

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course Number:	Fisheries 202	Semester	
		Credits	3 units
		(2 hrs Lecture; 3 hrs Lab)	
Course Title:	Advances in Fish Health Management		
Course Description:	Pathological Effects of Infectious and Non-Infectious Diseases in Fish, Shellfish and Crustaceans with Emphasis on Immunological Responses; Current Diagnostic Methods and Control Strategies in Aquaculture; and Environmental Factors that Influence Disease Transmission		
Prerequisite:	Any course in Parasitology, Microbiology, Fish Diseases or Equivalent Course/s		
Faculty-in-Charge:	Dr. Erlinda Lacierda 1 st Floor, IA Wing, CFOS Faculty Center		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	<ol style="list-style-type: none">1. To know the basic principles of fish health management and the underlying factors for effective management of fish and other aquatic organisms;2. To gain advanced information on the causes, control and preventive measures of common diseases affecting cultured fish and crustaceans;3. To have in-depth knowledge of different disease diagnostic procedures and its application for effective fish health management;4. To have hands-on basic approaches to monitor disease occurrence in an aquaculture facility;5. To critique and discuss relevant papers covering issues and recent advances in fish health management; and6. To write a research proposal pertaining to fish disease/fish health.		
Course Outline:	<ol style="list-style-type: none">1. Impact of disease in aquaculture, current issues in aquaculture related to fish health2. Parasitic protozoans in farmed fish and crustaceans3. Parasitic helminths in farmed fish and crustaceans4. Parasitic crustaceans in farmed fish5. Fungal diseases of farmed fish and crustaceans6. Bacterial diseases of farmed fish7. Bacterial diseases of farmed crustaceans8. Viral diseases of farmed fish9. Viral diseases of farmed crustaceans10. Environmental diseases of farmed fish and crustaceans11. Nutritional diseases of farmed fish and crustaceans12. Environmental and chemical methods of disease prevention and control13. Use of chemicals in aquaculture14. Fish and crustacean immune system15. Biological methods of disease prevention and control16. Fish histology17. Fish histopathology18. Fish zoonoses		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Evaluation Criteria	<ol style="list-style-type: none">1. Written examinations (45%)2. Presentations (10%)3. Research Proposal (10%)		

Laboratory Requirements

4. Lab Specimen/Lab Reports (15%)
5. Diagnostic case processing (20%)

Passing rate: Information supplied at the start of the semester. Usually 60-75%.

Main Reference: Lio-Po GD and Inui Y (editors). 2010. Fish Health Management in Aquaculture. SEAFDEC Aquaculture Department, Iloilo, Philippines. Other readings as prescribed by the faculty in charge.

Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No. Fisheries 218 Semester
Credit 3units
(2 hrs Lecture; 3 hrs Lab)

Course Title Advanced Aquatic Ecology

Description In-depth Treatment and Insights into Central Ecological Concepts Pertaining to the Structure and Functioning of Aquatic Ecosystems; New Developments and Contemporary Issues in Aquatic Ecology

Prerequisites Any graduate or undergraduate ecology or related subject

Faculty

-in-Charge: Dr. Crispino Saclauso (Dean's Office, Old Administration Bldg., CFOS)
Dr. Fiona Pedroso (1st Floor, IA Wing, CFOS Faculty Center)

Consultation

Hours: (Provided at the start of the semester)

Course Objectives

1. To describe the central ecological concepts pertaining to the structure and functioning of aquatic ecosystems
2. Discuss the current and contemporary issues in aquatic ecology

Course Outline 1. Ecological Concepts

- 1.1. Principles and concepts in organism population
 - Dynamics of competitive interactions
 - Dynamics of predator-prey relationship
 - Symbiosis and mutualism
 - Parasitism and mutualism
 - Biodiversity
 - Patterns of diversity
 - Parameters regulating diversity
 - Measurement of diversity and species richness
 - 1.2. Factors influencing biotic interactions
 - Temporal patterns
 - Spatial dynamics
 - Habitat selection
 - 1.3. Social behavior in aquatic organisms
 - 1.4. Nutrients dynamics in the ecosystem
 - 1.5. Biogeochemical cycles in the ecosystem
 - 1.6. Trophic relationships
 - Trophic structure
 - Food chains and food webs
 - Ecological pyramid
 - 1.7. Energy flow in the ecosystem
 - Energy budget
 - Factors affecting energy budget parameters (ingestion, metabolism, growth and production, excretion and fecal production)
 - Ecological, absorption, assimilation and growth efficiencies
2. Current and Contemporary Ecological Issues
 - 2.1. Issues on Biodiversity
 - Types of biodiversity
 - Threats on biodiversity
 - Overexploitation
 - Introduction of exotic and alien species
 - Introduction of transgenic organisms
 - Habitat alteration
 - Global climatic and weather changes
 - Rehabilitation, conservation and protection of aquatic resources
 - 2.2. ECOPATH in energy flow determination in ecosystem
 - 2.3. Ecological footprint

