

Profiles of Faculty

【Program in Biological System Sciences: Master's and Doctoral Course】

For more information, please contact professors freely.
Applicants are requested to consult with the prospective professors about future research plans before the application

Field	Position	Name • Subject(Class) Email	Outline of Research	Research Topics
Applied Life Science	Prof.	Sugihiro ANDO Molecular Plant Pathology sando@pu-hiroshima.ac.jp	Plants are constantly exposed to attack from pathogens. In order to prevent yield loss of agricultural products due to disease, it is important to understand the disease resistance mechanisms of plants and the infection strategies of pathogens. As a research target, we are mainly focusing on clubroot disease of Brassica crops. We are using molecular biological approaches to analyze pathogen-plant interactions and the effects of environmental microorganisms for disease control.	<ul style="list-style-type: none"> • Analysis of infection strategy of <i>Plasmodiophora brassicae</i> • Search for microorganisms with suppressive activity against clubroot disease • Analysis of cucumber mosaic virus resistance in cowpea • Analysis of bacteria with suppressive activity against seedling rot caused by <i>Burkholderia glumae</i> • Analysis of defense priming of plant
	Prof.	Shinji IHARA Bioresource chemistry and Extracellular matrix engineering ihara@pu-hiroshima.ac.jp (Master's Course Only) (The course will not be offered in 2026 academic year.)	Damage to the basement membrane contributes to skin aging. Using the visualized basement membrane of the nematode <i>C. elegans</i> , we will analyze the molecular mechanism of built up of basement membrane, search for biological resources which suppress the damage of the basement membrane, and analyze its action mechanism.	<ul style="list-style-type: none"> • Visualization of Basement Membranes using the <i>C. elegans</i> • Analysis of the localization mechanism of basement membrane proteins <i>in vivo</i> • Search for biological resources that suppress damage of basement membrane • Study on the protein folding in endoplasmic reticulum • Study of molecular mechanisms that maintain organ size
	Prof.	Masahiro KANAOKA Plant Molecular Genetics mkanaoka@pu-hiroshima.ac.jp	Sexual reproduction in angiosperms is achieved through complex interactions between male tissues (sperm cells/pollen tubes) and female tissues (ovules/female gametophytes). We focus on pollen tube guidance factors that attract pollen tubes to ovules, and analyze their functional domains and interspecific diversity. We are also interested in the relationship between environmental response and development of plants.	<ul style="list-style-type: none"> • Plant sexual reproduction • Analysis of functional domains of pollen tube guidance factors • Identification of novel pollen tube guidance factors • Investigation of genes expressed in reproductive cells and identification of their functions • Genesis of pollen development • Analysis of stomatal development in response to the environment

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Applied Life Science	Prof.	Yasukazu SAITOH Bioscience and Biotechnology for Cell Function Control ysaito@pu-hiroshima.ac.jp	Studies on control of aging, cancer and various disorders through the development of controllable methods/ biomaterials against stress-induced cell injuries/cell death.	<ul style="list-style-type: none"> • Development of controllable methods/ biomaterials against stress-induced cell injuries/cell death. • Anti-aging through senolysis and senostatics. • Development of preferential anti-cancer biomaterials to cancer cells over normal cells by intracellular redox control. • Elucidation of vitamin C transport system and its regulatory mechanisms
	Prof.	Hiroshi SUGA Bioinformatics and Evolutionary Genomics hsuga@pu-hiroshima.ac.jp	What happened in the genome when multicellular organisms evolved from a single-cellular organism hundreds of million years ago? Using “unicellular holozoans”, the closest unicellular ancestor of animals, we are elucidating the mechanism of multicellularity evolution in animals. Unicellular holozoans are the showcase of “multicellularity genes”, which are considered to be deployed for constructing multicellular system at the onset of metazoans.	<ul style="list-style-type: none"> • Functional analysis of cell-cell communication tools already equipped in unicellular organisms • Functional analysis of cell adhesion molecules found in our unicellular models • Functional analysis of developmental transcription factors found in our unicellular models • “Evolve” multicellularity in the lab • Theoretical study on the evolution of multicellularity by comparative genomics approaches • Introduction of systems biology into evolutionary study using transcriptomics and proteomics • Development of model organisms (and molecular techniques) for the study of multicellularity evolution
	Prof.	Kenji FUKUNAGA Applied Plant Science fukunaga@pu-hiroshima.ac.jp	Conservation, evaluation and utilization of plant genetic resources. 1) Evaluation of genetic diversity of landraces and wild relatives based on agronomic traits and DNA markers. 2) Isolation and analysis of the genes conferring agronomic traits and analysis of mechanism for diversification of cultivated plants. 3) Development of DNA markers for cultivar identification	<ul style="list-style-type: none"> • Analysis of genetic diversity of Japanese landraces of foxtail millet based on agronomic traits and DNA markers. • Comparison of mechanisms causing waxy variants among cereal species. • Isolation and analysis of rice gene homologs from foxtail millet. • Mapping and isolation of morphogenesis genes in cereals • Development of retrotransposon-based markers for cultivar identification

