

## **FACULTY MEMBERS AND THEIR RESEARCH INTERESTS (Doctoral Program)**

### **EARTH SCIENCES**

#### **Baba, Sotaro** (Faculty of Education)

Professor, D.Sc., 1998, Osaka City University

Geology, metamorphic petrology

E-mail: baba@edu.u-ryukyu.ac.jp

#### **Fujita, Kazuhiko**

Professor, D.Sc., 1999, Tohoku University

Marine micropaleontology and coral-reef geosciences, paleoenvironmental analysis of Quaternary reef deposits; ecology and paleoecology of large benthic foraminifers

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#### **Furukawa, Masahide**

Professor, Ph.D., 1990, Kobe University

Tectonics of the back-arc basin and radiation science of the earth's environment

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#### **Hisaki, Yukiharu**

Professor, D.Sc., 1996, Tohoku University

Physical oceanography

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#### **Ito, Kosuke**

Associate Professor, Ph.D., 2011, Kyoto University

Numerical weather prediction, high-impact weather events such as tropical cyclones and local heavy rainfall, data assimilation, atmosphere-ocean coupled system, geophysical fluid dynamics

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#### **Nakamura, Mamoru**

Professor, D.Sc., 1997, Kyoto University

Seismology, seismotectonics, crustal structure in island arc, numerical modeling of tsunami

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#### **Shinjo, Ryuichi**

Professor, Ph.D., 1992, Tohoku University

Igneous petrology, mineralogy and isotope geochemistry

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#### **Yamada, Hiroyuki**

Associate Professor, Ph.D., 2000, Hokkaido University

Tropical meteorology, mesoscale meteorology, observations and numerical simulations of precipitation processes associated with disturbances and tropical cyclones

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### **CHEMISTRY**

#### **Arakaki, Takemitsu**

Professor, Ph.D., 1996, Duke University (U.S.A.)

Environmental chemistry, atmospheric chemistry

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**Arimitsu, Satoru**

Associate Professor, Ph.D., 2008, University of Louisville (U.S.A.)

Organic chemistry

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**Asato, Eiji**

Professor, D.Sc., 1989, Kyushu University

Inorganic chemistry, coordination chemistry

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**Fujimura, Hiroyuki**

Professor, D.Sc., 2002, University of the Ryukyus

Analytical chemistry, chemical oceanography and carbonate chemistry

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**Ogihara, Kazuhito**

Professor, D.Sc., 1990, Hiroshima University

Organic chemistry, natural product chemistry

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**Suzuka, Toshimasa**

Professor, Ph.D., 2003, Kyoto University

Organic chemistry, synthetic chemistry

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**Tanaka, Junichi**

Professor, Ph.D., 1990, Osaka University

Marine natural products chemistry

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**Teruya, Toshiaki** (Faculty of Education)

Professor, D.Sc., 2003, Nagoya University

Natural products chemistry, structure elucidation and evaluation of biological activities of natural products

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**Toki, Tomohiro**

Associate Professor, D. Sc., 2004, Hokkaido University

Geochemistry, cold seeping mechanism, geochemistry of hydrothermal systems, origin and migration of natural gas, formation processes of gas hydrates

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**BIOLOGY****Denda, Tetsuo**

Professor, D.Sc., 1996, Kobe University

Vascular plant phylogeny and evolution in the Ryukyus and adjacent areas

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**Harii, Saki** (Tropical Biosphere Research Center)

Associate Professor, D.Sc., 2001, The University of Tokyo

Biology and ecology of marine invertebrates in coral reefs, with special focus on the reproductive biology and symbiosis of reef-building corals

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**Hirose, Euichi**

Professor, D.Sc., 1991, University of Tsukuba

Invertebrate biology: biology of tunicates, morphology, body surface, cell function, photosymbiosis

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**Ikeda, Yuzuru**

Professor, D.Fish. Sc., 1993, Hokkaido University

Cephalopod behavior and laboratory culture of cephalopods

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**Imai, Hideyuki**

Associate Professor, D.Fish. Sc., 1999, Tokai University

Population genetics of aquatic animals

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**Itoh, Ryouichi**

Associate Professor, D.Sc., 1999, The University of Tokyo

Biology of plant organelles (plastids and mitochondria)

