DOCTOR OF PHILOSOPHY IN MARINE BIOLOGY

(2012 – 2013 Curriculum Update)

All revisions/additions are shaded. Revisions are mainly with regard to subject matter.

Added subject: MB 259 Climate Change and MB 375 Residency (3) – three units in parenthesis

Classification	Subject Number	Subject Description	Total Number of Units	Lecture		Laboratory	
				Units	Contact Hours	Units	Contact Hours
Core Subjects (12 units)	MB 301	Biological Oceanography	3	2	2	1	3
	MB 302	Physical Oceanography	3	2	2	1	3
	MB 303	Chemical Oceanography	3	2	2	1	3
	MB 305	Elements of Research	3	2	1	1	3
Major Subjects (9 units)	MB 326	Marine Microbiology	3	2	2	1	3
	MB 327	Anatomy and Physiology of Marine Plants and Algae	3	2	2	1	3
	MB 328	Anatomy and Physiology of Marine Animals	3	2	2	1	3
	MB 329	Marine Pollution	3	2	2	1	3
	MB 330	Marine Resource Management	3	2	2	1	3
	MB 331	Environmental Toxicology	3	2	2	1	3
	MB 332	Marine Planktonology	3	2	2	1	3
PhD Seminars (27 units)	MB 341	Integrated Natural Resource Management	3	2	2	1	3
	MB 342	Evolutionary Biology	3	2	2	1	3
	MB 343	Marine Parasitology	3	2	2	1	3
	MB 344	Molecular Ecology	3	2	2	1	3
	MB 345	Marine Biodiversity	3	2	2	1	3
	MB 346	Principles of Systematics	3	2	2	1	3
	MB 347	Coastal and Marine Systems Restoration	3	2	2	1	3
	MB 348	Coral Reef Biology	3	2	2	1	3
	MB 349	Marine Natural Products	3	2	2	1	3
	MB 350	Biology of Marine Mammals	3	2	2	1	3
	MB 351	Biology of Marine Fishes	3	2	2	1	3
	MB 352	Developmental Biology of Marine Organisms	3	2	2	1	3
	MB 353	Impacts of Aquaculture	3	2	2	1	3
	MB 354	Intertidal Ecology	3	2	2	1	3
	MB 355	Marine Biogeography	3	2	2	1	3
	MB 356	Resource Valuation of Marine Ecosystems	3	2	2	1	3
	MB 357	Marine Fisheries Biology	3	2	2	1	3
	MB 358	Marine Invertebrates	3	2	2	1	3
	MB 359	Climate Change	3	2	2	1	3
	MB 360	Special Topics in Marine Biology	3	2	2	1	3
Residency	MB 375	Residency	(3)			3	9
PhD Dissertation	MB 400	Dissertation	12			12	36

COURSE DESCRIPTIONS

MB 301 Biological Oceanography (3 units)

- Studies marine organisms (plankton, nekton and benthos) in relation to their environments; factors that control their distribution and abundance of different types of marine life and how these organisms influence and interact with ocean processes; biological flow of energy and matter in marine ecosystems; includes processes such as photosynthesis, cycling of nutrients, and effect of ocean currents on marine productivity.

MB 302 Physical Oceanography (3 units)

- Deals with physical properties of seawater, atmospheric influences, oceanic heat budget, dynamics of ocean currents and the effects of temperature, salinity and density; ocean circulation (Coriolis effect, Ekman Transport), ocean currents, types of waves.

MB 303 Chemical Oceanography (3 units)

- Deals with the dissolved elements in sea water and the ocean's numerous chemical and biochemical cycles, the origin and evolution of sea water, the origin of the sediment that covers the seafloor, the relationships between the chemical constituents of sea water, and the significance of changes in ocean chemistry (i.e., the influence of changing geology, including biological activity, and human-included pollution.

MB 305 Elements of Research (3 units)

- Discusses with the formulation and conceptualization of research questions, sampling design and applications of statistical tests in biological research.

MB 326 Marine Microbiology (3 units)

- Deals with the classification, structure and physiology of marine prokaryotes and eukaryotic bacteria and archea; their roles in carbon and nutrient cycling, photosynthesis, primary productivity, chemoautotrophic symbiosis, bioluminescence and disease.

MB 327 Anatomy and Physiology of Marine Plants and Algae (3 units)

- Deals with the structure, function and relationships of marine animals with emphasis on nutrition, osmoregulation, and reproductive strategies; focuses on behavioral and physiological responses of animals to the major environmental drivers of temperature, salinity, oxygen, and light.

MB 328 Anatomy and Physiology of Marine Animals (3 units)

- Deals with the structure, function and relationships of marine plants and with the emphasis on photosynthesis, life cycles and osmoregulation.

MB 329 Marine Pollution (3 units)

- Deals with the direct or indirect introduction by humans of substances or energy into the marine environment (including estuaries) that results in harm to living resources, hazards to human health, hindrances to marine activities and impairment of the quality of sea water; types and sources of marine pollution their impacts and costs.

MB 330 Marine Resource Management (3 units)

- Discusses the history and principles of marine resource conservation rational utilization, protection and management of the marine environment, Philippine conservation laws; strategies, practices and evaluation of marine resources management programs.