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Applied Life Science	Prof.	Toshiki YAGI Structural Biology of Supramolecule yagit@pu-hiroshima.ac.jp	Cilia are hair-like organelle which are important for eukaryotic cell movements and developments. To understand the molecular mechanism of ciliary movements, we have analyzed the motility of <i>Chlamydomonas</i> mutants lacking specific axonemal components. Our research focus is ciliary motor proteins, dynein.	<ul style="list-style-type: none"> • Analyses of regulatory mechanism of dynein motor activity in ciliary movement. • Analysis of ciliary waveform conversion mechanism in response to extracellular stimuli. • Analysis of various types of dyneins using genome editing techniques. • Analysis of molecular mechanism of cilia assembly. • Structural analysis of ciliary dynein by Cryo electron microscopy. •
	.Prof	Yasuhisa YAMASHITA Molecular Physiology yamayasu@pu-hiroshima.ac.jp	We investigate the mechanism of follicular development and ovulation in ovary. Furthermore, we also investigate the mechanism of spermatogenesis and fertilization.	<ul style="list-style-type: none"> • Analysis of the mechanism of follicular development and ovulation in ovary. • Analysis of the mechanism of spermatogenesis of in testis and fertilization in fallopian tube. • Application of basic knowledge of follicular development, ovulation, and spermatogenesis obtained from mice and domestic animals to human ARTs.
	Assoc. Prof.	Yasuyuki ABE Functional Anatomy abe@pu-hiroshima.ac.jp	Our research is the establishment of the assisted reproductive techniques (ARTs) such as cryopreservation and in vitro culture of eggs (oocytes and embryos) in mammals (mouse, bovine, canine, etc.). ARTs have contributed not only to human infertility treatment and animal production including domestic and experimental animals, but also to development of biomedical sciences.	<ul style="list-style-type: none"> • Cryopreservation of oocytes and embryos in mammals • In vitro culture of non-growing oocytes (follicle) in mammals • Identification of sperm factor for fertilization and embryo development in bull • Influence of chronic radiation exposure associated with the Fukushima Daiichi Nuclear Plant on bovine oocytes
	Assoc. Prof.	Morihiro OKADA Biological stress responses okadam@pu-hiroshima.ac.jp	Why cannot organisms control homeostasis, eventually dying, when stresses are too substantial in a situation like cancer? We investigate the mechanism responsible for tumor- mediated systemic effects, especially focusing on a secreted factor from the tumor.	<ul style="list-style-type: none"> • Carnitine metabolism in cancer cachexia • Identification of tissues and signals responsible for cancer-mediated physiological alterations. • Development of a novel cancer cachexia model.

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Biofunctional Science and Technology	Prof.	Shusaku KANAI Kinesiology and motor control kanai@pu-hiroshima.ac.jp (Doctoral Course Only)	Studies on pathological motor control and traditional physiotherapy. Studies on human motion analysis theory and practice.	<ul style="list-style-type: none"> • Effects of traditional physical agents and therapeutic exercise • Disability science by observational motion analysis • Musculoskeletal motor control • Development and validation for training equipment and welfare device

