# Outline of Graduate School of Agriculture, Kyoto University for 2023

## Division of Agronomy and Horticultural Science

| Research fields【No.】 | Research contents | Research staff |
|---|---|---|
| Crop Science<br>【101】 | Development of theories for efficient and stable production of agricultural crops in harmony with the environment<br>Physiological and ecological research on the characteristics of crops, especially in relation to the interaction of gene and environment on yield and quality<br>Development of technologies to evaluated crop performance in the field | Tatsuhiko Shiraiwa<br>Tomoyuki Tanaka<br>Yu Tanaka |
| Plant Breeding<br>【102】 | Search and isolation of useful genes which are the basis for breeding staple plants such as rice, wheat and soybeans, and physiological analysis of their mechanism of phenotype expression<br>Investigation of the activation mechanism of the transposable element of rice, specifically MITE, isolation of genes by transposon-tagging, and development of molecular markers for useful genes | Shuhei Nasuda<br>Masayoshi Teraishi<br>Takanori Yoshikawa |
| Vegetable and Ornamental Horticulture<br>【103】 | Physiological and ecological researches on the production and quality control of vegetables and ornamental plants, with special emphasis on the development of environmental control techniques, production and propagation techniques for disease-free plants and new breeding techniques by tissue culture | Motoaki Doi<br>Yoshiyuki Tanaka<br>Sho Ohno |
| Pomology<br>【104】 | Physiological and ecological investigation of the whole lifecycle of fruit trees, specifically flowering, pollination physiology, growth and ripeness of fruits; systemic biology of genetic resources of fruit trees; and proliferation and breeding of fruit trees by utilizing a tissue and cell culture system | Ryutaro Tao<br>Hisayo Yamane<br>Soichiro Nishiyama |
| Weed Science<br>【105】 | Weed biology for the establishment of rational weed management programs. Ecological and genetic analyses on the evolution of life history strategies of weeds, the origin and reproductive biology of herbicide resistant biotypes of weeds and alien weeds, crop-weed complex through introgression, and man's impacts on the diversity of weed flora and genetic structure of weed populations. | Shunji Kurokawa<br>Yoshiko Shimono<br>Satoshi Iwakami |
| Plant Production Systems<br>【106】 | Basic and empirical research aimed at clarifying current problems in agricultural production systems in Japan from the perspective of the mechanisms and functions of an agricultural ecosystem, conserving the ecosystems and creating a highly-productive and sustainable agricultural production system | Tetsuya Nakazaki (concurrent)<br>Hiromo Inoue<br>Yu Iwahashi |
| Food Quality Design and Development<br>【107】 | Research on the relationship between food quality and components such as allergenicity, physicochemical characteristics, and physiological functionality of agricultural crops. Research on the quality design and development of components for expanding the uses of agricultural products. | Nobuyuki Maruyama<br>Cerrone S.CABANOS<br>Yuki Matsuoka |
| (Uji)<br>Quality Analysis and Assessment<br>【108】 | Quality analysis and assessment of food crops and processed food materials<br>Food science of emulsions and gels<br>Mechanism of oral sensory reception mainly for taste sensation<br>Analysis of aroma compounds of foods and horticultural plants to reveal their physiological effects | Akira Oikawa<br>Yukako Hayashi<br>Misaki Ishibashi |
| (Farm)<br>Plant Production Control Science<br>【109】 | Physiological, ecological, genetical, and molecular biological basic research and applied research in the agricultural field on important elements for increasing productivity and high-quality production with a decrease in environmental loads among agricultural and horticultural crops | Tetsuya Nakazaki<br>Ryohei Nakano<br>Kazusa Nishimura<br>Ko Motoki<br>Kyoka Nagasaka |

(Uji) Uji Campus …… Gokasho, Uji-shi, Kyoto
(Farm) Experimental Farm of Graduate School of Agriculture, Kyoto University …… Shiroyamadai, Kizugawa-shi, Kyoto