- 2.4. Ecological effects of Aquaculture practices and the environment
- 2.5. Pollution and the environment

Course Requirements:

- 1. Long Exams
- 2. Field Trips
- 3. Oral presentation/critique of articles published in international journals

Assessment Criteria

Written reports -	30%
Written exams -	40%
Presentations -	30%
Total -	100%

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	Fisheries 205	Semester	
		Credit	4
		(2 hrs Lec; 6 hrs Lab)	
Course Title	Aquaculture Management		
Description	The Integration and Rational Application of Knowledge and Various Approaches in Attaining Sustainable Production of various Aquatic Organisms		
Prerequisite:	Introductory Aquaculture or Equivalent Course/s		
Faculty -in-Charge:	Dr. Carlos Baylon (1st Floor, IA Wing, CFOS Faculty Center) Dr. Liberato Laureta (1st Floor, IA Wing, CFOS Faculty Center) Dr. Crispino Saclauso (Dean's Office, Old Administration Bldg)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	<ol style="list-style-type: none">1. To engage in realistic aquaculture management, providing the latest concepts and practical skills required for managing various types of aquaculture systems such as ponds, pens, cages, and open waters;2. To appreciate the current status and constraints for the production of major aquaculture species in the different aquaculture systems;3. To appreciate the trend and opportunities for aquaculture of new species;4. To understand the general biology and major methods for production of important aquatic species in the Philippines and other countries;5. To develop capability to make an informed evaluation of potential and opportunity of aquaculture in various places;6. Gain first-hand experience in managing aquaculture systems through visits of aquaculture farms and research institutes;7. Development of effective writing skills that conform to current scientific conventions for reporting, disseminating and evaluating information.		
Course Outline:	<ol style="list-style-type: none">1. Introduction<ol style="list-style-type: none">1.1 Extent of world fishery resources1.2 Extent of Philippine fishery resources1.3 Trends in fishery production by sector1.4 Role of aquaculture in the utilization of aquatic resources1.5 Contribution of aquaculture in the production of the fisheries sector and in the national economy2. Types of aquaculture systems: environment, species, carrying capacity<ol style="list-style-type: none">2.1 Pond culture2.2 Cage/pen culture2.3 Shellfish/ seaweed culture2.4 Culture in land-based facilities2.5 Integrated culture, e.g. rice-fish culture3. Management of aquaculture systems<ol style="list-style-type: none">3.1 Land-based facilities (fishpond, tanks, etc)3.2 Open water aquaculture (lakes, reservoirs, bays, running waters)4. Issues in fisheries and aquaculture management<ol style="list-style-type: none">4.1 Aquaculture and environment4.2 Assessment/ Enhancement of aquaculture resources5. Socio-economic aspects of aquaculture		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Evaluation Criteria	Project reports (including field trip report) (40%)		

Production success (10%)
Student initiative, involvement and leadership ability (15%)
Written exams (35%)

Passing rate: Information supplied at the start of the semester; usually 60-75%

References: Text, readings and other materials provided by the faculty-in-charge.

Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course Number:	Fisheries 207	Semester	3
		Credit	
Course Title:	Advances in Fish Nutrition		
Course Description:	Analysis of Nutritional Factors Complementing Various Aquaculture Systems and Aquaculture Production Goals; Current Feeding Techniques; and the General Aquatic Environmental Well Being		
Prerequisite:	Introductory Nutrition and Biochemistry		
Faculty -in-Charge:	Dr. August Serrano (1st Floor, IA Wing, CFOS Faculty Center) Dr. Rex Ferdinand Traifalgar (1st Floor, IA Wing, CFOS Faculty Center)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	At the end of the semester, students are expected to: 1. Discuss the basic nutritional requirements of fish 2. Describe feed formulation and estimate feeding rations, feed needs and requirements 3. Discuss physiological aspects of nutrition and the response of fish to diet in relation to environmental and genetic factors 4. Evaluate and critique selected papers and articles on fish nutrition		
Course Outline	1. Introduction to fish nutrition 2. Feed formulation 3. Nutrient requirement models 4. Fish and shellfish digestive physiology 5. Dietary energy 6. Vitamins and minerals 7. Proteins 8. Lipids 9. Carbohydrates 10. Feed and ingredient evaluation 11. Fish nutrition research 12. Feed additives/ immunostimulants		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Evaluation Criteria	Examinations - 60% Oral and written reports - 40%		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		
References:	Belal, I.E.H. 2005. A review of some fish nutrition methodologies. <i>Bioresource Technology</i> 96 395–402. Brody, T. 1999. <i>Nutritional Biochemistry</i> . Academic Press. 1007 pp. Combs, G.F. 2008. <i>The Vitamins: Fundamental aspects in nutrition and health</i> . 3 rd Ed. Elsevier. 583 pp. Halver, J.E., Hardy, R.W., (Eds.), 2002. <i>Fish Nutrition</i> . 3 rd Ed., Acad. Press, U.S.A., 824 pp. Hepher, B. 1988. <i>Nutrition of pond fishes</i> . Cambridge Univ. Press. 388 pp. Houlihan, D., Boujard, T., Jobling M. 2001. <i>Food Intake in Fish</i> . 2001. Blackwell Science Ltd., 418 pp. Stickney, R.R. (Ed.), <i>Encyclopedia of Aquaculture</i> . 2000. Wiley & Sons, Inc., Canada, 1063 pp.		

Webster, C.D., Lim, C.E. 2002. Nutrient Requirements and Feeding of
Finfish for Aquaculture. CAB Publ. 418 pp.

Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No. Fisheries 203 Semester
Credit 3units
(2 hrs Lecture; 3 hrs Lab)

Course Title Advances in Hatchery Management

Description Management Techniques, Strategies and Recent Concepts in Hatchery Operation

Prerequisite Introductory Hatchery Management or Animal Physiology

Faculty

-in-Charge: Dr. Carlos C. Baylon (1st Floor, IA Wing, CFOS Faculty Center)
Dr. Crispino A. Saclauso (Dean's Office, Old Administration Bldg., CFOS)

Course Credit 3 units (2 hrs lecture; 3 hrs laboratory)

Course Objectives:

1. To engage students in realistic aquaculture hatchery production, providing the latest concepts and practical skills required for broodstock management, spawning induction and larval rearing in aquaculture hatcheries.
2. To provide concepts and practical skills required for production, harvesting, enrichment of live feeds and management of a live feeds laboratory.
3. To provide experience and training regarding various aspects of aquaculture hatchery protocol.
4. To develop skills in the critical assessment of methodology and evaluation of success in hatchery production.
5. To foster ability of applying theoretical knowledge to practical aquaculture exercise.
6. To develop critical thinking, problem identification and solving skills and capacity to make sound decisions.
7. To develop effective communication skills (e.g. listening, arguing a point, public speaking and presenting).
8. To develop effective interpersonal skills, including cooperation and teamwork, leadership and organisational, as well as conflict resolution skills.
9. To develop capacity of preparing a major technical report.

Course Outline (Lecture)

A. Hatchery management principles and practices

1. Critical analysis of current and potential hatcheries for aquaculture species in the Philippines (prospects and problems)
 - 1.1 Marine Finfish (Milkfish/Grouper/Sea Bass/Pompano/Cobia/ Snapper)
 - 1.2 Freshwater Finfish (Tilapia, Catfish, Carps. Etc)
 - 1.3 Crustacean (Tiger Prawn, White Shrimp, Mud Crab, Swimming Crab, Freshwater Shrimp)
 - 1.4 Shellfish & others (mussels, oysters, angel wings, sea urchins, sea cucumbers)
2. Site Selection and Hatchery Design Considerations
 - 2.1 Species specific versus Multi-species Hatcheries
 - 2.2 Integrated broodstock, hatchery & nursery operation versus independent operations
 - 2.3 Computation of basic requirements
3. Advances in Hatchery Designs
 - 3.1 Schemes for achieving good/ideal water quality (protein skimmers, ozone treatments, chemical treatment, mechanical filtration systems, biological filters, water heaters)
 - 3.2 Species-specific larval rearing systems (lobsters, sea urchin, continuous culture systems for rotifers)
4. Species-specific practices in hatchery management
 - 4.1 Broodstock selection and maintenance
 - 4.1.1 Nutrition and health management
 - 4.1.2 Induced maturation /spawning (hormonal injection/implantation, environmental manipulation)