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Food Resource Science	Prof	Shinjiro OGITA Advanced Plant Cell, Tissue and Organ Culture ogita@pu-hiroshima.ac.jp	A high frequent regulation of plant stem cell development during plant cell, tissue and organ culture (PCTOC) is the most important concept of this subject. We focus on the application of PCTOC methodologies to all research and development areas of traditional and modern plant biotechnology.	<ul style="list-style-type: none"> • Plant Stem Cell • Plant cell, tissue and organ culture • Cellular agriculture • 3D bioprinting • Cell manipulation • Histochemical analysis • Transformation • Metabolic engineering
	Prof.	Shota TANIMOTO Science of Food Processing and Preservation s-tanimoto@pu-hiroshima.ac.jp (Doctoral Course Only)	We study changes in chemical component in food, primarily fishery products during storage and processing. We also investigate the preservation of food quality during them. In, addition, we try to improve gel quality of fish meat products by using subsidiary materials.	<ul style="list-style-type: none"> • Study on quality change of food products during storage and processing. • Development of preservation method for food. • Improving the quality of fish meat gel
	Prof.	PARK SOO YOUNG Agricultural management park@pu-hiroshima.ac.jp	To solve problems of agricultural management, we have been studying a method of information processing based on data, and neuromarketing by measuring cerebral blood flow. Furthermore, we are interested in research on the development, diffusion and issues of smart agriculture from a business perspective.	<ul style="list-style-type: none"> • Data science • Neuromarketing • Smart agriculture
	Prof.	Yukihiro YAMAMOTO Applied Lipid Chemistry yyamamoto@pu-hiroshima.ac.jp	Food chemistry, especially based on enzyme and lipid chemistry. For example, to produce physiologically functional materials using enzymes or study on development of technique which enable to improve oxidation stability of oils and fats.	<ul style="list-style-type: none"> • Preparation of functional lipids using enzymatic esterification or acidolysis. • Effects of emulsifiers on oxidation stability of emulsified oils and fats. • Utilization of unused resources.

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Food Resource Science	Assoc. Prof.	Keiko FUJITA Fruit Crop Science (pomology) fujitak@pu-hiroshima.ac.jp (Master's Course Only)	We are analyzing the effects of changes in environmental factors on fruit trees from various perspectives, including gene expression, secondary metabolites, and morphology, with the aim of elucidating the regulatory mechanisms of environmental responses.	<ul style="list-style-type: none"> • Isolation and analysis of genes involved in the regulation of anthocyanin biosynthesis in grapes. • Differences in accumulation of secondary metabolites between coloring and noncoloring grape varieties in response to external stimuli.
	Assoc. Prof.	Ryota MABUCHI Food Evaluation mabuchi@pu-hiroshima.ac.jp	food quality evaluation by foodomics	<ul style="list-style-type: none"> • Fundamental studies on food quality evaluation based on metabolome analysis • Applied research on fish quality assessment based on food metabolomics
	Assoc. Prof.	Wakayo MURATA Farming Systems murataw@pu-hiroshima.ac.jp (Master's Course Only)	We study the difference of food production in the world from aspect of technology, policy and social condition.	<ul style="list-style-type: none"> • Comparative Farming Systems and Agricultural Policy • Analysis of Food Trade and Management Women and Development
	Assoc. Prof.	Tomoyuki YOSHINO Food Process Engineering yoshino@pu-hiroshima.ac.jp (Master's Course Only)	Study of food processing for functional ingredients and preservation. Development of biodegradable materials made from food by product. Microscopic study of interaction between cell and biomaterials.	<ul style="list-style-type: none"> • Development of functional foods made from agricultural products. • Development of low-cost biodegradable materials from corn protein. • Study of interaction between LDL and receptor on cell membrane by scanning probe microscopy (SPM). • Imaging of the chromosome surface by SPM.
	Lecturer	Yusuke TANIGAKI Biological rhythm for control plant growth yu-tanigaki@pu-hiroshima.ac.jp (Master's Course Only)	We focus on the plant circadian clock for elucidation of growth instability of crops. The plant circadian clock with both stability and instability is analyzed from omics data to elucidate the relationship between growth and plant circadian clock. Then, we develop crop growth control technology.	<ul style="list-style-type: none"> • A study on the effects of plant circadian clock synchronization and non-synchronization on growth in crop communities • Study on stability and flexibility of plant circadian clock
	Lecturer	Shinichi FURUYAMA Protected Horticulture furuyama@pu-hiroshima.ac.jp (Master's Course Only)	We conduct research on greenhouse and plant factory systems for protected horticulture in hilly and mountainous regions. Our recent work focuses on developing high-quality, stable production technologies using the environmental control systems and examining how light and temperature influence plant growth and crop quality.	<ul style="list-style-type: none"> • Advancement of protected horticulture through the application of environmental control technologies and plant-based sensing • Development of labor-saving and cost-effective production technologies for protected horticulture • Elucidation of cultivation characteristics of horticultural crops suitable for hilly and mountainous regions

