

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. | Kyoko INAGAKI- OHARA Immunology and Cell Biology k-inagaki@pu-hiroshima.ac.jp | Leptin receptor signaling exerts a pleiotropic effect on regulation of food intake and energy expenditure, immunity and hematopoiesis, regulating cell differentiation, proliferation and polarity. Leptin is produced in a variety of tissues including adipose tissue and gastrointestinal. We explore the significance of leptin receptor signaling in the development of inflammatory diseases and tumorigenesis in the gastrointestinal. | <ul style="list-style-type: none"> • Determine the role of leptin receptor signaling in cell differentiation and proliferation of epithelial cells in the gastrointestinal. • Clarify the role of leptin receptor signaling in modulation of the immune system supporting inflammation and tumorigenesis in the gastrointestinal. |
| | Prof. | Shinjiro OGITA Advanced Plant Cell, Tissue and Organ Culture ogita@pu-hiroshima.ac.jp | We focus on the application of plant cell, tissue and organ culture (PCTOC) methodologies to all research and development areas of traditional and modern plant biotechnology. A high frequent regulation of plant stem cell development during PCTOC is the most important concept of this subject. | <ul style="list-style-type: none"> • Plant Stem Cell • Plant cell, tissue and organ culture • Transformation • Cell manipulation • Histochemical analysis • Metabolic engineering |
| | 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 suppression of intracellular reactive oxygen species. • 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 |

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| Applied Life Science | Prof. | Toshifumi SAKAGUCHI Microbiology sakaguchi@pu-hiroshima.ac.jp | Development and creation of biomaterials and biofunctions based on biotechnology and genetic engineering by using microbes for bioremediation and eco-monitoring. Fundamental researches on environmental microorganisms, extremophiles and biomineralization toward technological application. | <ul style="list-style-type: none"> • Development of biomaterials and biofunctions for bioremediation. • Development of ecomonitoring systems, biodevices, biosensors by microfabrication techniques. • Synthesis of bionano-particles based on biomineralization. • Fundamental researches on biomineralization of metalloids and metals. • Search and isolation of functional microbes and extremophiles toward technological applications. |
| | Prof. | Toshiki YAGI Structural Biology of Supramolecule yagit@pu-hiroshima.ac.jp | To understand the molecular mechanism of ciliary and flagellar movements, we have been analyzing 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"> • Functional analyses of cilia dyneins. • Regulatory mechanism of dynein motor activity in ciliary movement. • Molecular mechanism of cilia assembly. • X-ray structural analysis of cilia dynein. |

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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"> • 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. | 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 bioinformatics-based approach, we analyze the genome data of various organisms. Based on the hypotheses drawn from these “dry” analyses, we also perform “wet” approaches using model organisms that are considered to be the “direct unicellular ancestor” of animals. | <ul style="list-style-type: none"> • 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 • Functional analysis of cell-cell communication tools already equipped in unicellular organisms • Functional analysis of cell adhesion molecules found in our unicellular models • Evolve” multicellularity in the lab |
| | Assoc. Prof. | Yasuhisa YAMASHITA Molecular Physiology yamayasu@pu-hiroshima.ac.jp | We conduct our research to elucidate the basic mechanism of oocyte maturation during follicular development and ovulation. Furthermore, we also study to apply the fundamental insight to prevention of reproductive disorder in animal, establishment of novel method of <i>in vitro</i> maturation in domestic animal, and assisted reproductive technique of human. | <ul style="list-style-type: none"> • Analysis of secretory mechanism of EGF-like factor in granulosa/cumulus cells during follicular development and ovulation process. • Analysis of biosynthesis of steroid hormone in granulosa/cumulus cells during follicular development and ovulation process. • Search of novel factor to induce oocyte maturation during follicular development and ovulation process. • Kinetic change of maturation inducing maker of oocyte in ovulation process using ovarian pick-up (OPU) technique. |

