

# 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.	Shinji IHARA Bioresource chemistry and Extracellular matrix engineering  ihara@pu-hiroshima.ac.jp	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"> <li>• Visualization of Basement Membranes using the <i>C. elegans</i></li> <li>• Analysis of the localization mechanism of basement membrane proteins <i>in vivo</i></li> <li>• Search for biological resources that suppress damage of basement membrane</li> <li>• Study on the protein folding in endoplasmic reticulum</li> <li>• Study of molecular mechanisms that maintain organ size</li> </ul>
	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"> <li>• Plant Stem Cell</li> <li>• Plant cell, tissue and organ culture</li> <li>• Transformation</li> <li>• Cell manipulation</li> <li>• Histochemical analysis</li> <li>• Metabolic engineering</li> <li>• 3D bioprinting</li> </ul>
	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"> <li>• Plant sexual reproduction</li> <li>• Analysis of functional domains of pollen tube guidance factors</li> <li>• Identification of novel pollen tube guidance factors</li> <li>• Investigation of genes expressed in reproductive cells and identification of their functions</li> <li>• Genesis of pollen development</li> <li>• Analysis of stomatal development in response to the environment</li> </ul>

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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"> <li>• Development of controllable methods/ biomaterials against stress-induced cell injuries/cell death.</li> <li>• Anti-aging through senolysis and senostatics.</li> <li>• Development of preferential anti-cancer biomaterials to cancer cells over normal cells by intracellular redox control.</li> <li>• Elucidation of vitamin C transport system and its regulatory mechanisms</li> </ul>
	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"> <li>• Functional analysis of cell-cell communication tools already equipped in unicellular organisms</li> <li>• Functional analysis of cell adhesion molecules found in our unicellular models</li> <li>• Functional analysis of developmental transcription factors found in our unicellular models</li> <li>• Evolve” multicellularity in the lab</li> <li>• Theoretical study on the evolution of multicellularity by comparative genomics approaches</li> <li>• Introduction of systems biology into evolutionary study using transcriptomics and proteomics</li> <li>• Development of model organisms (and molecular techniques) for the study of multicellularity evolution</li> </ul>
	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"> <li>• Analyses of regulatory mechanism of dynein motor activity in ciliary movement.</li> <li>• Analysis of ciliary waveform conversion mechanism in response to extracellular stimuli.</li> <li>• Analysis of various types of dyneins using genome editing techniques.</li> <li>• Analysis of molecular mechanism of cilia assembly.</li> <li>• Structural analysis of ciliary dynein by Cryo electron microscopy.</li> </ul>

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Applied Life Science	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"> <li>• Cryopreservation of oocytes and embryos in mammals</li> <li>• In vitro culture of non-growing oocytes (follicle) in mammals</li> <li>• Identification of sperm factor for fertilization and embryo development in bull</li> <li>• Influence of chronic radiation exposure associated with the Fukushima Daiichi Nuclear Plant on bovine oocytes</li> </ul>
	Assoc. 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"> <li>• Analysis of the mechanism of follicular development and ovulation in ovary.</li> <li>• Analysis of the mechanism of spermatogenesis of in testis and fertilization in fallopian tube.</li> <li>• Application of basic knowledge of follicular development, ovulation, and spermatogenesis obtained from mice and domestic animals to human ARTs.</li> </ul>