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**Kubota, Yasuhiro**

Professor, D.Sc., 1996, Tokyo Metropolitan University

Macroecology, biogeography and community ecology and their application to biodiversity conservation

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**Kurihara, Haruko**

Professor, D.Sc., 2004, Kyoto University

Biology, marine environmental science, coral reef biology and ecology, climate change, eco-physiology

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**Morita, Masaya** (Tropical Biosphere Research Center)

Associate Professor, Ph.D. 2003, The University of Tokyo

Reproductive biology, evolutionary biology, cell biology

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**Naiki, Akiyo** (Tropical Biosphere Research Center)

Associate Professor, Ph.D., 2003, Kyoto University

Plant taxonomy, systematics, plant reproductive ecology

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**Nakamura, Takashi**

Associate Professor, Ph.D., 2003, University of the Ryukyus

Biology, ecology and physiology of coral reef organisms, photophysiology of plant-animal symbiosis

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**Naruse, Tohru** (Tropical Biosphere Research Center)

Associate Professor, Ph.D., 2004, University of the Ryukyus  
Biology, taxonomy, systematics, biodiversity, crustacean biology  
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**Otaki, Joji**

Professor, Ph.D., 2000, Columbia University in the City of New York  
Biology, molecular physiology, color-pattern formation of butterfly wings, cellular regeneration and development, phenotypic plasticity and evolution, protein structure and function, biological impact of Fukushima nuclear accident  
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**Reimer, James D**

Associate Professor, Ph.D., 2004, Kagoshima University  
Biology, marine invertebrate biodiversity, evolution, phylogenetics and phylogenomics, taxonomy, ecology, symbiont diversity and ecology, marine and conservation ecology, eDNA, historical marine ecology  
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**Sakai, Kazuhiko** (Tropical Biosphere Research Center)

Professor, D.Sc., 1999, Kyushu University  
Ecology and conservation biology of reef corals  
Note: Will teach courses but not take new students.  
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**Suda, Shoichiro**

Professor, D.Agr., 2000, The University of Tokyo  
Microalgal morphology, taxonomy and phylogeny  
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**Tachihara, Katsunori**

Professor, D.Agr., 1988, Kyushu University  
Life history of fishes in the Ryukyu Archipelago  
Note: Will teach courses but not take new students.  
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**Takahashi, Shunichi** (Tropical Biosphere Research Center)

Professor, Ph.D., 2002, University of the Ryukyus  
Biology of coral-algal symbiosis, marine physiology  
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**Takemura, Akihiro**

Professor, D. Fish Sc., 1989, Hokkaido University  
Environmental biology of fishes  
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**Toda, Mamoru** (Tropical Biosphere Research Center)

Associate Professor, Ph.D., 2000, Kyoto University  
Systematics and biogeography of amphibians and reptiles  
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**Tokuda, Gaku** (Tropical Biosphere Research Center)

Professor, D.Sc., 1997, The University of Tokyo

Digestive physiology of invertebrates

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**Tominaga, Atsushi** (Faculty of Education)

Associate Professor, Ph.D., 2005, Kyoto University

Animal taxonomy, biodiversity, ecology of amphibians

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**Yagisawa, Fumi** (Center for Research Advancement and Collaboration, CRAC)

Associate Professor, Ph.D., 2006, University of Tokyo

Organelles, molecular biology, and cell biology

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**Yamahira, Kazunori** (Tropical Biosphere Research Center)

Professor, Ph.D., 1996, Kyushu University

Evolution and ecology of tropical fishes

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**Yamasaki, Hideo**

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Biology and biochemistry of active oxygen and nitrogen species

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Table (Article 5) Doctoral Program

