

College of Life Science, National Chiayi University

Subject title	Seminar (I)	Semester Credit	1 2
Key words	aquaculture science, aquatic Biotechnology		
Professor	Assistant Professor Chien-Hsien Kuo		
Contact office	Department of Aquatic biosciences A28-408		
Contact hours	Mon 3:20-5:10pm Wed 3:20-5:10pm		
Target	This is an aquatic bioscience course that involve literature analysis of the recent progress on the subject of research project and oral presentations on results of individual student research. The aim of this course is to help students develop academic research skills under the principle of aquarium ecological environment and conservation.		
Course description	Let students access library online research databases, literature inquiries, literature reading and reporting, and be familiar with independent study, oral presentation/ discussion and data collection/analysis for practical application or academic research.		
Schedule	<ol style="list-style-type: none"> 1. Expectation 2. Introduction to library 3. Literature review 4. Teach how to search online databases for academic research 5. Keyword query, data collection, Oral presentation 6. Keyword query, data collection, Oral presentation 7. Keyword query, data collection, Oral presentation 8. Keyword query, data collection, Oral presentation 9. Midterm break 10. Keyword query, data collection, Oral presentation 11. Keyword query, data collection, Oral presentation 12. Keyword query, data collection, Oral presentation 13. Keyword query, data collection, Oral presentation 14. Keyword query, data collection, Oral presentation 15. Keyword query, data collection, Oral presentation 16. Keyword query, data collection, Oral presentation 17. Keyword query, data collection, Oral presentation 18. Keyword query, data collection, Oral presentation 		
Important items	To understand basic ideas of aquaculture science or aquatic biotechnology.		
Self-studies and other advices	Students need to search and summarize journal papers in aquaculture science or aquatic biotechnology and prepare an oral presentation.		
Textbooks	None		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method:	Total evaluation is consisted of oral presentation 80% and discussion participation 20%.		
Evaluation criteria:	Pass if score is not less than 70%		
Relevant matters:	This class is basically described in English.		

College of Life Science, National Chiayi University

Subject title	Seminar (II)	Semester	2
		Credit	2
Key words	aquaculture science, aquatic Biotechnology		
Professor	Associate Professor Shu-Mei Chen		
Contact office	Department of Aquatic Bioscience A28-401		
Contact hours	After class		
Target	This is the second module of seminar designed for the aquatic biosciences Major curriculum. The aim of this course is to help students develop academic research skills under the principle of aquarium ecological environment and conservation.		
Course description	Let students access library online research databases, literature inquiries, literature reading and reporting, and be familiar with independent study, oral presentation/discussion and data collection/analysis for practical application or academic research.		
Schedule	<ol style="list-style-type: none"> 1. Expectation 2. Introduction to library 3. Literature review 4. Teach how to search online databases for academic research 5. Keyword query, data collection, Oral presentation 6. Keyword query, data collection, Oral presentation 7. Keyword query, data collection, Oral presentation 8. Keyword query, data collection, Oral presentation 9. Midterm break 10. Keyword query, data collection, Oral presentation 11. Keyword query, data collection, Oral presentation 12. Keyword query, data collection, Oral presentation 13. Keyword query, data collection, Oral presentation 14. Keyword query, data collection, Oral presentation 15. Keyword query, data collection, Oral presentation 16. Keyword query, data collection, Oral presentation 17. Keyword query, data collection, Oral presentation 18. Keyword query, data collection, Oral presentation 		
Important items	To understand the basic knowledge on of aquaculture science or aquatic biotechnology.		
Self-studies and other advices	Students need to search and summarize journal papers in aquaculture science or aquatic biotechnology and prepare an oral presentation.		
Textbooks	None		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of oral presentation 80% and discussion participation 20%.		
Evaluation criteria	Pass if score is not less than 70%		
Relevant matters			