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Biofunctional Science and Technology	Prof.	Tadayuki IIDA Epidemiology of Health Science for Local Residents (DC)  iida@pu-hiroshima.ac.jp	The main purpose of my study is to take preventive measures for health promotion and extension of healthy life expectancy. Studies mainly focus on the epidemiological elucidation of the pathogenic factors of lifestyle-related diseases (arteriosclerosis, osteoporosis, cancer, etc.), the proposal of prevention method of dementia, an early detection by change of physiological function due to psychological stress.	<ul style="list-style-type: none"> <li>• Study on prevention-related of lifestyle diseases and dementia</li> <li>• Study on health maintenance and promotion by food intervention</li> <li>• Study on psychological stress and stress response</li> </ul>
	Prof.	Takeya ONO Science of Disabilities (DC)  ono@pu-hiroshima.ac.jp	Study of the influence of disease and/or disuse syndromes on impairments. Research on the theory and methods of treatment that contribute to the improvement of motor deficits and facilitate health promotion.	<ul style="list-style-type: none"> <li>• To investigate the prevention and restoration of impairments.</li> <li>• To investigate the prevention and restoration of muscle elasticity in joint contractures.</li> <li>• To investigate the influence of the duration of an application of a tourniquet to induce skeletal muscle atrophy.</li> <li>• To investigate the influence of spinal cord injury, peripheral nerve injury and joint fixation on muscle elasticity in contractures.</li> </ul>
	Prof.	Shusaku KANAI Kinesiology and motor control (DC)  kanai@pu-hiroshima.ac.jp	Studies on pathological motor control and traditional physiotherapy.  Studies on human motion analysis theory and practice.	<ul style="list-style-type: none"> <li>• Effects of traditional physical agents and therapeutic exercise</li> <li>• Disability science by observational motion analysis</li> <li>• Musculoskeletal motor control</li> <li>• Development and validation for training equipment and welfare device</li> </ul>

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Food Resource Science	Prof.	Hiroyuki KOHMURA Vegetable Crop Science  kohmura@pu-hiroshima.ac.jp	Development and improvement of cultivation method of vegetables. Especially, we investigate the effect of environmental stress to vegetable plant growth, yield, taste quality and ingredients.	<ul style="list-style-type: none"> <li>• Long-term harvesting method of asparagus (Green, white, purple, pink).</li> <li>• Forcing culture of asparagus.</li> <li>• Bag culture method of tomato.</li> <li>• Hiroshima specialty vegetables. (Summer autumn strawberry, tubers and roots, Leafy vegetables etc.)</li> <li>• Medicinal herbs.</li> </ul>
	Prof.	Tadashi GOMI Ecology of Changing Environment  gomi@pu-hiroshima.ac.jp	We study adaptation of insects to environmental change, especially global warming. We investigate patterns and mechanisms of the shift in insect life cycles in response to climate change.	<ul style="list-style-type: none"> <li>• Effects of climate change on life-history traits of insects, such as photoperiodic responses for diapause induction and developmental rates.</li> <li>• Seasonal adaptation of insects and evolution of their life cycles.</li> </ul>
	Prof.	Shota TANIMOTO Science of Food Processing and Preservation (DC)  s-tanimoto@pu-hiroshima.ac.jp	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"> <li>• Study on quality change of food products during storage and processing.</li> <li>• Development of preservation method for food.</li> <li>• Improving the quality of fish meat gel</li> </ul>
	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"> <li>• Data science</li> <li>• Neuromarketing</li> <li>• Smart agriculture</li> </ul>

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<b>Food Resource Science</b>	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"> <li>• Analysis of genetic diversity of Japanese landraces of foxtail millet based on agronomic traits and DNA markers.</li> <li>• Comparison of mechanisms causing waxy variants among cereal species.</li> <li>• Isolation and analysis of rice gene homologs from foxtail millet.</li> <li>• Mapping and isolation of morphogenesis genes in cereals</li> <li>• Development of retrotransposon-based markers for cultivar identification</li> </ul>
	Assoc. Prof.	Norio NAGAO Cell Biochemistry and Function  nagao@pu-hiroshima.ac.jp	Chemical and Physiochemical Analysis of Food Products.	<ul style="list-style-type: none"> <li>• Measurement of Total Antioxidant Capacity from colored beans.</li> </ul>
	Assoc. Prof.	Keiko FUJITA Fruit Crop Science (pomology)  fujitak@pu-hiroshima.ac.jp	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"> <li>• Isolation and analysis of genes involved in the regulation of anthocyanin biosynthesis in grapes.</li> <li>• Differences in accumulation of secondary metabolites between coloring and noncoloring grape varieties in response to external stimuli.</li> </ul>
	Assoc. Prof.	Ryota MABUCHI Food Evaluation  mabuchi@pu-hiroshima.ac.jp	food quality evaluation by foodomics	<ul style="list-style-type: none"> <li>• Fundamental studies on food quality evaluation based on metabolome analysis</li> <li>Applied research on fish quality assessment based on food metabolomics</li> </ul>
	Assoc. Prof.	Wakayo MURATA Farming Systems (MC)  murataw@pu-hiroshima.ac.jp	We study the difference of food production in the world from aspect of technology, policy and social condition.	<ul style="list-style-type: none"> <li>• Comparative Farming Systems and Agricultural Policy</li> <li>• Analysis of Food Trade and Management Women and Development</li> </ul>