4.2 Larval rearing

- 4.2.1 Feeds and feeding schemes (enrichment of live feeds, feeding with formulated feeds)
- 4.2.2 Water management schemes (schemes for minimizing stress)
- 4.2.3 Larval health management (prevention and control of diseases)

5. Fry handling and transport techniques

B. Recent developments in hatchery management

Review/discussion of the latest published articles on the following topics:

- 1.0. Application of biotechnology in hatchery production
- 2.0. Broodstock management
- 3.0. Nutrition of broodstock and larvae
- 4.0. Bio-security in hatchery management

LABORATORY ACTIVITIES

- I. Group experiment on a special topic.
- II. Participation in various hatchery activities (live food production, larval rearing).
- III. Field trip to hatcheries.
- IV. Writing of reports

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course Number: Fisheries 221

Semester
Credit 3
(2 h Lecture and 3 h Lab)

Course Title: Fisheries Ecology

Course

Description: Parameters Defining the Marine Environment, their Influences and Interactions in the Ecosystem; Organic Production, Food webs, Food cycles, and Pollution

Prerequisite: Introductory course in Ecology

Faculty

-in-Charge: Dr. Gerald Qunitio (IMFO Director's Office, Old Admin Bldg.)
Dr. Nathaniel Añasco (2nd Floor, IMFO Wing, CFOS Faculty Center)

Consultation

Hours: (Provided at the start of the semester)

Course

Objectives:

At the end of the semester, students are expected to:

1. Discuss basic concepts and principles of marine and fisheries ecology including trophic relationships, energy and material cycling, ecosystem stability and resilience
2. Discuss biological parameters including age, growth, mortality, reproduction, diet, recruitment and fish population dynamics
3. Describe human influence on the marine ecosystem including utilization, conservation and restoration of biological communities and ecosystems
4. Read and critically evaluate fisheries ecology literature
5. Be equipped with knowledge and skills in quantitative marine ecology, conservation biology, and resource assessments

Course Outline: 1. Introduction (Ecological concepts and principles, the marine environment, diversity of teleost fishes)
2. Environmental/Organic constraints
3. Feeding
4. Bioenergetics
5. Growth
6. Reproduction
7. Biotic interactions
8. Dynamics of population abundance and production
9. Life history strategies
10. Fish assemblages
11. Ecological issues and concerns
12. Ecological interventions
13. Selected topics

Laboratory activities

Activity 1: Fisheries assessment

Activity 2: Ecological assessment

Activity 3: Management options

Activity 4: Field trip

Activity 5: Mini research

Self studies

and advices: Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.

Course Requirements and Evaluation Criteria:

1. Reports, field trip report, lab reports (25%)
2. Long exams, final exams (50%)
3. Mini research and report (25%)

Passing rate: Information supplied at the start of the semester; usually 60-75%

References: Jennings S, Kaiser M, Reynolds JD. 2001. Marine Fisheries Ecology.
Blackwell Science
Selected papers and readings
Materials provided by faculty-in-charge

Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course Number:	Fisheries 227	Semester	
		Credit	3
		(2 h Lecture and 3 h Lab)	
Course Title:	Advanced Fishing Technology		
Course Description:	Advanced Techniques in Fishing Gears, Designs and Construction; Electrocoustics and its Application for Detection and Estimation of Fish Abundance		
Prerequisite:	Physics and Introductory capture fisheries		
Faculty -in-Charge:	Dr. Ricardo Babaran (OVCRE, New Admin Bldg.) Dr. Harold Monteclaro (IFPDS, Old Admin Bldg)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	At the end of the course, the students are expected to be able to: 1. Discuss the different fishing gears including their design, operation and classification 2. Discuss the factors that play a significant role in the development and use of fishing gears 3. Assess the impacts of fishing to both resources and environment and describe measures in conservation 4. Be updated with recent developments in fishing technology and responsible capture fisheries		
Course Outline:	Lecture 1. Introduction 1.1 Trends in the exploitation of fisheries resources 1.2 Major developments in capture fisheries 2. Review of fishing gears and vessels (classification, materials, construction, etc) 3. Significant factors that influence fishing (environment, fish biology and behavior, technology) 4. Major fishing gears in the Philippines: design, operation, significant factors that affect efficiency/use, and issues (Traps, lines, gillnets, seines, towed gears, others) 5. Responsible capture fisheries 6. Recent developments in fishing technology 7. Readings in capture fisheries/ fishing gear technology Laboratory Activities 1. Fishing gear materials, construction and design 2. Fishing gear specifications 3. Field trip 4. (Mini) Project Report and Presentation		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Assessment Criteria	Midterm and Final Examination – 50% Project Report and Presentation – 35% Reporting/ Class discussion – 15%		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		
References:	Modern Fishing Gears of the World (edited by H. Kristjonsson), Fishing News (Books), Ltd. Selected books and scientific articles identified by faculty-in-charge		
Relevant matters:	Course delivered in English.		