College of Life Science, National Chiayi University

Subject title	Biostatistics	Semester	2
		Credit	3
Key words	Data analysis, statistics		
Professor	Professor Chen-Huei, HUANG		
Contact office	Department of Aquatic biosciences A28-307		
Contact hours	Thu 1:20-5:10pm		
Target	1.Strengthen the bio-statistical concepts of the participated graduate students. 2.Improve students' ability to apply Sigmaplot and Sigmastat software in their studies.		
Course description	Biostatistics is a critical tool for interpretation of scientific data. This course applies scientific statistical and graphic software in data analysis of students' research outcome.		
Schedule	<ol style="list-style-type: none"> 1. Introduction 2. Review the fundamental statistical concepts 1 3. Review the fundamental statistical concepts 2 4. Review the fundamental statistical concepts 3 5. Review the fundamental statistical concepts 4 6. Comparison between two treatments 1 7. Comparison between two treatments 2 8. Multiple comparisons 1 9. Mid exam 10. Multiple comparisons 2 11. Regression analysis 1 12. Regression analysis 2 13. Application of SigmaStat software 1 14. Application of SigmaStat software 2 15. Application of SigmaStat software 3 16. Application of SigmaPlot software 4 17. Application of SigmaPlot software 5 18. Final exam 		
Important items:	Review of the basic concepts of biostatistics with statistical software - 50% Selection of suitable analytical tools for individual set of data - 25% Presentation of data using scientific graphing software - 25%		
Self-studies and other advices	Attendance and participation in the class		
Textbooks	Elementary Biometry, Statistical methods in biological assay		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of Quizzes 30%, Middle exam 35% and Final exam 35%		
Evaluation criteria	Pass if the final score is equal to or more than 70%.		
Relevant matters	Explanations in English when overseas students are in the class		

College of Life Science, National Chiayi University

Subject title	Fish Nutrition	Semester	1
		Credit	2
Key words	Review, aquatic animal, nutrition, literature		
Professor	Professor Chen-Huei, HUANG		
Contact office	Department of Aquatic Biosciences A28-307		
Contact hours	Thu 11am-5-pm		
Target	Prepare graduate students for conducting aquatic animal nutrition research project independently		
Course description	This is a critical review course in fish nutrition research. It is designed for graduate students who have taken undergraduate Fish Nutrition related courses. The instructor will give the lectures for major subjects in Fish Nutrition before the midterm, followed by the group discussion on manuscripts assigned to each student from Journals such as Aquaculture, Aquaculture Nutrition, and Aquaculture Research, etc. Critical reviews on individual paper will be conducted by both instructor and students. Students are expected to acquire both the knowledge of Fish Nutrition and the abilities to pinpoint the strength and weakness of related research papers when they complete this course.		
Schedule	<ol style="list-style-type: none">1. Experimental design for aquatic animal nutrition2. Protein and amino acids 13. Protein and amino acids 24. Lipids and fatty acids 35. Lipids and fatty acids 46. Carbohydrates 17. Carbohydrates 28. Vitamins 19. Mid exam10. Vitamins 211. Minerals 112. Minerals 213. Feed additives 114. Feed additives 215. Feed additives 316. Current trends in aquaculture nutrition research 117. Current trends in aquaculture nutrition research 218. Final exam		
Important items:	No cell phone calls in class room		
Self-studies and other advices	Attendance, participation, presentation.		
Textbooks	All aquaculture nutrition related international journals.		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of participation in discussion 50% and oral presentation 50%		
Evaluation criteria	Pass if score is not less than 70%		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Chemical Residues in Aquatic Environment	Semester Credit	1 3
Key words	Pharmaceutical residues, aquatic environment		
Professor	Professor Hong-Thih Lai		
Contact office	Lab 402		
Contact hours	Wed 8-12am		
Target	The aim of this course is to help students develop theoretical background and importance of pharmaceutical residues in environment. Students will be able to know the types and characteristics of pharmaceuticals and also able to know the future trend of pharmaceutical residues in aquatic environment.		
Course description	This class will establish the basic knowledge for the pharmaceutical residues in aquatic environment.		
Schedule	<ol style="list-style-type: none"> 1. Introduction 2. A global perspective on the use, sales, exposure pathways, occurrence, fate and effects of veterinary antibiotics (VAs) in the environment. 3. Pharmaceutical antibiotic compounds in soils 4. Pharmaceutical antibiotic compounds in soils - a review. (I) 5. Pharmaceutical antibiotic compounds in soils - a review. (II) 6. Are pharmaceuticals potent environmental pollutants? Part I: Environmental risk assessments of selected active pharmaceutical ingredients. 7. Are pharmaceuticals potent environmental pollutants? Part II: Environmental risk assessments of selected pharmaceutical excipients. 8. Significance of antibiotics in the environment. 9. Mid exam 10. Occurrence, fate, and removal of pharmaceutical residues in the aquatic environment: a review of recent research data. 11. Environmental behavior and analysis of veterinary and human drugs in soils, sediments and sludge 12. Towards safe and effective use of chemicals in coastal aquaculture. (I) 13. Towards safe and effective use of chemicals in coastal aquaculture. (II) 14. Photo-degradation of pharmaceuticals in the aquatic environment: A review. 15. Dissipation of oxytetracycline in soils under different redox conditions 16. Fate of the antibiotic sulfamethoxazole and its two major human metabolites in a water sediment test. 17. Degradation and elimination of various sulfonamides during anaerobic fermentation: a promising step on the way to sustainable pharmacy? 18. Final exam 		
Important items:	to understand the principles of chemical residues in environment		
Self-studies and other advices	Attendance, participation, presentation.		
Textbooks	Keri L. Henderson and Joel R. Coats, 2009. Veterinary Pharmaceuticals in aquatic environment, USA, 247 pp.		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of Participation in discussion 10%, Reports 15%, Oral presentation 15%, Middle exam 30% and Final exam 30%		
Evaluation criteria	Pass if score is not less than 70%		
Relevant matters	The class is conducted in English.		