**Division of Forest and Biomaterials Science**

| Research fields【No.】 | Research contents | Research staff |
|---|---|---|
| Forest Resources and Society<br>【201】 | Forest governance and socio-economic studies on forestry and environmental services of forest. Specifically, studies focusing on sustainable forest management, biodiversity conservation, carbon sequestration, customary use of forest, rural livelihood and use of non-timber forest | Koji Matsushita<br>Daisuke Naito |
| Tropical Forest Resources and Environments<br>【202】 | Research on forest ecology, forestry and environmental issues in the tropics. Specifically, functional ecology of forest plants, seedling regeneration and maintenance mechanism of tropical forests, plant-soil interactions, restoration and reforestation of degraded tropical forests, options for sustainable timber production and land-use systems, responses of tropical forests to climate change, and the environmental services of tropical forests | Kaoru Kitajima<br>Yusuke Onoda<br>Takayuki Kaneko |
| Forest Ecology<br>【223】 | Studies on the nutrient-use efficiency of trees, tree eco-physiology, functions of biological diversity, and soil nutrient dynamics to understand the mechanisms of long-term maintenance of forest ecosystems. Studies on the mechanisms of the maintenance of<br>biological diversity, and the biological interactions between insects and plants in forest ecosystems. Ecological studies to achieve | Naoya Osawa<br>Ryota Aoyagi |
| Forest Utilization<br>【203】 | Research on the evaluation of multilateral functions of forests and sustainable utilization of those functions. Specifically, evaluation of the structural development of forests and carbon accumulation in a forest ecosystem, the ecophysiology of tropical and temperate forests, and the investigation of spatio-temporal variation of forest resources using tree ring and stable isotope data, etc. | Masako Dannoura |
| Forest Biology<br>【204】 | Ecological research on plants in forests, the structure and function of communities, the genetic structure of wild populations, forest damage caused by wild animals and insects, and damage prevention and forest protection. Conservation genetics and ecology of forest plants and animals | Yuji Isagi<br>Atsushi Takayanagi<br>Michimasa Yamasaki |
| Landscape Architecture<br>【205】 | Principles, landscape ecology, greenery engineering, landscape planning and environmental design for the protection, conservation, regeneration and creation of landscapes (the nature and culture of the land)<br>Researches on gardening culture, urban revegetation, forest landscapes, the conservation of natural environment and damage mitigation, etc. | Shozo Shibata<br>Katsue Fukamachi<br>Ryo Nukina |
| Erosion Control<br>【206】 | Researches on sediment production and discharge phenomena such as landslide and debris flow, rainfall infiltration and outflow phenomena and their impacts on forests, measures against sediment-related disasters in mountainous terrain, slope greening, and mountain stream environments | Ken'ichiro Kosugi<br>Kana Nakatani<br>Naoya Masaoka |
| Forest Hydrology<br>【224】 | Gas exchange processes between forest and the atmosphere from the photosynthesis and transpiration on an individual leaf scale to the water and carbon fluxes at an ecosystem scale. Hydrological and hydrochemical processes in the forest, soil and stream system of a small catchment. Evaluating forest influences on the watershed management and forest-climate interactions based on the field observations in temperate and tropical forests. | Yoshiko Kosugi<br>Daniel EPRON<br>Ayaka Sakabe |
| Biomaterials Design<br>【207】 | Fundamental investigation and application of physical properties of biomaterials Specifically, 1) Searching physical properties of biomaterials and designing new materials, 2) Fracture and fatigue mechanics of wooden material and wood structural materials, 3) Scientific studies on the affinity of humans and biomaterials | Masashi Nakamura<br>Koji Murata |
| Wood Processing<br>【208】 | Basic and applied researches on the processing and utilization of wood. Specifically, the mechanism of wood cutting, the non-destructive inspection of wooden materials and structures in production and in service, involving the evaluation of wood surface using sensory test and pattern recognition, the analysis of moisture migration in wood drying, detection of physical properties and biodegradation, using acoustic, microwave, millimeter wave and X-ray CT. | Yoshiyuki Yanase<br>Yutaka Sawada |
| Fibrous Biomaterials<br>【209】 | Development and application of advanced utilization methods of biomass<br>The creation of cellulosic functional materials with magnetic processing<br>Crystal structure analysis by X-ray, neutron and solid nuclear magnetic resonance for polysaccharides and physiologically active substances using magnetically aligned samples | Masahisa Wada<br>Kayoko kobayashi |

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| Tree Cell Biology<br>【210】 | Ultrastructure of lignified secondary wall<br>Cytochemical investigation on cell wall formation in woody plants<br>Biosynthesis and accumulation of cell wall components and their functional analysis<br>Topochemical analysis of cell walls and their utilization for biomass resources<br>The relationship between morphological characteristics and solid state properties of biomaterials | Junji Sugiyama<br>Arata Yoshinaga<br>Tatsuya Awano |
| Chemistry of Composite Materials<br>【211】 | Creating excellent functional high-polymer materials from biomass such as wood, cellulose, chitin, and glucose via diverse chemical composition techniques,<br>Specifically, designing and developing biodegradable plastic, liquid crystals, optical materials, adhesive materials, foam and molded materials, magnetic materials, soft materials (gels), etc. | Hiroshi Kamitakahara<br>Mariko Yoshioka<br>Kazuki Sugimura |
| Chemistry of Biomaterials<br>【212】 | Basic and applied chemistry of biomaterials, mainly wood components. (1) Chemical analysis of biomaterials (chemical structure elucidation of lignin carbohydrate complex (LCC) etc.); (2) Development of new reaction of biomaterials (regio-selective reaction of cellulose, electro-oxidation of lignin etc.); (3) Functionalization of biomaterials (preparation of cellulosic LB film for photo-current generation system, new cellulose derivative for drug delivery system etc.). | Toshiyuki Takano<br>Yoshikuni Teramoto |
| Forest Biochemistry<br>【225】 | Molecular and biochemical studies on recycling system of forest biomass by natural organisms. Basic and applied sciences of mushroom-forming fungi with respect to their unique properties such as lignin-degrading system and simple carbohydrate modification of protein. Molecular breeding of bamboos to create a new plant resource, by modifying flowering regulation and/or sugar translocation. These researches are carried out in collaboration with Laboratory of Environmental Interface Technology of Filamentous Fungi (Endowed Chair). | Yoichi Honda<br>Masahiro Sakamoto<br>Takehito Nakazawa<br>Moriyuki Kawauchi |
| (FSERC)<br>Forest Information<br>【213】 | Researches on analyses of environmental changes in forested watersheds, the evaluation of multifunctional roles of forests, and the optimal management of forest resources based on the scientific and sociological valuations.<br>Specifically on 1) mechanisms of material outflow from forests and evaluation of their impacts on water systems, 2) the management of forest resources, wood distribution and consumption processes, 3) the interaction between plant and soil and 4) the proper management based on the ecological knowledge. | Ryunosuke Tateno<br>Kazuya Kobayashi<br>Nao Sakanoue<br>Asami Nakanishi<br>Shunsuke Matsuoka<br>Yoriko Sugiyama |
| (FSERC)<br>Silvicu lture<br>【214】 | Research on biogeochemical cycle in forest ecosystems and the application of ecosystem approaches toward the conservation and development of sustainable and resilient forest ecosystems. Researches on various problems with the production and maintenance of forest resources, such as timber production, and the mechanism of maintenance and restoration of forests. Researches on various problems relating to the preservation, regeneration and adaptation of environmental slope-related species. | Naoko Tokuchi<br>Hisashi Hasegawa<br>Takeshi Ise<br>Masae Ishihara<br>Daisuke Akaishi |
| (RISH)<br>Material Biology<br>【222】 | Synthetic biology and biochemistry of wood formation, and multi-scale structural analysis of wood using scattering, diffraction, and microscopic techniques, which aim for understanding its excellent physical properties in a view of structure.<br>Humanistic research on the relationship between humans and wood using natural scientific methods. | Tomoya Imai<br>Suyako Tazuru<br>Kei'ichi Baba |
| (RISH)<br>Active Bio-based Materials<br>【216】 | Nanostructural analysis of biological resources for the utilization of wood materials<br>Development of high-performance nanomaterials for vehicles and information technology devices using plant biomass resources<br>Solid state properties of wood under high pressure and high temperatures<br>Temperature and humidity control functions of wood in a housing environment<br>Analysis of crystal structure of polysaccharides and their derivatives<br>Analysis of structural functions using computational chemistry, and upgrading their performance with a computer-aided molecular design<br>Deeply understanding the mechanism of how trees support their huge body | Hiroyuki Yano<br>Kentaro Abe<br>Soichi Tanaka |
| (RISH)<br>Sustainable Materials<br>【217】 | Exploring the structure and function of lignocellulosic biomass, and developing environmentally friendly materials that take advantage of its characteristics. In particular, development of novel adhesion system for decarbonization, new wood-based materials using unutilized lignocellulosic biomass, elucidation of aging of wood etc., development of smart materials inspired by the structure and mechanics of wood. | Kenji Umemura<br>Miyuki Matsuo |