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	Fisheries 239	Semester	3
		Credit	
Course Title	Low Temperature Preservation of Fish		
Course Description	Application of principles of low temperature preservation to specific fisheries commodities		
Prerequisite	Introduction to Fish Handling and Preservation		
Faculty -in-Charge:	Dr. Jose Peralta (IFPT, Old Admin Bldg.) Dr. Sharon Nuñal (2nd Floor, IFPT Wing, CFOS Faculty Center)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	<p>At the end of the course, the students are able to:</p> <ol style="list-style-type: none"> 1. Provide detailed insight on various aspects of low temperature preservation of fish; 2. Discuss the bacterial and physic-chemical changes during chilling and freezing; 3. Understand the environmental impacts of freezing operations; 4. Design an effective and appropriate low temperature storage condition for a Particular fishery commodity; and 5. Be aware of the subject areas that are for further research. 		
Course outline	<ol style="list-style-type: none"> 1. Introduction (Fish as food: nutritional aspects, bioactives from fish; Pre and post mortem changes in fish; Fish handling) 2. Fish quality management system: methods of assessment, quality systems, codes of conduct, plant hygiene and sanitation, quality criteria and standards for frozen fish products 3. Chilling: water phases, principles, methods, advances 4. Freezing: principles, importance, freezing curve for fish, methods, advances 5. Design calculations: heat transfer, freezing rate factors, recommended rates 6. Types of freezers 7. Freezing methods for selected seafoods and seafood products 8. Effects of freezing on fish quality: effects on microorganisms and parasites, physic-chemical changes, issues related to low temperature preservation, seafood quality and safety, quality criteria and standards for frozen fish 9. Issues and future directions: energy efficiency, seaweedy odor and flavor, geosmin, global trends <p>Suggested activities:</p> <ol style="list-style-type: none"> 1. Visit to a fish cold storage/ processing facility. 2. Students to submit a paper review and report on the advances in low temperature preservation of a pre-assigned fishery commodity. 3. Students to design effective and appropriate low temperature storage condition for a pre-assigned fishery commodity. 		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Assessment Criteria:	<ol style="list-style-type: none"> 1. Two Long Exams and One Final Exam (60%) 2. 16 Executive Summary of journal articles (20%) 3. One concept research (20%) 		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		
References	<p>Clucas, I. J. 1981. Fish handling, preservation and processing in the tropics. Part I. Tropical Products Institute, London.</p> <p>Espejo, J. M.1980. Phil Handbook on Fish Processing Technology NSDB,</p>		

Manila. 109p

Espejo-Hermes, J. 1998. Fish Processing Technology in the Tropics. Tawid Pub., Quezon City, Phil. 336p.

Evans, JA(Ed). 2008. Frozen Food Science and Technology. Blackwell Publishing, Oxford, UK.

Fish Handling & Processing. 1982. Aitken, A., et. al. eds: 2nd ed. Ministry of Agri., Fish. & Food, Torry Research Station; Edinburgh, UK

Garthwaite, GA. 1997. Chilling and freezing fish. In: Fish Processing Technology, 2nd ed, Hall GM (Ed), Blackie Academic & Professional, London, pp. 93-118.

Hall, GM. 2011. Freezing and chilling of Fish and Fishery Products. In: Fish Processing: Sustainability and New Opportunities, GM Hall(Ed), Wiley-Blackwell, Oxford, UK, pp 77-97.