College of Life Science, National Chiayi University

Subject title	Feed Analysis	Semester	1
		Credit	3
Key words	Analysis, composition, feed, nutrition		
Professor	Professor Chen-Huei HUANG and Assistant Professor Jen-Hong Chu		
Contact office	Department of Aquatic Biosciences A28-307		
Contact hours	Tue 1pm-5pm		
Target	Acquire practical skill for feed proximate compositional analysis		
Course description	Practical training for sensory and chemical analysis of aquatic feed ingredients and final diets		
Schedule	<ol style="list-style-type: none">1. Introduction and Lab rule2. Feed ingredients sensory test3. Microscopic evaluation4. Diet preparation5. Moisture determination6. Preparation of standard solution for total nitrogen determination7. Crude protein determination 18. Crude protein determination 29. Ether extract (crude lipid) determination 110. Ether extract (crude lipid) determination 211. Mid exam12. Crude fiber determination13. Crude fiber determination14. Ash determination15. Acid insoluble determination16. Fatty acid analysis with GC17. Field trip18. Final exam		
Important items:	No cell phone calls in class room		
Self-studies and other advices	Attendance, participation, presentation.		
Textbooks	Handouts		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of participation in discussion 50%and oral presentation 50%		
Evaluation criteria	Pass if score is not less than 70%		
Relevant matters	The class will be conducted in English.		