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| (RISH)<br>Innovative Humano-habitability<br><br>【218】 | Research and development of the integrated wood protection system<br>Feasibility of wood-degrading agents for environmental bioremediation and new-energy options<br>Diversity of wood-deteriorating organisms in the tropical plantation forests<br>Microtextural analysis of carbonized wood and development of non-platinum cathode catalysts for fuel cells<br>Development of functional materials by fast pyrolysis<br>Diversity of wood degrading organisms in tropical planted forests | Wakako Ohmura<br>Toshimitsu Hata |
| (RISH)<br>Timber Science & Engineering<br><br>【221】 | Development of high performance residential and non-residential timber building made of wood and wood-based composite materials<br>Evaluation of mechanical properties of wooden structural components and connections<br>Examination of bio-deterioration effect on structural performance of timber buildings | Hiroshi Isoda<br>Takafumi Nakagawa |

(FSERC) Field Science Education and Research Center
Forest Station
Ashiu Forest Research Station …… Ashiu, Miyama-cho,Nantan-shi, Kyoto
Hokkaido Forest Research Station …… Tawa, Shibecha-cho, Kawakami-gun, Hokkaido
Wakayama Forest Research Station …… 76 Kamiyukawa, Aridagawa-cho, Arida-gun, Wakayama
Field Station
Kamigamo Experimental Station ……2 Kamigamo Motoyama, Kita-ku, Kyoto
Tokuyama Experimental Station …… Tokuyama-hachikubo, Sunan-shi,Yamaguchi
Kitashirakawa Experimental Station …… Kitashirakawa Oiwake-cho, Sakyo-ku, Kyoto
(RISH) Research Institute for Sustainable Humanosphere …… Gokasho, Uji-shi, Kyoto