MB 331 Environmental Toxicology (3 units)

MB 332 Marine Planktonology (3 units)

- Includes the biology of marine phytoplankton and zooplankton (mero- and holo- plankton), their importance in the economy of the sea with emphasis on their role in the food chain; sampling methodology and preparation for biomass and productivity estimates; dynamics of algal blooms and its result (red tides, toxic shellfish poisoning, ciguatera fish poisoning); application as biofuels, human health supplements and others.

MB 341 Integrated Natural Resource Management (3 units)

- Deals with the responsible and broad-based management of biological resources (land, water, forest) needed to sustain productivity and avert degradation of potential productivity.

MB 342 Evolutionary Biology (3 units)

- Deals with the study of evolution from the formation of the earth, development of conditions for the start of life, theories on the origin of life from simple unicellular organisms to multicellular organisms, development of the theories of evolution, Darwinian concept of natural selection, theories on the mechanisms of evolution/and speciation and evolution of populations.

MB 343 Marine Parasitology (3 units)

- Deals with diversity and basic biology of the different groups of marine parasites, their morphology, life cycles, infection mechanisms and effects on hosts; ecology and importance of marine parasites; behavioral and ecological aspects of parasitism and evolution and zoogeography of marine parasites; their economic, environmental and medical significance and their importance in aquaculture and their effects on marine mammals and birds.

MB 344 Molecular Ecology (3 units)

- Is concerned with the application of molecular population genetics, phylogenetics and genomics to tradition ecological questions (species diagnosis, biodiversity assessment, species-are relationships and behavioral ecology); includes methods used to determine gene flow and hybridization between populations.

MB 345 Marine Biodiversity (3 units)

- Discusses the concept of biodiversity, its scope (from genes to ecosystems) and methods to determine biodiversity; includes the theories explaining biodiversity hotspots like the Philippines.

MB 346 Principles of Systematics (3 units)

- Deals with the study of rules, principles and practice of classifying organisms, and the basic approaches in deducing evolutionary relatedness (phenetics/numerical taxonomy, cladistics, phylogenetic systematics and evolutionary systematics/classical taxonomy).

MB 347 Coastal and Marine Systems Restoration (3 units)

- Deals with recent concepts, understanding and experience of the restoration, recovery and human-mediated modification of coastal and marine ecosystems.

MB 348 Coral Reef Biology (3 units)

- Deals with the distribution, formation and types of coral reefs, and the physiological, ecological and behavior strategies that contribute to the success of reef-building corals; includes an integrated overview of the function, physiology, ecology and behavior of coral reef organisms; discusses the effects of tourism, pollution, climate change and over-fishing on reefs and their inhabitants as well as efforts in their conservation and management.

MB 349 Marine Natural Products (3 units)

- Deals with bioactive compounds isolated from marine microorganisms and phytoplankton, green algae, brown algae, red algae, sponges, coelenterates, bryozoans, mollusks, tunicates and echinoderms; their relevant biological activities, source organisms and country of origin.

MB 350 Biology of Marine Mammals (3 units)

- Deals with the biology, evolutionary history, ecology and conservation of marine mammals, focusing on cetaceans; discusses local and global conservation concerns with emphasis on cetacean mortality in fisheries; includes techniques used in cetacean surveys in the Philippines and sampling techniques in collecting data on cetacean mortality in fisheries.

MB 351 Biology of Marine Fishes (3 units)

- Studies the taxonomy, anatomy and physiology, life cycle and ecology of marine fishes; their diversity and distribution, roles in marine ecosystems and, threats and issues relating to their conservation.

MB 352 Developmental Biology of Marine Organisms (3 units)

- Deals with developmental biology of selected marine organisms through the study of reproduction, early embryology, histogenesis, organogenesis, and morphogenesis.

MB 353 Impacts of Aquaculture (3 units)

- Deals with the aquaculture practices and their impacts on the environment such as conservation of natural ecosystems, introduction of exotic species, nutrient pollution and algal blooms.

MB 354 Intertidal Ecology (3 units)

- Deals with intertidal communities (rocky shores, sandy communities and soft bottom communities), their environmental conditions and the accompanying adaptations of intertidal organisms; human (as source of food and recreation) and anthropogenic (invasive species, climate change) impacts.

MB 355 Marine Biogeography (3 units)

- Deals with geographic patterns of species distribution and the processes that result in such patterns; processes involved include speciation, extinction, continental drift, glaciation, variations in sea level, and river capture, area and isolation of landmasses.

MB 356 Resource Valuation of Marine Ecosystems (3 units)

- Includes principles of economic valuation of ecosystems; cost and benefit analysis of fisheries, tourism, mineral resource (oil and gas, mining), shipping, socio-cultural values, marine bioprospecting, and Aesthetic value of ocean views; suitable design and assessment methods, and its implementation to management of marine resources.

MB 357 Marine Fisheries Biology (3 units)

- Deals with population structure of fish stocks, function and selective properties of fishing gear, exploitation strategies of fish populations from selected ecosystems, population dynamics, how ecological factors and fishing pressure influence the development of fish stocks and management measures to prevent further fisheries decline.

MB 358 Marine Invertebrates (3 units)

- Adopts an evolutionary approach to portray invertebrate diversity and function against a background of selective pressures and selective advantages in the present and in the past.

MB 359 Climate Change (3 units)

MB 360 Special Topics in Marine Biology (3 units)

- Deals with special topics like marine biodiversity and biogeography, the current marine environmental issues like climate change and global warming and recent advances in the various fields of marine biology.

MB 375 Residency