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<b>Food Resource Science</b>	Assoc. 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"> <li>• Preparation of functional lipids using enzymatic esterification or acidolysis.</li> <li>• Effects of emulsifiers on oxidation stability of emulsified oils and fats.</li> <li>• Utilization of unused resources.</li> </ul>
	Assoc. Prof.	Tomoyuki YOSHINO Food Process Engineering  yoshino@pu-hiroshima.ac.jp	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"> <li>• Development of functional foods made from agricultural products.</li> <li>• Development of low-cost biodegradable materials from corn protein.</li> <li>• Study of interaction between LDL and receptor on cell membrane by scanning probe microscopy (SPM).</li> <li>• Imaging of the chromosome surface by SPM.</li> </ul>
	Lecturer	Yusuke TANIGAKI Biological rhythm for control plant growth (MC)  yu-tanigaki@pu- hiroshima.ac.jp	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"> <li>• A study on the effects of plant circadian clock synchronization and non-synchronization on growth in crop communities</li> <li>• Study on stability and flexibility of plant circadian clock</li> </ul>

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Environmental Science	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 generated 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"> <li>• Quantum dots solar cells.</li> <li>• Plasmonic solar cells.</li> <li>• Materials design of perovskite semiconductors endowed with photo functionality.</li> <li>• Investigation of strongly correlated electron system as endowed with photo functionality in metal oxides.</li> <li>• Development of flexible solar cells at lightness and filminess.</li> </ul>
	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"> <li>• 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.</li> <li>• Enterotoxin gene positive A type <i>C. perfringens</i> spores as a microbial fecal source tracking indicator.</li> <li>• 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.</li> </ul> Quantitative Microbial Risk Assessment (QMRA).
	Prof.	Hiroyuki HARADA Environmental Systems Engineering  ho-harada@pu-hiroshima.ac.jp  (Master's Program Only)	For environmental maintenance and restoration, we study technique as construct system of the eco-friendly most suitable process using combination of elemental technologies.	<ul style="list-style-type: none"> <li>• A study on recovery of the exhaustion related resources which utilized unused disposal biomass</li> <li>• A study on adsorption of the hydrogen sulfide which utilized a natural mineral</li> <li>• A study on environmental conservation of the tideland</li> </ul>