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Environmental Science	Prof.	Noriatsu OZAKI Urban environmental behaviors of emerging trace organic pollutants ojaki@pu-hiroshima.ac.jp	To contribute to sustainable urban water management, our research investigates the environmental fate of emerging trace organic pollutants in urban watersheds. A particular focus is placed on understanding unexpected behaviors of contaminants originating from domestic sewer systems and assessing their potential ecological and human health risks. Through interdisciplinary approaches combining field observations, laboratory experiments, and modeling, we aim to provide practical insights for improving urban water quality management.	<ul style="list-style-type: none"> • Leakage of pollutants due to the aging of separate sewer system pipelines • Study on the unintended intrusion of pollutants into aging water supply pipes • Detection of contamination from underground sewer leakage through leaf analysis of street trees • Emergence of pollutants from sedimentation tanks in sewage treatment plants • Study on the potential increase in pollutant toxicity due to solar exposure
	Prof.	Toshihito OHTAKE Environmental Material Chemistry ohtake@pu-hiroshima.ac.jp	We will need novel ideas based on a new principle to design for next generation solar cell that is far superior to usual one for a conversion efficiency. We have studied quantum dots solar cells by utilizing a quantum size effect, and plasmonic solar cells by using a surface plasmon surface.	<ul style="list-style-type: none"> • Quantum dots solar cells. • Plasmonic solar cells. • Materials design of perovskite semiconductors endowed with photo functionality. • Investigation of strongly correlated electron system as endowed with photo functionality in metal oxides. • Development of flexible solar cells at lightness and filminess.
	Prof.	Kensuke KOBAYASHI Environmental Management kensuke@pu-hiroshima.ac.jp (Master's Course Only)	Research for environmental load reduction on various subjects including services and socio-economic systems based on lifecycle thinking; thus to contribute to sustainable, lower-emission society; with the efforts for LCA study by creating emission intensity databases and evaluation methods plus verifying the results.	<ul style="list-style-type: none"> • Utilization of resources (e.g. building materials) • Study for reduction of environmental load • Enhancement of LCA emission intensity database management → Efforts for higher accuracy of LCA activities

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Environmental Science	Prof.	Atsushi HASHIMOTO Environmental Risk Assessment and Management atsushi@pu-hiroshima.ac.jp	Our study has focused on microbial safety and sanitation of drinking water. We have studied about widely water environment such as river water, sea area, sewages and water treatment process including disinfection. The microorganisms to be studied in our laboratory are also widely types with protozoa (<i>Cryptosporidium</i>), virus (Nov, PMMoV) and bacteria (<i>C. perfringens</i> , <i>E. coli</i> , <i>L. pneumophila</i> and Enterococci).	<ul style="list-style-type: none"> • The rapid detection of indicator bacteria, intestinal virus and protozoa (<i>Cryptosporidium</i>) from various water environments using molecular biological assay. Especially, developing new <i>Cryptosporidium</i> antibody for specific and easy detection of oocysts from water samples. • Enterotoxin gene positive A type <i>C. perfringens</i> spores as a microbial fecal source tracking indicator. • Intestinal virus and its indicators (NoV, PMMoV etc. detection/quantification from water environments using q-PCR and its fate under various water environment such as river, sea, sewage and water treatment include disinfection. • • Quantitative Microbial Risk Assessment (QMRA).
	Prof.	Seiichiro YONEMURA Atmospheric Environment yone@pu-hiroshima.ac.jp	Studying interactions between atmosphere and biosphere	<ul style="list-style-type: none"> • Monitoring of atmospheric environment and bio-meteorology • Gas exchange of permafrost soil • Emission mechanisms of N₂O and NO from soil. • Plant gas exchange • Measurements of degradation rates of bio-film and soil carbon in soil • Dynamics of earthworms through gas exchange • Modeling the processes listed above.
	Assoc. Prof.	Mitsuru AOYAGI Chemistry of Environmental Macromolecules aoyagi@pu-hiroshima.ac.jp	<p>1) Structural analyses and characterization of macromolecular materials derived from components of lignocellulosics.</p> <p>(2) Applications of these materials are also tried based on properties under molecular level.</p> <p>(3) Analyses of macromolecular materials based on physical chemistry.</p>	<ul style="list-style-type: none"> • Photochemical analyses of variations in condensed structures of several lignin derivatives. • Investigations on physical properties of lignin-based polymeric materials. • Investigations and applications of lignocellulosic composites with chemical modifications. <p>Synthesis and analysis of sustainable macromolecules directly from lignocellulosic materials.</p>
	Assoc. Prof.	Yoshitaka KOSEKI Instrumental Analysis of the Environment koseki@pu-hiroshima.ac.jp	We focus on establishing environmentally friendly organic synthesis methods through two main approaches: developing green synthetic technologies, and creating synthesis techniques to convert biomass resources into valuable chemical products. Additionally, our research extends to environmental analysis using organic nanoparticles.	<ul style="list-style-type: none"> • Development of aqueous-phase coupling reactions and elucidation of their reaction mechanisms • Depolymerization of cellulose and lignin into low molecular weight compounds and their conversion to valuable chemical products • Development of environmental analysis methods using organic nanoparticles • In vivo organic synthesis