## Division of Applied Life Sciences

| Research fields 【No.】 | Research contents | Research staff |
|---|---|---|
| Cellular Biochemistry 【301】 | Researches to understand how mammalian cells sense and respond to the extracellular environment and organize multicellular organism using methods of cell biology, molecular biology, biochemistry, and structural biology. Cell adhesion and extracellular matrix molecules, cytoskeletons, signaling molecules, and membrane transporters, which are related to various diseases, are studied, focusing on various cellular functions such as cell proliferation and differentiation. | Noriyuki Kioka<br>Yasuhisa Kimura<br>Mito Kuroda<br>Atsushi Kodan *1<br>Koh Nagata |
| Biomacromolecular Chemistry 【302】 | Correlations between the molecular structure of biomolecules and the expression of physiological functions<br>Basic analysis of cell kinetics and dynamics<br>Fundamental analysis of bioinformation and application to its integration<br>Practical researches relating to life, environmental, health, and food sciences based on biological measurement such as omics analysis<br>Development of frontier molecular biotechnology such as combinatorial bioengineering and nanobiotechnology | Kenji Sugase<br>Kouichi Kuroda<br>Wataru Aoki |
| Bioregulation Chemistry 【303】 | Organic chemistry and biochemistry of biologically active substances and their structure-activity relationships. Regulation of insect molting and metamorphosis using chemical growth regulators. Searches for insecticidal peptides and plant defense inducing peptides. Chemical regulation of secondary metabolism in plants. Metabolism of auxin plant hormone | Hisashi Miyagawa<br>Masahiro Miyashita |
| Chemical Ecology 【304】 | Characterization of chemical factors related to interactions among organisms and analysis of their ecological significance<br>The main research themes are chemical analyses of physiologically active substances such as insect pheromones, and chemoecological investigation of semiochemicals affecting the mutual interactions between insects and plants<br>Clarification of growth regulation and environmental adaptation mechanisms of insects by hormones | Naoki Mori<br>Hajime Ono<br>Naoko Yoshinaga |
| Plant Nutrition 【305】 | Researches on molecular mechanisms of plant metabolism that convert inorganic nutrients into organic substances, especially on photosynthesis. Inorganic chemistry, biochemistry, structural biology, and molecular biology to understand plant physiological phenomena, such as environmental stress responses. Studies for crop growth promotion, and production of useful substances using plant metabolic functions. | Kentaro Ifuku<br>Masaru Kobayashi<br>Kumiko Ochiai |
| (Uji) Bioenergy Conversion 【306】 | Molecular cell biology research on the mechanism of metabolic stress response in yeast<br>Researches on signal transduction and gene expression | Yoshiharu Inoue<br>Wataru Nomura*1 |
| Fermentation Physiology and Applied Microbiology 【307】 | Screening and application of microbial functions<br>Researches on clarifying microbial metabolism and biosynthesis at enzyme, gene and molecule levels<br>Metabolic engineering for lipids, nucleic acids, amino acids, organic acids, and sugars productions<br>Chiral technology utilizing microbial enzymes<br>Bioenergy production<br>Development of ecosystem controlling technology<br>These researches are carried out in collaboration with Laboratory of Industrial Microbiology (Contributed Chair) | Jun Ogawa<br>Shigenobu Kishino<br>Akinori Ando<br>Makoto Ueda *2<br>Ryotaro Hara *2<br>Michiki Takeuchi *2 |
| Microbial Biotechnology 【308】 | Search for new cellular regulatory functions based on cellular metabolism, gene expression, dynamics of cell structures, and their application to useful metabolite and protein production, innovative resource development and environmental conservation technology. | Yasuyoshi Sakai<br>Hiroya Yurimoto<br>Kosuke Shiraishi |
| Bio-Analytical and Physical Chemistry 【309】 | Clarification of the functions of biodynamic molecules and molecular aggregates relating to energy conversion and information conversion, and application of these functions<br>Oxidation and reduction enzymes, electron transport reactions, photosynthetic reactions, biological membrane iron transportation, biosensors, biofuel cells, etc. | Osamu Shirai<br>Yuki Kitazumi<br>Keisei Sowa |
| Biofunction Chemistry 【310】 | Bioorganic chemical researches to elucidate the mechanisms of enzymes closely related to mitochondrial functions, such as the respiratory enzymes and membrane transporters, based on the design synthesis of chemicals possessing unique physiological activities and the functional characterization of them. | Hideto Miyoshi<br>Masatoshi Murai<br>Takahiro Masuya |

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| (Uji)<br>Applied Structural Biology<br><br>【311】 | X-ray crystal structure analysis and protein engineering of food related proteins and enzymes such as egg albumins, amylase, transglutaminase and serine protease inhibiters<br>The mechanisms of protein folding and unfolding<br>The mechanism of large protein crystal growth for neutron diffraction study | Kimihiko Mizutani |
| (ICR)<br>Chemistry of Molecular Biocatalysts<br><br>【312】 | Studies on the biosynthesis, transport, perception and signaling of plant hormones that regulate growth, development and environmental responses of plants using biochemical, bioorganic chemical and genetic approaches<br>Identification of new plant hormone-like compounds suggested by studies on mutants<br>Manipulation of plant growth and development by using plant hormone-related genes and chemicals | Shinjiro Yamaguchi<br>Kiyoshi Mashiguchi |
| (ICR)<br>Molecular Microbial Science<br><br>【313】 | Studies on the molecular basis of environmental adaptation of extremophilic microorganisms and their application<br>Mechanistic analysis of enzyme reactions and their application<br>Biochemical analysis of specific functions of lipids and proteins in biological membrane and the mechanism of their biosynthesis<br>Mechanistic studies of biogenesis of bacterial extracellular membrane vesicles and their application | Tatsuo Kurihara<br>Jun Kawamoto<br>Takuya Ogawa |
| (RISH)<br>Plant Gene Expression<br><br>【314】 | Isolation and functional analysis of genes related to the transport and accumulation of valuable natural products (secondary metabolites) in higher plants<br>Molecular breeding of plants with these genes<br>Molecular mechanisms of the interaction between plants and rhizosphere microbes<br>Development of plants producing valuable compounds | Kazufumi Yazaki<br>Akifumi Sugiyama<br>Ryosuke Munakata |
| (RISH)<br>Metabolic Science of Forest Plants and Microorganisms<br><br>【315】 | Chemical, biochemical, molecular biological and system biological researches of regulatory mechanisms of lignocellulosic biomass formation in plants<br>Creation of highly durable trees, grass plants which are adaptable to biorefinery, and trees adaptable to a recycling-oriented society<br>Biosynthesis of antitumor lignans<br>Elucidation of supramolecular structures of lignocellulose | Toshiaki Umezawa<br>Yuki Tobimatsu |
| (RISH)<br>Biomass Conversion<br><br>【316】 | Fundamental and applied studies of conversion of lignocellulosic biomass into biofuels, chemicals and functional substances with microorganisms, enzymes and chemical reactions in electromagnetic field<br>Molecular biological and biochemical studies of basidiomycetous fungi for biorefinery and bioremediation; Regulation mechanism of extracellular free radical reactions through secondary metabolites and enzymes<br>Expression and catalytic mechanism of lignin-degrading enzymes<br>Analysis of superfine structure of plant cell wall components and their interaction with cellulolytic enzymes and peptides | Takashi Watanabe<br>Takahito Watanabe<br>Hiroshi Nishimura |