College of Life Science, National Chiayi University

Subject title	Special topics in life sciences	Semester Credit	1 3
Key words	Fish Ecology		
Professor	Professor Chishih CHU Professor Hong-Thih LAI Professor Yun-Wei LIN Professor Ruey-Shyang CHEN Associate Professor Yuh-Wen CHIU Associate Professor Shu-Mei LIN		
Contact office			
Contact hours	After class		
Target	The objective of this course is to provide a grounding in life science fields for all life science majors. This course will introduce the major aspects of biotechnology, including the background, methods, and applications in life sciences.		
Course description	The Special Topics in Life Sciences is a multiple-disciplinary course focusing on the current research studies and laboratory techniques related to different fields of life sciences, including Food Science, Aquatic Biosciences, Biological Resources, Biochemical Science and Technology, and Microbiology, immunology and Pharmaceuticals. The objective of this course is to provide opportunity for students to establish their fundamental knowledge background, logic thinking, basic laboratory skills for independent research in Life Sciences. The course is instructed by faculty members from five departments in College of Life Sciences.		
Schedule	<ol style="list-style-type: none"> 1. Fish Ecology 2. Ecosystem Health 3. Food science 4. Microbiology 5. Biotechnology-PCR techniques 6. Fungal related diseases and fermentation 7. Anti-cancer drug development 8. Molecular Biology 		
Important items:	Lab work is required		
Self-studies and other advices	Attendance, participation, presentation.		
Textbooks	All aquaculture nutrition related international journals.		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Final exam 100% (the average mark for each lecturer)		
Evaluation criteria	Pass if score is not less than 70%		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Aquatic animal nutrition and feeds-feeds and nutrition	Semester Credit	Summer Session 1
Key words	Aquatic feed, fish and shellfish nutrition		
Professor	Professor Chen-Huei HUANG Assistant Professors Jen-Hong Chu and David Tung		
Contact office	A28-307		
Contact hours	After class		
Target	The objective of this course is to provide students with knowledge in aquatic animal nutrition, feed formulation, and applications in feed industry.		
Course description	Lectures and practical training in aquatic animal nutrition and aquatic feed manufacturing.		
Schedule	1.Nutrients and their requirements of aquatic animals (5 hr) 2.Introduction of feed processing machinery and feed ingredients (5 hr) 3.Principles of diet formulation for aquatic animals (8 hr)		
Important items:	Participation No cell phone allowed in class		
Self-studies and other advices	Half of the class will be in form of practical training. Preview and review the materials prepared by the instructor is recommended.		
Textbooks	Prepared by the professor		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Report in the end of the class and discussion performance during the class		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Aquatic animal physiology-general, reproductive, propagation, and stress physiology	Semester Credit	Summer Session 1
Key words	Endocrinology of Fish; Stress; Zebra fish; tilapia; teleost; larvae; maternal effect, antioxidative response; metallothionein, Respiration, osmoregulation, fish, clam, microalgae		
Professor	Professor Su-Mei Wu Associate Professor Shu-Mei Chen		
Contact office	A28-202 (Professor Wu) A24-401 (Associate Professor Chen)		
Contact hours	After class		
Target	The objective of this course is to help students understand the physiological adaptations of aquatic animals to their environment and the basics of gamete development, the diverse reproductive strategies displayed by aquatic animals, and the underlying regulatory mechanisms.		
Course description	Basic principles related to aquatic animal and environmental physiology and basic techniques for biology are widely lectured.		
Schedule	<ol style="list-style-type: none"> 1. Osmoregulation in fish, shrimp & clam 2. Operation of osmoregulation in fish, shrimp & clam - osmoconformer or osmoregulator 3. Hard clam culture & microalgae 4. Operation of Feeding rate in clam with different microalgae 5. Artificial fertilization 6. Students presentation & discussion 7. Oyster feeding rate 8. The concept of Biological stress 9. The Pituitary-Internal Axis as an indicator of stress in fish 10. Example of the use of HPI axis to evaluate the stress response upon salinity and cold shock. 11. Energy cost of stress in fish 		
Important items:	Lab work is required		
Self-studies and other advices	Homework needs preparing for reports after the class.		
Textbooks	Prepared by the professor		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of 50% report (Professor Wu) and 50% report (Associate Professor Chen)		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Aquatic environment-water quality, wetland and pond management	Semester Credit	Summer Session 1
Key words	Aquatic ecology		
Professor	Professor Hong-Thih Lai Assistant Professor Hsuan-Wien Chen		
Contact office	To be discussed between a supervising professor and a student		
Contact hours	After class		
Target	The aim of this course is to help students understand aquatic ecological environment. This training will provide the student with the ability to identify the water quality, wetland and pond management.		
Course description	Basic principles related to aquatic environment, water quality, biodiversity, resources and ecosystem management.		
Schedule	1. Introduction of pond aquaculture, impact of climate warming, and management methods 2. Fish parasitism an aquatic food web modeling for fishery management 3. Integrated ecosystem management and ecosystem services assessment for aquatic resources.		
Important items:	Contents and topics are decided through discussion between a supervising professor and a student on the basis of student's interest. Lab works are required.		
Self-studies and other advices	Need to preview and summarize class materials, read original papers, make presentations and write lab reports		
Textbooks	Prepared by the professor		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of 34% report (Professor Lai) and 66% report (Assistant Professor Chen)		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Aquatic foods-processing and safety	Semester Credit	Summer Session 1
Key words	Sea food processing, food safety management system, food traceability		
Professor	Professor Cheng-Kuang Hsu Associate Professor Jan-Jeng HUANG		
Contact office	To be discussed between a supervising professor and a student		
Contact hours	After class		
Target	This course provides students with background information for risk assessment, risk management and risk-benefit analysis in relation to aquatic food processing, packaging, distribution and consumption. This will allow the student to identify hazards and to discuss how different processing and distribution parameters will influence safety and health effects of aquatic food.		
Course description	Basic principles related to analytical chemistry, molecular biology, food analytical chemistry, basic techniques for biology are widely lectured.		
Schedule	1.Seafood foods processing and current development 2.Seafood safety and current development 3.HACCP (hazard analysis and critical control point)		
Important items:	Contents and topics are decided through discussion between a supervising professor and a student on the basis of student's interest		
Self-studies and other advices	Homework needs searching and summarizing a journal paper after a class and preparing for reports for the next class.		
Textbooks	Prepared by the professor		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Understanding level of the contents provided in the class will be evaluated based on Discussion I and II.		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		