Kolbe, E and D Kramer. 2007. Planning Seafood Freezing, Alaska Sea Grant, University of Alaska, Fairbank, AK.

SEAFOOD Handbook, 2nd ed. 2010. Seafood Business eds., John Wiley & Sons, Inc: New Jersey, p 280

The Use of Standard Returnable Fish Containers in ASEAN countries. 1979. Kamari, A. and JCA Sayers eds. National Materials Handling Bureau; Sydney, Australia.

WHO/FAO. 2009. Code of Practice for Fish and Fishery Products, 1st ed.

Codex Alimentarius Commission. World Health Organization/Food and Agriculture Organization, Rome, Italy.

Selected Journal Articles on the subject

Relevant matters:

Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	Fisheries 240	Semester Credit	3
Course Title	Fish Curing and Dehydration		
Course Description	Unit operations and processes involved in fish curing and dehydration.		
Pre-requisite	Introduction to Product Development or Consent of Instructor		
Faculty -in-Charge:	Dr. Jose Peralta (IFPT, Old Admin Bldg.) Dr. Sharon Nuñal (2nd Floor, IFPT Wing, CFOS Faculty Center)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	At the end of the course, the students are able to: 1. Identify the key concepts on the alternative methods of fish processing; 2. Accurately describe and explain the practices and principles involved in fish curing; 3. Describe the importance of fish quality on the value addition chain; 4. Recognize the problems and issues concerning production and product marketing; 5. Formulate appropriate technologies to address safety issues and improve the quality of existing cured fishery products; 6. Formulate concepts for further research.		
Course Outline:	1. Introduction: definition of terms, dimension analysis, water properties, salt manufacture, overview of processed fishery foods 2. Heat and mass transfer: basic concepts of heat transfer and mass transfer, applications 3. Fish curing: traditional and indigenous practices and products a. Fish salting: salt characteristics, fundamentals, mechanisms, techniques b. Sugar and honey c. Nitrates/nitrites 4. Fish dehydration: principles, drying processes, modelling of fish drying process, unit operations and processes, psychrometric chart, drying and drying rate curves 5. Fish smoking: smoked products, principles, types/methods, critical parameters, quality criteria and standards in smoked products, issues related to smoke preservation 6. Fish fermentation: principles, techniques, products, value addition of dried fishery products 7. Packaging and shelf-life of cured and/or dried products: principles and techniques in packaging, packaging materials, accelerated shelf-life testing 8. Dryers, equipment, and instruments 9. Water activity and sorption isotherms of fishery products: methods, calculations, specific fishery products 10. Product and process standards, safety and quality of fishery products 11. Issues and concerns		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Evaluation Criteria	1. Two Long Exams and One Final Exam (60%) 2. 16 Executive Summary of journal articles (20%) 3. One concept research (20%)		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		