(Uji) Uji Campus …… Gokasho, Uji-shi, Kyoto
(ICR) Institute for Chemical Research …… Gokasho, Uji-shi, Kyoto
(RISH） Research Institute for Sustainable Humanosphere …… Gokasho, Uji-shi, Kyoto
*1 KUIAS, iCeMS
*2 Research Unit for Physiological Chemistry
*3 Laboratory of Industrial Microbiology (Contributed Chair)

**Division of Applied Biosciences**

| Research fields【No.】 | Research contents | Research staff |
|---|---|---|
| Plant Genetics<br>【401】 | Heredity of higher plants, specifically, cytogenetics, population genetics, evolutionary genetics and molecular genetics.<br>Genetic researches on the dynamics of genes and genomes related to environmental adaptation and biotic interaction, intraspecific differentiation, and new species formation. | Kentaro Yoshida<br>Yoshihiro Inoue |
| Crop Evolution<br>【402】 | Researches on crop evolution and plant genetic resources<br>Genetic diversity of crops and closely related wild plants<br>Ethnobotany and Archaeobotany | Ryohei Terauchi<br>Yasuo Yasui<br>Toshiyuki Sakai |
| Plant Pathology<br>【403】 | Biochemical and molecular biological researches on phytopathogens and researches on the interactions between pathogens and plants. Specifically, researches on the infection mechanism of filamentous fungi, the proliferation mechanism of RNA viruses, and the mechanism of plant defense against pathogens. | Yoshitaka Takano<br>Kazuyuki Mise<br>Akira Mine |
| Insect Ecology<br>【404】 | Researches on the ecology of insects, specifically, their life history strategy, behavioral ecology, population dynamics and insect pest management<br>Researches on the evolution of termite reproductive systems<br>Theoretical studies on insect sex ratios<br>Molecular basis of the extended longevity of reproductives in social insects<br>Development of novel termite control technology | Kenji Matsuura<br>Mamoru Takata<br>Kazuya Kobayashi<br>(Field Science Education and Research Center) |
| Insect Physiology<br>【405】 | Molecular endocrinology of insects, focusing especially on hormonal control of molting and metamorphosis<br>Chemical ecology, physiology, and evolution of insect sex pheromones<br>Development of novel genetic tools for genome engineering of non-model insects | Takaaki Daimon<br>Takahiro Ohde |
| Animal Breeding and Genetics<br>【406】 | Molecular biology, molecular genetics, statistical genetics, and systems biology of qualitative and quantitative traits in animals<br>Elucidation of the genetic factors and molecular pathogenesis of diabetes<br>Elucidation of the molecular mechanism of intramuscular fat deposition in humans and cattle<br>Establishment of methods for genetic evaluation, breeding, and preservation of animal resources and rare animals | Norihide Yokoi<br>Yukio Taniguchi |
| Reproductive Biology<br>【407】 | Elucidation of the regulatory mechanism of development from fertilization to implantation in mammals. In particular, epigenetics that control the transition from totipotency to pluripotency. Elucidation of the regulatory mechanism of gene expression involved in germ cell formation. | Naojiro Minami<br>Shuntaro Ikeda<br>Shinnosuke Honda<br>Yoichiro Hoshino<br>(Livestock Farm) |
| Nutritional Science of Animals<br>【408】 | Defensive responses against nutritional variations in the liver, muscle, and adipose tissue and cells. Elucidation of the mechanism underlying adaptive metabolism of micronutrients (vitamins and minerals). Nutritional physiology of beef cattle. Establishment of nutritional science to improve the stress-induced adverse effect. Basic research to improve the health status of companion animals. | Masayuki Funaba<br>Shozo Tomonaga |
| Animal Physiology and Functional Anatomy<br>【409】 | Research on the anatomy, histology and pathophysiology of animals<br>Clarification of the effects of highly functional elements, environmental alteration and pollution on physiological and reproductive functions<br>Researches on functional morphology and its regulation of mammalian reproductive organs | Takeshi Ohta<br>Miki Sugimoto |
| Animal Husbandry Resources<br>【410】 | System research on beef cattle production<br>Research on the conservation of indigenous animal resources<br>Research on the utilization of livestock and feed in tropical regions<br>Utilization of unused resources<br>Research on the use of sensing technologies for animals | Hiroyuki Hirooka<br>Hajime Kumagai<br>Kazato Oishi |
| Fisheries and Environmental Oceanography<br>【411】 | Researches on the aquatic animals' behavior using biologging<br>Researches on the nutrient transport, which allows sustainable production in coastal areas<br>Researches on the mechanisms of eutrophication and hypoxia (oxygen depleted water)<br>Researches on the marine ecosystems<br>Researches on the physical-biological interactions in the sea | Hiromichi Mitamura<br>Kotaro Ichikawa<br>Shiho Kobayashi<br>Satoko Kimura<br>(Center for Southeast Asian Studies)<br>Manabu Kume<br>(Field Science Education and Research Center) |