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Subject title	Aquatic biotechnology	Semester Credit	Summer Session 1
Key words	Collagen extraction and zebrafish model organism		
Professor	Professor Hsin-I Chang Associate Professor Shao-Hung Wang		
Contact office	A32-412 (Prof. Chang) A32-614 (Assoc Prof. Wang)		
Contact hours	After class		
Target	The aim of this course is to provide a broad exposure to basic techniques used in aquatic biology research, with particular emphasis on use of marine resources, bioactive compounds, gene products and marine rest raw materials.		
Course description	Basic principles related to analytical chemistry, molecular biology, food analytical chemistry, basic techniques for biology are widely lectured.		
Schedule	1 Collagen extraction, purification, analysis and application 2 Bioactive compounds from marine algae, and zebrafish model organism		
Important items:	Lab work is required		
Self-studies and other advices	Homework needs preparing for reports after the class.		
Textbooks	Prepared by the professors		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of 50% report (Professor Chang) and 50% report (Associate Professor Wang)		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		

College of Life Science, National Chiayi University

Subject title	Aquatic feed manufactory and high-tech aquaculture facility	Semester Credit	Summer Session 1
Key words	Aquaculture facility, Seafood processing company, Fish market		
Professor	Associate Professor Che-Chun CHEN Associate Professor Shu-Mei CHEN Assistant Professor Chien-Hsien KUO		
Contact office			
Contact hours	After class		
Target	Students will explore how aquatic animals are farmed (aquaculture); and how those practices impact ecosystems. Students will visit fishery, seafood processing plant, aquaculture, and aquaponics facilities. Students will learn different processing methods and the impacts on the productions.		
Course description	Industrial trip-aquatic feeds, high-tech aquaculture, and seafood processing facilities		
Schedule	1 Traditional aquaculture facility - Tilapia Farm or Oyster farm 2.High-tech aquaculture facility – Fisheries & solar power symbiosis for Mable goby 3. Aquatic feed manufactory - Trifull Industrial Co. LTD. 4. Seafood processing and product developing company – Milk Fish processing plant or TOSEI SEAFOOD CO., LTD. 5. Fish markets (fishing port and consumer market) - Budai or Dongshih Tourist Fish Market		
Important items:	Field trip for 2-3 days		
Self-studies and other advices	Homework needs preparing for reports after the class.		
Textbooks	Prepared by the professor		
Requisites to take subject:	Unconditional and no prerequisite		
Assessment method	Total evaluation is consisted of 100% reports.		
Evaluation criteria	Pass if the evaluation is equal to or more than 70%.		
Relevant matters	Explanations in English		