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Environmental Science	Assoc. Prof.	Kanako NAITO Hydrospheric Environmental Chemistry naito@pu-hiroshima.ac.jp (Master's Course Only)	We study the role of trace metals, especially iron, on phytoplankton in hydrospheres. We investigate the mechanisms of red tide outbreaks in coastal area, and develop effective strategies to combat the threat of harmful algal blooms through management and mitigation.	<ul style="list-style-type: none"> • Elucidation of iron uptake mechanism by eukaryotic phytoplankton • Elucidation of physiological and ecological specificity of microalgae causing red tides • Study on seasonal dynamics of microalgae and trace metals in hydrospheric environments Development of a chemically defined artificial medium for harmful algae
	Assoc. Prof.	Jun NISHIMOTO Inorganic Analytical Chemistry nishimoj@pu-hiroshima.ac.jp	Research on separation for hazardous and useful substances by solvent extraction, solid phase extraction, ion exchange and precipitation. Research on behavior of inorganic substances in environmental.	<ul style="list-style-type: none"> • Recovery of metals in ash and wastewater Behavior of inorganic substances in tidal flat of Ariake bay

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Environmental Science	Prof	Hisako Orimoto Evaluation and Analysis of Environment Systems orimoto@pu-hiroshima.ac.jp (Doctoral Course Only)	Real phenomena in environment system show random fluctuation and uncertain characteristics having a complicated relation to various factors. In this subject, evaluation and analysis methods applicable to real phenomena with considerable complexity are considered by applying stochastic system theory. Especially, system identification, state estimation and environmental prediction methods are investigated.	<ul style="list-style-type: none"> • State estimation of sound environment system with uncertainty based on stochastic system theory • Identification and analysis for various environment systems by introducing fuzzy theory • Evaluation and prediction of wave motion type environment based on stochastic information processing • Time series analysis and regression analysis for environmental data by considering higher order correlation information
	Prof.	Tetsuya Shigeyasu Emergency network technologies for disaster environmental information sigeyasu@pu-hiroshima.ac.jp (Doctoral Course Only)	In the event of large-scale disaster, existing communication infrastructure will be damaged at a high rate, and it makes relief activities extremely hard. We study ICT systems enabling rapid grasp the environment context of the disaster-stricken area for supporting both of victims escape and disaster relief activities.	<ul style="list-style-type: none"> • Delay/Disruption Network (DTN) technologies for disaster information collecting system, without depending on existing communication infrastructure • Information Centric Network (ICN) technologies for effective delivery of collected disaster information, under disaster distressed communication infrastructure • ICT systems for supporting relief activities at disaster-stricken areas
	Prof.	Hugang HAN Intelligent Control of Environmental Systems hhan@pu-hiroshima.ac.jp (Doctoral Course Only)	On the basis of system control and fuzzy control theories, we focus our attentions on the fuzzy modellings of a range of environmental issues, particularly in the case of urban rivers. Then we try to give and verify some measures in order to resolve problems in the environmental issues concerned using the models we achieved.	<ul style="list-style-type: none"> • Water quality modelling of an urban river and development of fuzzy water quality prediction model • T-S/polynomial fuzzy control system in consideration of modelling error and its application to intelligent environmental systems • System disturbance observer and its applications to control systems.