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| Marine Stock-Enhancement Biology<br><br>【412】 | Physiology and ecology of teleosts, as a basis for stock-enhancement of marine biological resources in a broad sense. Developmental and endocrinological research on flatfish metamorphosis. Studies on morphological abnormality of artificially reared juveniles of teleosts. Molecular genetic research on species diversity, population structure, and interspecific hybridization. Field research on temporal changes of larval fish fauna in a specific area. | Masatomo Tagawa<br>Kouji Nakayama |
| Marine Molecular Microbiology<br><br>【413】 | Molecular microbiological research on the basis for the search for novel marine prokaryotes including (hyper) thermophiles, eukaryotic microorganisms, and viruses, and the development of useful gene resources such as next-generation extreme enzymes and transcriptional control mechanisms. Molecular ecological research on marine microorganisms and viruses based on metagenomic analysis. | Takashi Yoshida<br>Ryoma Kamikawa |
| Marine Environmental Microbiology<br><br>【414】 | Genome analysis and genetic engineering for the production of useful substances such as ω3 fatty acids, carotenoids, and biofuels by microalgae and Labyrinthulea<br>Researches on physiology and ecology of microbes living in extreme environments<br>Researches on molecular mechanisms underlying symbiosis | Shigeki Sawayama<br>Satoshi Nakagawa |
| Marine Bioproducts Technology<br><br>【415】 | Screening of novel bioactive components contributing to our healthy life style from oceanic lives and elucidation of their functional mechanisms based on cellular and molecular biology, especially clarification of effects of marine compounds on the lipid metabolism through nuclear receptors<br>Recent research focuses on preventing obesity, allergy and cardiovascular diseases, and maintaining sound skin | Tatsuya Sugawara<br>Yuki Manabe<br>Shinsuke Mohri |
| Marine Biological Function<br><br>【416】 | Development and utilization of genetic engineering for marine organisms. Elucidation of health promoting functions of aquatic products. Functions of marine/aquatic organisms from molecules to individuals are integrated for exploring new academic field. | Kenji Sato<br>Masato Kinoshita |
| (FSERC)<br>Coastal Fisheries Ecology<br><br>【417】 | Early life history of fish and their habitats; Ontogeny of behavior in fish and invertebrates; Systematics and biogeography of fish and aquatic invertebrates; Ecology of zooplankton and environmental fluctuations; Environmental DNA; Learning and memory of fish and aquatic invertebrates; Symbiotic ecology of estuarine gobies; Impact of terrestrial areas on coastal ecosystems through rivers | Reiji Masuda<br>Yoshiaki Kai<br>Keita Suzuki<br>Kohji Takahashi<br>Yumi Henmi |

Laboratory of Crop Evolution Plant Germ-plasm Institute …… Mozume-cho, Muko-shi, Kyoto
(FSERC) Field Science Education and Research Center
Maizuru Fisheries Research Station…… Nagahama, Maizuru-shi, Kyoto
Livestock Farm …… Kyotanba-cho, Funai-gun, Kyoto

**Division of Environmental Science and Technology**

| Research fields【No.】 | Research contents | | Research staff |
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| Comparative Agricultural Science<br>【501】 | Comparative Agricultural Science | Complex research on various aspects of human-caused environment systems including food, life and the environment, and their mutual relationships across a broad spectrum.<br>For example, genetic improvement in consideration of the domestic and overseas diversity of various livestock as well as regional peculiarities, development and application of measures evaluating land as a socio-ecological system for sustainable land use, elucidation of the mechanism of fruit maturation and development of its applied technology, etc. | Takeshi Miyake<br>Hitoshi Shinjo<br>Ayako Katayama |
| Tropical Agriculture<br>【505】 | Biology and ecology | Clarification of environmental factors, especially water environment, which affect the agricultural productivity in the tropics, The impacts of farming conditions and environment on the eco-physiology of tropical crops, such as upland crops, vegetables and fruits, and their mutual interactions, Research on agricultural ecology in the tropics, Analyses on land use and farming systems in the tropics, The origin and dissemination of tropical crops | Hirokazu Higuchi<br>Tomohiro Kondo |
| Soil Science<br>【506】 | | Dynamics of elements in soil ecosystems, Soil forming processes and classification methods from the tropical to the frigid zones, Interactions of plants and soil in natural ecosystems and cropland ecosystems, Evaluation of soil fertility, Development of environmentally sound land utilization and soil management, Methods making great use of environmental information with GIS and geostatistics | Shinya Funakawa<br>Tetsuhiro Watanabe<br>Makoto Shibata |
| Terrestrial Microbial Ecology<br>【507】 | | Researches on the nature of interactions between microbes and their biotic and abiotic environments in agricultural ecosystems. Special attentions are given to microbe-host interactions and molecular and cellular studies of parasites and symbionts in agricultural and forest plant. These researches are carried out in collaboration with Laboratory of Environmental Interface Technology of Filamentous Fungi (Endowed Chair). | Chihiro Tanaka<br>Akira Yoshimi<br>Yuko Takeuchi<br>Yuki Terauchi *1 |
| Ecological Information<br>【508】 | | Basic and applied research on the ecological control of agricultural pests, especially phytophagous mites and thrips, in agricultural ecosystems.<br>The main research topics include interactions among host plant-pest-predator, and ecology and utilization of natural enemies. | Norihide Hinomoto<br>~~Masahiro Osakabe~~<br>Shuichi Yano |