Course : Marine and Environmental Sciences

FIELD	SUBJECT		CREDITS	HOURS	YEARS	SEMESTERS	SUBJECT DESCRIPTION		
	REQUIRED	COMMON	Advanced Special Seminar	2	30	1-3	Fall/ Spring	Present and discuss research information such as original academic papers, as well as research plans and findings, in a seminar format.	All faculty members
		Advanced Special Exercise	2	60	1-3	Fall/ Spring	For each individual research objective and phase, provide direct instruction and guidance concerning research methods and development.	All faculty members	
BIOSCIENCE	ELECTIVE	SPECIAL	Fish and Shellfish Molecular Population Genetics	2	30	1-3	Fall	Genetic species identification of fish and shellfish, existence of cryptic species, exploration of genetic markers for stock identification, study method for aquatic organisms will be presented and discussed. How to write dissertation will be instructed.	Imai, H.
			Cephalopod Behavior	2	30	1-3	Fall	Various aspects of behavioral characteristics in cephalopods. These include learning, memory, sociality, and reproductive behavior in octopus, squid and cuttlefish. This class tries to learn how intelligent these creatures (cephalopods) are.	Ikeda, Y.
			Reproductive Physiology	2	30	1-3	Spring	Physiological and behavioral mechanisms of reproductive events in low vertebrates. Special attention is paid to endocrine regulation of respective function.	Takemura, A.
			Advanced Marine Ecology	2	30	1-3	Fall	Reviews and discussions of recent topics in ecology of coral reef organisms with emphasis on responses of the organisms to climate change.	Sakai, K.
			Freshwater Biology	2	30	1-3	Spring	Life historical characteristics of freshwater fishes (primary freshwater fish, amphidromous fish, catadoromous fish) in the Ryukyu Archipelago	Tachihara, K.
			Plant Molecular Phylogeny	2	30	1-3	Spring	Discussion of current topics in molecular phylogeny and evolution of vascular plants	Denda, T.
			Plant Molecular Biology	2	30	1-3	Fall	Current topics in molecular genetics, genome science, genetic engineering, and bioimaging techniques, mainly focusing on plants	Itoh, R.
			Oxygen Biology	2	30	1-3	Fall	Comprehensive review on biochemistry and biology of reactive oxygen (ROS) and nitrogen species (RNS)	Yamasaki, H.
			Microscopic Structures of Body Surfaces and Their Functions	2	30	1-3	Fall	Microscopic structures of the body surface of marine invertebrates and the approaches to reveal their properties and functions	Hirose, E.
			Developmental Physiology	2	30	1-3	Spring	Molecular and cellular aspects of mammalian and insect developmental systems.	Otaki, J.
			Species Biology	2	30	1-3	Fall	Discussion and presentation about the definition, identification and characteristics of "species".	Toda, M.
			Evolutionary Biology of Tropical Organisms	2	30	1-3	Fall	Discussion about evolutionary mechanisms that create biodiversity in the tropics.	Yamahira, K.
			Organelles and Cell Physiology	2	30	1-3	Spring	Topics in physiological aspects of organelle dynamics and function. Focuses on organelle-related diseases, aging, and cell differentiation.	Yagisawa, F.
			Vertebrate Systematics and Evolutionary Biology	2	30	1-3	Fall	Discussion and presentation about evolution and divergent process in vertebrates.	Tominaga, A.
Molecular Enzymology of Plant Degradation	2	30	1-3	Fall	Reviews on the recent advances on molecular machinery and classifications of enzymes involved in biodegradation of plant cell walls.	Tokuda, G.			

