Institute For Environmental Studies) naka-320@nies.go.jp	① Optimization of carbon and nitrogen metabolisms involved in the biomass production and interaction among cellular metabolisms in microalgae ② Molecular mechanisms for perception of the environmental factors to acclimatize function of photosynthesis in microalgae ③ Biochemical and molecular biological studies for production of renewable energy from oil-producing algae ④ Elucidation and application of a unique metal metabolism in a sulfo-thermophilic red alga

Field of Research	Faculty	Detailed Description of Research Field
Environmental Plant Physiology	SATOH Shinobu sato.h.shinobu.ga@u.tsukuba.ac.jp IWAI Hiroaki iwai.hiroaki.gb@u.tsukuba.ac.jp FURUKAWA Jun furukawa.jun.fn@u.tsukuba.ac.jp (IRVING Louis John) irving.louis.fb@u.tsukuba.ac.jp	① Regulation of root functions by environment & hormones and role of xylem sap organic substances, Molecular mechanism of recovery from injury and tissue reunion ② Functions of cell wall network in plant morphogenesis and development. ③ Regulation of metal transport, toxicity of metal ions and adaptation mechanisms ④ Carbon / nitrogen interactions between legumes and parasitic plants
Environmental Molecular Microbiology	NAKAMURA Akira nakamura.akira.fm@u.tsukuba.ac.jp	① Development and application of host-vector systems in extreme thermophiles ② Analysis of metabolism of rare sugars and its application
	YING Bei-Wen ying.beiwen.gf@u.tsukuba.ac.jp	① Bacterial growth analyses and prediction by means of data science ② Experimental evolution with <i>E. coli</i>
	TAKAYA Naoki takaya.naoki.ge@u.tsukuba.ac.jp	① Identification and application of novel fungal metabolic mechanisms
Water and Environmental Resources	ONDA Yuichi onda@geoenv.tsukuba.ac.jp MARUOKA Teruyuki maruoka.teruyuki.fu@u.tsukuba.ac.jp KATO Hiroaki hiros980@ies.life.tsukuba.ac.jp (TAKAHASHI Junko) takahashi.junko.ka@u.tsukuba.ac.jp	① Sediment yield and overland flow generation in forest plantations ② Interaction between subsurface water movement and sediment yield ③ Transfer of isotopes in environment by Fukushima NPP accident ④ Geochemistry to detect and understand environmental perturbations ⑤ Global geochemical cycles
Water Environment	MATUSHITA Bunkei matsushita.bunkei.gn@u.tsukuba.ac.jp	① Integrating remote sensing and GIS techniques with an ecosystem process-based model to monitor the global environmental changes ② Analysis and modeling of environmental changes and their causes ③ Conservation of aquatic environments ④ Analysis and improvement of regional and global sustainability

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

Faculty members listed in parentheses cannot be assigned an academic advisor's position, but the listed research projects can be done in collaboration with other academic advisors in the same research field

※1 The faculty member marked with ※1 will be retired by March 31,2021.

※2 The faculty member marked with ※2 will be retired by March 31,2022.

※3 The faculty member marked with ※3 will be retired by March 31,2023.

※4 The faculty member marked with ※4 will be retired by March 31,2024.