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Environmental Science	Prof.	Yoshiharu MITOMA Instrumental Analysis of the Environment mitomay@pu-hiroshima.ac.jp	Applied research on proper disposal of waste materials aimed at creation and promotion of a recycling-oriented society, with basic studies of green processes via heterogeneous catalysis.	<ul style="list-style-type: none"> <li>• Energy-saving detoxification systems for endocrine-disrupting chemicals.</li> <li>• Biomass conversion into useful materials using environmentally-friendly chemical reactions.</li> <li>• Synthetic organic reactions in water and their mechanisms.</li> </ul>
	Prof.	Seiichiro YONEMURA Atmospheric Environment yone@pu-hiroshima.ac.jp	Studying interactions between atmosphere and biosphere	<ul style="list-style-type: none"> <li>• Monitoring of atmospheric environment and bio-meteorology</li> <li>• Gas exchange of permafrost soil</li> <li>• Emission mechanisms of N<sub>2</sub>O and NO from soil.</li> <li>• Plant gas exchange</li> <li>• Measurements of degradation rates of bio-film and soil carbon in soil</li> <li>• Dynamics of earthworms through gas exchange</li> <li>• Modeling the processes listed above.</li> </ul>
	Assoc. Prof.	Mitsuru AOYAGI Chemistry of Environmental Macromolecules aoyagi@pu-hiroshima.ac.jp	1) Structural analyses and characterization of macromolecular materials derived from components of lignocellulosics. (2) Applications of these materials are also tried based on properties under molecular level. (3) Analyses of macromolecular materials based on physical chemistry.	<ul style="list-style-type: none"> <li>• Photochemical analyses of variations in condensed structures of several lignin derivatives.</li> <li>• Investigations on physical properties of lignin-based polymeric materials.</li> <li>• Investigations and applications of lignocellulosic composites with chemical modifications.</li> </ul> Synthesis and analysis of sustainable macromolecules directly from lignocellulosic materials.
	Assoc. Prof.	Kensuke KOBAYASHI Environmental Management (MC) kensuke@pu-hiroshima.ac.jp	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"> <li>• Utilization of resources (e.g. building materials)</li> <li>• Study for reduction of environmental load</li> <li>• Enhancement of LCA emission intensity database management</li> <li>• Efforts for higher accuracy of LCA activities</li> </ul>

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<b>Environmental Science</b>	Assoc. Prof.	Kanako NAITO Hydrospheric Environmental Chemistry  naito@pu-hiroshima.ac.jp	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"> <li>• Elucidation of iron uptake mechanism by eukaryotic phytoplankton</li> <li>• Elucidation of physiological and ecological specificity of microalgae causing red tides</li> <li>• Study on seasonal dynamics of microalgae and trace metals in hydrospheric environments</li> <li>• Development of a chemically defined artificial medium for harmful algae</li> </ul>
	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"> <li>• Recovery of metals in ash and wastewater</li> <li>• Behavior of inorganic substances in tidal flat of Ariake bay</li> </ul>

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<b>Environmental Science</b>	Prof.	Tetsuya SHIGEYASU Emergency network technologies for disaster environmental information (DC)  sigeyasu@pu-hiroshima.ac.jp	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"> <li>• Delay/Disruption Network (DTN) technologies for disaster information collecting system, without depending on existing communication infrastructure</li> <li>• Information Centric Network (ICN) technologies for effective delivery of collected disaster information, under disaster distressed communication infrastructure</li> <li>• ICT systems for supporting relief activities at disaster-stricken areas</li> </ul>
	Prof.	Yegui XIAO Adaptive and intelligent signal processing for environmental systems (DC)  xiao@pu-hiroshima.ac.jp	Adaptive analysis and processing of signals and noises are indispensable in various areas such as digital communications, environmental and economic systems etc. Advanced theory and systems of adaptive and intelligent signal processing will be explained in detail in this course to extend the knowledge scope and to enhance the ability to benefit from sophisticated DSP methods.	<ul style="list-style-type: none"> <li>• Multi-channel adaptive noise canceller and application to speech recovery</li> <li>• Development of low-cost-high-performance active noise control systems in real-life applications</li> <li>• Vibration detection, monitoring, and fault diagnosis</li> <li>• Analysis and prediction of time-series data from solar radiation, economic system, etc. using soft computing techniques including deep neural networks</li> </ul>
	Prof.	Hugang HAN Intelligent Control of Environmental Systems (DC)  hhan@pu-hiroshima.ac.jp	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"> <li>• Water quality modelling of an urban river and development of fuzzy water quality prediction model</li> <li>• TS/polynomial fuzzy control system in consideration of modelling error and its application to intelligent environmental systems</li> <li>• System disturbance observer and its applications to control systems.</li> </ul>