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| Agricultural Facilities Engineering<br>【509】 | Regional environmental engineering (Water, soil and greenery systems) | Optimization of efficiency and sustainability of irrigation structures through evaluating their safety, fragility and functionality, which is oriented toward comprehensive stock management of the infrastructures for agriculture, incorporating the disciplines of soil and fluid mechanics, environmental science and computational engineering. Development of numerical methods for data assimilation, soil-fluid interaction and granular assemblage. | Kazunori Fujisawa<br>GUO, Jia<br>Shoichi Kiyama<br>KOCH, Michael Conrad |
| Water Resources Engineering<br>【510】 | | Fundamental and applied researches on the planning and management of water resources for agriculture, focusing on sustainable development of irrigation systems as well as conservation and restoration of sound agricultural water environment. Computational fluid dynamics approaches are used for numerical reconstruction of hydraulic phenomena and for identification of optimal management strategies. | Masayuki Fujihara<br>Koichi Unami<br>Junichiro Takeuchi |
| Hydrological Environment Engineering<br>【511】 | | Fundamental and applied researches on irrigation and drainage, hydrology, and soil physics for the sustainable agriculture and the conservation of rural environment through water management. Field work and analysis for the understanding and the meaningful human management of water, hydrogeochemical, and energy cycles in agro-ecosystem. | Kimihito Nakamura<br>Takehide Hama |
| Rural Planning<br>【512】 | | Development of theories and methods on rural planning and rural improvement related to rural land use, infrastructure for agricultural production, infrastructure for rural living environment , conservation of natural environment, conservation of rural landscape and so on as well as practical researches on rural revitalization. | Satoshi Hoshino<br>Kenichiro Onitsuka<br>Mrittika BASU |
| (Institute for Integrated Radiation and Nuclear Science)<br>Radiation Control<br>【516】 | | Basic and applied researches on the risk evaluation and appropriate management of radiation and radioactive materials, including the discharge into the environment, the dynamic state in soil and underwater systems, and the impacts on the environmental organisms and human health. Lectures and experiments are provided at the site of Institute for Integrated Radiation and Nuclear Science in Osaka Kumatori. | Yasuhito Igarashi<br>Yuko Kinashi<br>Hiroshi Yashima |
| Agricultural Systems Engineering<br>【513】 | Regional environmental engineering (Food and energy systems) | System analysis of food production and biomass utilization considering the human and natural environment. Proposal of the food production system based on human nutritional needs and system optimization through environmental impact assessment. Research on cultivation prediction models based on data science. Research on bio-resource circulation by methane fermentation. | Ryozo Noguchi<br>Juro Miyasaka<br>Katsuaki Ohdoi |
| Field Robotics<br>【514】 | | Development of agricultural machinery and robots to produce food<br>Researches on machine intelligence for agricultural robot<br>Application of variable control technology with smart machine<br>Remote sensing to make a diagnosis of crop growth | Michihisa Iida<br>Masahiko Suguri<br>Ryohei Masuda |
| Bio-Sensing Engineering<br>【517】 | | Bio-sensor development<br>Substance identification by spectroscopy<br>Bio-instrumentation and applications for precision livestock and aquaculture<br>Quality evaluation of agri-products and foods<br>Automation and robotization systems within controlled environments<br>Informatization of food production | Naoshi Kondo<br>Yuichi Ogawa<br>Tetsuhito Suzuki<br>Keiichiro Shiraga |

Institute for Integrated Radiation and Nuclear Science …… Asashiro-nishi, Kumatori-cho, Sennan-gun, Osaka

*1 Laboratory of Environmental Interface Technology of Filamentous Fungi (Endowed Chair)

**Division of Natural Resource Economics**

| Research fields【No.】 | Research contents | Research staff |
|---|---|---|
| Agri-food System Management<br>【609】 | Market and management of farm/ agribusiness/ food business, roles of local agricultural organizations, social responsibility and ethics in business management , coordination of price and quality in food system, family farming, cooperatives fair trade, consumer behavior, social systems to maintain food safety, etc. | Hideyuki Tsujimura<br>Yayoi Kito |
| Farm Managerial Information and Accounting<br>【602】 | 1) Managerial development, management control, management information, and accounting structure in family-run, joint management, corporate management and community-run farming<br>2) Development of agricultural service and service business bodies<br>3) Agricultural human-resourcing, career establishment and the development of managerial competency<br>4) Theoretical and empirical researches on joint businesses combining agriculture, commerce and industry, agri-food industrial clusters, etc. | Shusuke Matsushita<br>Haruhiko Iba |
| Regional Environmental Economics<br>【603】 | Theoretical and empirical researches on relations between resource environments and agriculture/forestry in the world, sustainable development, and dynamic optimisation<br>1) Basic theory of regional environmental economics<br>2) International comparison of regional environmental economics<br>3) Linkage of trade liberalization and regional industries | Kajisa Kei<br>Jinhu Shen |
| Agricultural and Environmental Policy<br>【604】 | Theoretical and econometric researches on 1) food supply and demand balance in Asian countries, 2) land rental markets in agriculture, 3) mechanism design of agricultural and environmental policies, 4) rural producer organizations, 5) economic evaluation of environment, and 6) institutional analysis of common pool resource management. | Junichi Ito<br>Shinichi Kitano |
| Forest Policy and Economics<br>【610】 | Theoretical and empirical researches on domestic and overseas forest and forestry policies, problems with the supply and demand of timber and wood products, economic analysis of timber-related industries, the timber trade and the global environment, social economic problems in farming and mountain villages, global warming and forests, biodiversity conservation policy, national park management, etc. | Koichi Kuriyama<br>Yohei Mitani |
| International Rural Development<br>【606】 | Theoretical and empirical researches on 1)agricultural development, 2)poverty alleviation, 3)production and food system of agricultural products, 4)farm economy, 5) rural institutions and organizations, in developing worlds or at a development stage, using micro economics, comparative institutional analysis, econometrics, and field survey. | Atsuyuki Asami<br>Yoshiaki Nakada<br>Ken Miura |
| Comparative Agricultural History<br>【607】 | Comparative history of Japan and other countries/regions on 1) farming and agricultural structure, 2) agricultural policy and farmer's movement from 1931 to 1961, 3) agriculture- forest resource development in the total war system.<br>Social and environmental history on German agriculture and its rural community in 20 centuries | Yoshihiro Adachi<br>Atsushi Ito |
| Philosophy of Agricultural Science<br>【608】 | Theoretical, empirical and comparative researches on emerging challenges we face when pursuing sustainability of agriculture, food production and consumption, and rural societies in developing and developed countries from philosophical, sociological and ethical perspectives. | Motoki Akitsu<br>Kenta Sakanashi<br>Hart Nadav Feuer |