- References:
- Cristina Ratti. 2009. *Advances in Food Dehydration*, CRC Press Taylor & Francis Group, NW.
- Kudra, T and Mujumdar AS. 2009 . *Advanced Drying Technologies*, 2nd ed. Bosa Roca: Taylor & Francis, Inc.
- Rehbein, H and Oehlschlager J (Eds). 2009. *Fishery Products Quality, Safety and Authenticity*. Blackwell Publishing Ltd. John Wiley & Sons.
- Others:
- Clucas, I. J. 1981. *Fish handling, preservation and processing in the tropics*. Part II. Tropical Products Institute; London.
- Espejo-Hermes, J. 1998. *Fish Processing Technology in the Tropics*. Tawid Pub.; Quezon City, Phil. 336p.
- Fish as Food*. 1961. George Borgstrom, ed; Vol. II, III, & IV. Academic Press; New York
- Food Science & Technology*. 2009. Geoffrey Campbell-Platt, ed. Wiley Blackwell; UK, p 508
- Iglesias, Hector A. 1982. *Handbook of Sorptions Isotherms: Water Sorptions Parameters for Food and Food Components*. ACADEMIC Press, Inc.; London, 347 pp
- Packages & Packaging Material for Fish*. 1970. OECD; Paris
- Rockland, Louis B. and Geroge P. Stewart. 1981. *Water Activity: Influences on Food Quality*. ACADEMIC Press, Inc.; Sn Francisco, 921 pp
- Singh, R. Paul and Dennis R. Heldman. 2001. *Introduction to Food Engineering*. 3rd ed. ACADEMIC Press, Inc.; London
- The Production of Dried Fish*. 1976. Waterman, J. J. ed. FAO/UN; Rome, Italy
- Selected Journal Articles on the subject
- Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	Fisheries 241	Semester	
		Credit	2
Course Title	Thermal Processing of Fish		
Course Description	Thermal Process Calculations for Fish and Fishery Products with Reference to Microorganisms and Nutrient Retention		
Prerequisites	Introduction to Fish Processing or Consent of Instructor		
Faculty -in-Charge:	Dr. Jose Peralta (IFPT, Old Admin Bldg.) Dr. Sharon Nuñal (2nd Floor, IFPT Wing, CFOS Faculty Center)		
Consultation Hours:	(Provided at the start of the semester)		
Course Objectives:	At the end of the course, the students will be able to: 1. Understand the theory and principles of thermal/heat processing; 2. Perform thermal process calculations and correlate with microbial safety; 3. Identify appropriate packaging materials and technologies in thermal processing of specific fisheries commodities; 4. Apply principles of thermal processing in drawing HACCP to the safety of canned foods.		
Course Outline:	1. Principles of thermal processing: mechanisms of heat transfer, heat penetration and thermal process calculations 2. Types of foods and commercial sterility 3. The canning process: process requirements, operations, analyses of a canning plant 4. Issues in quality, safety and spoilage of canned/ bottled foods: physical, chemical and microbial quality, thermobacteriology, assessment/examination of canned products 5. HACCP of canned foods: concepts and principles of HACCP, identifying CCPs, drawing/creation of HACCP plan of a specific canned product 6. Innovations/Developments in thermal processing		
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.		
Course Requirements and Assessment Criteria:	1. Two Long Exams and One Final Exam (60%) 2. 16 Executive Summary of journal articles (20%) 3. One concept research (20%)		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		
References:	Hall, GM. 2011. Canning Fish and Fish Products. In: Fish Processing: Sustainability and New Opportunities, GM Hall(Ed), Wiley-Blackwell, Oxford, UK, pp 30-49. Horner, WFA. 1997. Canning fish and fish products. In: Fish Processing Technology, 2nd ed, Hall, GM (Ed), Blackie Academic and Professional, London, pp. 119-159. Sun, DW (Ed). 2012. Thermal Food Processing: New Technologies and Issues, 2nd Ed. CRC Group, Taylor & Francis Group, Florida. Warne, D. 1988. Manual on Fish Canning. FAO Fisheries Technical Paper 285. WHO/FAO. 2009. Code of Practice for Fish and Fishery Products, 1st ed. Codex Alimentarius Commission. World Health Organization/Food and Agriculture Organization, Rome, Italy.		
Relevant matters:	Course delivered in English.		

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	MA 208	Semester Credit	3
Course Title	Coastal Resources Assessment and Management		
Course Description	This course is intended to provide the students with the current tools on coastal resource assessment and management.		
Prerequisites	None		
Faculty -in-Charge:	Dr. Nathaniel Anasco (IMFO, CFOS Faculty Center) Dr. Sheila S. de Leon (IMFO, CFOS Faculty Center)		
Consultation Hours:	Consultation hours provided at start of semester		
Course Objectives:	<p>This course is intended to provide the students with the current tools on coastal resource assessment and management. At the end of the course, the students are expected to:</p> <ol style="list-style-type: none"> 1. Gain an increased understanding of the importance of coastal areas; 2. Acquire knowledge of coastal assessment tools and skills to ensure that management interventions are sustainable in an environmental, economic and social manner; and 3. Critically examine and assess the impacts of developments and management efforts in coastal areas. 		
Course Outline	<ol style="list-style-type: none"> 1. Introduction to the course 2. Characterizing the coastal zones from attributes to functions 3. Threats to sustainable oceans and coasts 4. Evaluating the state of coastal ecosystems, resources and people: participatory coastal resource assessment, habitat assessment, fish stock assessment, assessment of coastal marine pollution, social analysis, concept of carrying capacity, traditional ecological knowledge in coastal management 5. Coastal management approaches: concept of integrated management, protected areas and marine reserves, resource rehabilitation, fisheries management, territorial use rights in fisheries, institutionalizing resource management, resource management councils, environment information and education 6. Assessment techniques in coastal resource management: from theory to practice (workshops on the application of the different methods) <ol style="list-style-type: none"> a. Coastal resource management impact assessment: social, economic, and institutional b. Strategic environmental assessment c. Risk management and assessment d. Criteria and indicator development e. Multi-indicator tool as an aid to decision-making process <ol style="list-style-type: none"> i. Analytic hierarchy process ii. Multi-criteria decision making models f. Application of GIS 7. CRM Planning process: problem analysis and objective setting, strategy development, development of a coastal management plan, implementation, evaluation 8. Coastal zone and resource management experiences in other countries: case studies and documentation of experiences 		
Learning methods:	<ol style="list-style-type: none"> 1. Lectures 2. Field assessments 3. Film showing 4. Computer exercises 		

Self studies
and advices: Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.