Table (Article 5) Doctoral Program

Course : Marine and Environmental Sciences

FIELD	SUBJECT		CREDITS	HOURS	YEARS	SEMESTERS	SUBJECT DESCRIPTION		
BIOSCIENCE		Ecology of Tropical Coasts	2	30	1-3	Spring	Review on current topics of tropical coastal ecology, including coral reefs and discussion on environmental issues.	Harii, S.	
		Advanced Seminar of Reproductive Biology	2	30	1-3	Fall	Seminar and laboratory work on reproductive biology.	Morita, M.	
		Practice of Zootaxonomy	2	30	1-3	Spring	Learning how to address problems related to zoological nomenclature through discussion on actual cases.	Naruse, T.	
		Advanced Marine Environmental Biology	2	30	1-3	Fall	Review, presentation and discussion of current topics related on marine environment including climate change on the marine organisms and ecosystems.	Kurihara, H.	
		Plant Reproductive Ecology	2	30	1-3	Fall	This course will treat basic theories and methods as well as recent progress of plant reproductive biology. Presentation on a paper about plant reproductive biology is needed at least three times.	Naiki, A.	
ENVIRONMENTAL SCIENCE	ELECTIVE	SPECIAL	Applied Phycology	2	30	1-3	Fall	Discussion and presentation about recent and advanced phycological studies especially in applied phycology.	Suda, S.
			Advanced Ecology	2	30	1-3	Fall	Review of current topics on the maintenance and origin of biodiversity patterns based on taxonomic, functional and phylogenetic properties.	Kubota, Y.
			Advanced Ecology of Coral Reef Organisms	2	30	1-3	Fall	Review, presentation and discussion about coral reef organisms and related research fields.	Nakamura, T.
			Advanced Environmental Chemistry	2	30	1-3	Spring	This course provides an overview of chemical reactions occurring in aquatic environment. In particular, this course deals with photochemical reactions caused by sunlight.	Arakaki, T.
			Carbonate Geochemistry	2	30	1-3	Spring	This course deals with carbonates in lithosphere and hydrosphere, especially natural mechanism of CO <sub>2</sub> absorption from atmosphere in the global carbon cycles and its role in coral reefs.	Fujimura, H.
			Advanced Asymmetric Organic Reaction	2	30	1-3	Fall	This lecture will be about synthetic strategies for asymmetric organic reactions including catalysis.	Arimitsu, S.
			Advanced Marine Environmental Chemistry	2	30	1-3	Fall & Spring	Chemical processes in marine environments.	Toki, T.
			Organic Structural Spectroscopy	2	30	1-3	Spring	Spectroscopic methods to analyze the structures of organic molecules will be reviewed.	Tanaka, J.
			Spectrometric Analysis of Organic Compounds	2	30	1-3	Fall	Spectroscopic methods for structure analysis such as mass spectrometry, nuclear magnetic resonance spectroscopy and infrared spectroscopy.	Teruya, T.
			Advanced Ocean Wave Remote Sensing	2	30	1-3	Fall & Spring	Physics of ocean surface waves, principle of ocean wave remote sensing and application of ocean wave remote sensing to physical oceanography.	Hisaki, Y.
			Tropical Meteorology	2	30	1-3	Fall	This course provides fundamental knowledge of about tropical atmosphere, including energy balance, atmospheric structure and circulation, tropical cyclone, and intraseasonal variability.	Yamada, H.
			Advanced data assimilation	2	30	1-3	Fall	Data assimilation synthesizes the results of mathematical model with observations. In this lecture, Kalman filter, 4D-Var and particle filter are explained through lecture and exercise.	Itoh, K.
			Environmental Tectonics	2	30	1-3	Fall & Spring	Basics and application on the environmental changes related to crustal movement, weathering process, material circulation, sea-level change, etc..	Furukawa, M.
			Igneous Petrology and Geochemistry	2	30	1-3	Fall & Spring	Reviews and discussion about trace elements and isotopic composition of environmental Earth materials.	Shinjo, R.
			Geodynamics	2	30	1-3	Fall	This course deals with mechanics of deformation of the crust and mantle. Geological areas of application include earthquakes and tsunamis, tectonic plate flexure, and upper mantle flow and deformation.	Nakamura, M.

Table (Article 5) Doctoral Program

Course : Marine and Environmental Sciences

FIELD	SUBJECT		CREDITS	HOURS	YEARS	SEMESTERS	SUBJECT DESCRIPTION		
ENVIRONMENTAL SCIENCE	ELECTIVE	SPECIAL	Coral-reef Biogeoscience	2	30	1-3	Fall	A seminar to study topics and terms on multidisciplinary research on biogeosciences related to coral reefs in the present and past.	Fujita, K.
			Crustal Evolution	2	30	1-3	Fall	This unit of study provides an introduction to crustal evolution process from the point of views of petrogenesis of metamorphic rock and its geochronology.	Baba, S.
			Advanced Biodiversity of Marine Invertebrates	2	30	1-3	Spring	Discussion of marine biodiversity, historical and modern problems in its estimation, and varying concepts of species and methodologies to detect and count them.	Reimer, J.D.
			Global Change Biology	2	30	1-3	Spring	Introduction of current topics about the response of corals to global warming.	Takahashi, S.
		COMMON	Special Lecture A - D	2	30	1-3	Intensive	Course on marine and environmental sciences.	Members of marine and environmental sciences

## Requirements for course completion:

Students must obtain a total of 12 or more credits including 2 credits from Advanced Special Seminar and 2 credits from Advanced Special Exercise. In addition to receiving the necessary instruction, the student must also receive a passing grade on final examinations and Doctoral dissertation.