**Division of Food Science and Biotechnology**

| Research fields 【No.】 | Research contents | Research staff |
|---|---|---|
| Enzyme Chemistry 【701】 | Elucidation of the relationship between structure and function of enzymes including protease, amylase, reverse transcriptase, and aminoacyl tRNA synthetase; Tailoring of enzyme function and controlling of enzyme reaction; Screening of enzyme inhibitors and elucidation of their inhibitory mechanisms; Application of enzymes and inhibitors in food and medical technologies | Kiyoshi Yasukawa<br>Teisuke Takita |
| (Uji) Food Chemistry * 【709】 | | |
| Organic Chemistry in Life Science 【703】 | Chemical synthesis and functional analysis of various proteins (enzymes) related to lifestyle-related diseases such as cancer and Alzheimer's disease, and the development of therapeutic and preventive drugs targeting these diseases; Investigation and analysis of the mechanisms of functional substances which prevent these lifestyle-related diseases, found in foods; Total synthesis of bioactive natural products related to foods | Kazuhiro Irie<br>Kazuma Murakami<br>Chihiro Tsukano |
| Nutrition Chemistry 【704】 | To elucidate the mechanisms that control eating behavior, we incorporate various techniques used in biological sciences, such as neuroscience, endocrinology, molecular biology, genetics. The current topics are as follows: homeostatic regulation of nutritional preference, neurocircuits that regulates food preference, and the mechanisms for perception and recognition of food aromas in mammals. | Tsutomu Sasaki<br>Satoshi Tsuzuki<br>Sho Matsui<br>Yasuo Oguri |
| (Uji) Molecular Function of Food * 【705】 | | |
| (Uji) Physiological Function of Food 【706】 | Nutritional and physiological researches on interactions between food ingredients and living bodies: Nutritional physiology and neuroscience concerning exercise and central fatigue. Searches for physiological functions of orally active short peptides derived food proteins, which act on the nervous, gastrointestinal, cardiovascular, and immune systems, and applications of them to functional materials matched each life stage. Physiological and behavioral researches on the taste and palatability of foods | Kazuo Inoue<br>Kousaku Ohinata<br>Tsuyoshi Goto<br>Haruya Takahashi<br>Takumi Yokokawa |
| Bioengineering 【707】 | Elucidation of the relationship between the structures of food macromolecules (proteins, polysaccharides, and colloidal dispersion) and the physiological functions in the gastrointestinal tract such as organoleptic function and mucosal immunity. Development of food processing by using subcritical fluid and nano-technology. Elucidation of mechanisms of taste signaling. Visualization of physicochemical information inside food and design of food function based on the information. | Fumito Tani<br>Kentaro Matsumiya<br>Takashi Kobayashi<br>Takenobu Ogawa |
| (Uji) Basic and Applied Molecular Biotechnology 【708】 | Interactions between microbes and animals/plants, microbial chemotaxis, molecular biology of microbial ecosystems in fermented foods, structural biology of microbial enzymes and transporters, microbial responses to gases (nitrogen and oxygen), screening and functional analysis of microbes and enzymes, and their application to food and environmental areas, production of biofuels and chemicals by synthetic biology, dynamics of microbial cell membrane | Wataru Hashimoto<br>Sayoko Oiki |

(Uji) Uji Campus …… Gokasho, Uji-shi, Kyoto

* No recruitment for 2023

**Affiliated Institutions**

| Name of facilities, etc. | Research and business contents | Research staff |
|---|---|---|
| Livestock Farm | Practical education on production of beef cattle.<br>Research on artificial reproductive technology of beef cattle.<br>Research on improvement of beef cattle fattening.<br>Research on health and reproductive management of beef cattle using sensing technology. | Yoichiro Hoshino |
| International Exchange Section | Offering support for international researchers and students in the Graduate School of Agriculture: guidance sessions, Japanese language class, lectures given in English, newsletters, consultation service<br>Providing opportunities for international exchange: visiting researcher program, welcome parties, study trips, seasonal and traditional events | Motoki Akitsu<br>Takeshi Miyake<br>Hitoshi Shinjo<br>Garry John Piller<br>Ayako Katayama |

Livestock Farm …… Kyotanba-cho, Funai-gun, Kyoto