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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"> • Study on prevention-related of lifestyle diseases and dementia • Study on health maintenance and promotion by food intervention • Study on psychological stress and stress response |
| | 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"> • To investigate the prevention and restoration of impairments. • To investigate the prevention and restoration of muscle elasticity in joint contractures. • To investigate the influence of the duration of an application of a tourniquet to induce skeletal muscle atrophy. • To investigate the influence of spinal cord injury, peripheral nerve injury and joint fixation on muscle elasticity in contractures. |
| | 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"> • 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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| Biofunctional Science and Technology | Prof. | Yoshihisa KOIKE Physiological Response Analysis (DC) koike@pu-hiroshima.ac.jp | Our research focuses on promoting mental and physical health of people. The research method performs somatosensory stimulation with device stimulation or direct stimulation. The effects are examined by analyzing changes in autonomic nerve (mainly total power), tympanic temperatura, blood pressure and pulse due to stimulation. | <ul style="list-style-type: none"> • Research on the effects of vibro-acoustic therapy on psychological aspects. • Research on the effect of thermal therapy by sea water and Nigari (clinical and molecular biology) • Research on the effect of somatosensory stimulation on the Nucleus basalis of Meynert. |
| | Prof. | Yasuhiko KITADAI Molecular Pathology and Oncology (DC) kitadai@pu-hiroshima.ac.jp | <p>Previous studies have indicated that a large number of genetic and epigenetic alterations in oncogenes and tumor suppressor genes determine the multi-step process of colorectal carcinogenesis. However, cancer tissue consists of stroma, and tumor growth is determined not only by tumor cells themselves but also by stromal cells.</p> <p>The purpose of our study is to know molecular mechanisms of cancer metastasis using mouse orthotopic implantation models.</p> | <p>The current themes are:</p> <ul style="list-style-type: none"> • to clarify the importance of angiogenesis and lymphangiogenesis on cancer metastasis. • to clarify the role of cancer-stromal interaction to induce EMT at invasive edge. • to evaluate the mechanisms how MSC enhances metastatic ability of cancer cells. |

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| Food Resource Science | Prof. | Takashi OKU Molecular Plant Pathology toku@pu-hiroshima.ac.jp | Molecular genetics of pathogenicity and host plant resistance to <i>Xanthomonas oryzae</i> pv. <i>oryzae</i> | <ul style="list-style-type: none"> • Analysis of Type III secretion proteins • Molecular Biology in rice plant resistance • Physiologic races in <i>Xanthomonas oryzae</i> pv. <i>oryzae</i> |
| | 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"> • Effects of climate change on life-history traits of insects, such as photoperiodic responses for diapause induction and developmental rates. • Seasonal adaptation of insects and evolution of their life cycles. |
| | 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"> • 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. | Kenji FUKUNAGA Applied Plant Science fukunaga@pu-hiroshima.ac.jp | Conservation, evaluation and utilization of plant genetic resources. <ol style="list-style-type: none"> 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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| Food Resource Science | 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"> • Measurement of Total Antioxidant Capacity from colored beans. |
| | Assoc. Prof. | Taizo MASUDA Environmental Plant Nutrition and Bio-resources Recycling (MC) taizo@pu-hiroshima.ac.jp | Physiological and Biochemical Analysis of Plant Nutritional Mechanism, Effective Use of Nutrients and Environmental Conservation based on the Nutrient Recycle | <ul style="list-style-type: none"> • Analysis of leafy vegetable growth promotion by the oyster shell application • Investigation of effective use of organic waste on the agricultural lands • Material flow analysis of heavy metals on the bio-energy plant production with sludge fertilizer application in abandoned farmlands |
| | 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"> • Comparative Farming Systems and Agricultural Policy • Analysis of Food Trade and Management • Women and Development |
| | 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"> • Preparation of functional lipids using enzymatic esterification or acidolysis. • Effects of emulsifiers on oxidation stability of emulsified oils and fats. • Utilization of unused resources. |
| | Assoc. Prof. | Tomoyuki YOSHINO Food Process Engineering (MC) 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"> • 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. |

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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"> • 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 filmness. |
| | Prof. | Kazuyuki NISHIMURA Environmental Health Engineering on Sound Material-cycle Society nishimura@pu-hiroshima.ac.jp | In this subject, the treatment technology and the material cycles system for organic wastes and wastewater are developed and assessed. Moreover, risk management of recycled products is researched. | <ul style="list-style-type: none"> • Developing waste and/or wastewater treatment technologies designed to minimize environmental loads. • Developing material recycling technologies and systems. • Developing assessment technology of health risks. |
| | Prof. | Hiroyuki HARADA Environmental Systems Engineering ho-harada@pu-hiroshima.ac.jp | 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"> • A study on recovery of the exhaustion related resources which utilized unused disposal biomass • A study on adsorption of the hydrogen sulfide which utilized a natural mineral • A study on environmental conservation of the tideland |
| | 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"> • Energy-saving detoxification systems for endocrine-disrupting chemicals. • Biomass conversion into useful materials using environmentally-friendly chemical reactions. • Synthetic organic reactions in water and their mechanisms. |

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| Environmental Science | 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"> • 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. • 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"> • 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 |
| | Assoc. Prof. | Kanako NAITO Hydrospheric Environmental Chemistry (MC) 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 theat 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 | Assoc. 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. | 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"> • 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. |
| | 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 some detail in this course to extend your knowledge and research scope and to enhance your ability to benefit from sophisticated DSP technologies. | <ul style="list-style-type: none"> • Adaptive noise canceller and application to fetal ECG extraction and speech recovery • Development of high-performance and low-cost active noise control systems for real-life applications • Vibration detection, monitoring, and fault diagnosis • Analysis and prediction of time-series data from earthquakes, solar radiation, and economic system using soft computing techniques including deep learning based neural networks • Constructive neural networks and application to real-world problems |

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