Course Requirements and Evaluation Criteria:

1. Examination – 20%
2. Assignments and Class Exercises – 20%
3. Coastal Resource Assessment Proposal – 30%
4. Proposal Presentation – 20%
5. Class Participation – 10%

Passing rate: Information supplied at the start of the semester; usually 60-75%

References: Shall be recommended by faculty-in-charge.

Relevant matters: Course delivered in English.

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	MA 218	Semester Credit	3								
Course Title	Community-Based Coastal Resources Management										
Course Description	Management of resources in the coastal area by the community, especially the stakeholders and resource users, with emphasis on community organizing and mobilization										
Prerequisite:	None										
Faculty -in-Charge:	Dr. Carlo Baylon (1st Floor, CFOS Faculty Center)										
Consultation Hours:	Consultation hours provided at start of semester										
Course Objectives:	<p>At the end of the course, the student should be able to:</p> <ol style="list-style-type: none"> 1. Define the concepts and principles of CBCRM 2. Understand and appreciate the process of community organizing and mobilization in CBCRM 3. Analyze case studies in CBCRM (local and international settings) 4. Identify issues, concerns and challenges in CBCRM 										
Course Outline:	<ol style="list-style-type: none"> 1. Historical background of CBCRM in the Philippines <ul style="list-style-type: none"> - pre-colonial era, colonial era, post-colonial era 2. Traditional/Local management practices 3. Resource management approaches <ul style="list-style-type: none"> - top-down, bottom-up, co-management, linkage between management approaches 4. Community-Based Coastal Resource Management <ul style="list-style-type: none"> - concepts and principles, people's participation and empowerment, role of organizations, role of community education and participatory research, gender issues in CBCRM 5. Community organization and mobilization in CBCRM <ul style="list-style-type: none"> - principles and goals of community organization and mobilization, the process of community organization and mobilization, roles, functions, and qualities of a community organizer 6. Sharing experiences in CBCRM work 										
Self studies and advices:	Other than what is discussed in the classroom, students are expected to study and learn more about the course topics.										
Course Requirements and Evaluation Criteria:	<table border="0"> <tr> <td>Attendance and class participation</td> <td>- 10%</td> </tr> <tr> <td>Midterm and final exams</td> <td>- 50%</td> </tr> <tr> <td>Reports (oral and written)</td> <td>- 15%</td> </tr> <tr> <td>Case analyses and/or term paper</td> <td>- 25%</td> </tr> </table>			Attendance and class participation	- 10%	Midterm and final exams	- 50%	Reports (oral and written)	- 15%	Case analyses and/or term paper	- 25%
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Midterm and final exams	- 50%										
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Case analyses and/or term paper	- 25%										
Passing rate:	Information supplied at the start of the semester; usually 60-75%										
References:	Shall be recommended by faculty-in-charge.										
Relevant matters:	Course delivered in English.										

College of Fisheries and Ocean Sciences – University of the Philippines Visayas

Course No.	Fisheries 220	Semester Credit	3
Course Title	Special Topics		
Course Description	Supervised Study in Areas/Aspects of Fisheries of Special Interest to Graduate Students		
Prerequisite:	Consent of Student's Program Adviser		
Faculty -in-Charge:	Recommended CFOS Faculty (depending on faculty and student's special interest)		
Consultation Hours:	(Provided at the start of the semester)		
Course objectives:	Provided at the start of the semester		
Course Outline:	Topics vary according to faculty specialization and student interests		
Self studies and advices:	Nil		
Course Requirements and Assessment Criteria:	Information at the start of the semester		
Passing rate:	Information supplied at the start of the semester; usually 60-75%		
References:	To be recommended by faculty-in-charge		
Relevant matters:	Course delivered in English.		