

Department of Fisheries

FACULTY OF SCIENCE

UNIVERSITY OF JAFFNA

SRI LANKA

2017/2018

**Curriculum for
Bachelor of Science in Fisheries Science**

LEVEL 2G

January, 2019

GENERAL DESCRIPTION

For those course units amalgamated with practical and theory, students should obtain at least a D + grade in each, theory component and the practical component to secure any grade higher than E.

LEVEL 2G

Course Code	Course title	Lectures (hrs)	Practical & Field work (hrs)	Credit value
LEVEL2G				
	FIS 201G2: Laboratory Techniques	22	24	2
	FIS 202G2: Aquatic Fauna and Flora	22	24	2
	FIS 203G2: Principles of Aquatic Ecology and Behaviour	22	24	2
	FIS 204G2: Fish Biology and Embryology	22	24	2
	FIS 205G2: Fish Parasitology and Diseases	22	24	2
Sub Total – Level 2G				10

Course Title	Laboratory Techniques												
Course Code	FIS201G2												
Credit Value	2												
Hourly Breakdown	Theory	Practical	Independent Learning										
	22	24	54										
Objectives:													
<ul style="list-style-type: none"> • Outline different types of laboratory equipment • Examine quantitative and qualitative analysis related to fisheries with laboratory equipment 													
Intended Learning Outcomes (ILO):													
<ul style="list-style-type: none"> • Recall the basic laboratory skills • Demonstrate qualitative and quantitative analysis related to fisheries • Describe the factors that affect the accuracy of an experiment • Express the problems in experimentation • Choose appropriate methods for analysis with the available laboratory equipment • Develop the ethical rules when working in a fisheries laboratory 													
Course Contents:													
Laboratory safety, Introduction to laboratory techniques - microscopy, microtomy, spectrophotometry, Electrophoresis, ELISA, PCR, chromatography and their applications. Quantitative and qualitative analysis, preservation techniques of organism, temporary and permanent slide preparation.													
Teaching and Learning Methods:													
Lecture presentation, Class discussion, Tutorial discussion, Laboratory experiment, Group activity, Spot exam													
Assessment Strategy:													
<p>Theory:</p> <table> <tr> <td>In – course assessment/s:</td> <td>30%</td> </tr> <tr> <td>End of Course Examination of two hours duration</td> <td>70%</td> </tr> </table> <p>Practical/ Field work:</p> <table> <tr> <td>In – course assessment/s:</td> <td></td> </tr> <tr> <td>Spot exam /Recording / Field Report / Field assessment</td> <td>30%</td> </tr> <tr> <td>End Course Examination of two hours duration</td> <td>70%</td> </tr> </table> <p>Overall mark for the unit = (3MT + 2MP)/ 5 Where MT and MP are the marks scored for theory and practical / field work respectively.</p>				In – course assessment/s:	30%	End of Course Examination of two hours duration	70%	In – course assessment/s:		Spot exam /Recording / Field Report / Field assessment	30%	End Course Examination of two hours duration	70%
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References:													
<ul style="list-style-type: none"> • <i>Marine Microbiology: Ecology & Applications</i>, Colin, M., 2003. Taylers and Francis. • <i>Biotechnology and Genetics in Fisheries and Aquaculture</i>. Andy, B., Pierre, B. and Kathrin, H., 2010. Wiley. • <i>Histological Techniques: An Introduction for Beginners in Toxicology</i>. Robert, M., Noel, D. and Brenda, F., 2014. Royal Society of Chemistry. 													

Course Title	Aquatic Fauna and Flora												
Course Code	FIS202G2												
Credit Value	2												
Hourly Breakdown	Theory	Practical	Independent Learning										
	22	24	54										
Objectives:													
<ul style="list-style-type: none"> • Outline the characteristics of aquatic animals and plants • Understand the interaction between fauna and flora 													
Intended Learning Outcomes (ILO):													
<ul style="list-style-type: none"> • Recall economically important aquatic animals and plants • Demonstrate a site assessment to identify flora and fauna species and habitat values within the precinct area • Discuss biology and physiology of selected aquatic animals including fish, crustaceans, mollusks and echinoderms • Outline the strategies of harvest techniques and propagation of aquatic plants • Evaluate the interaction between aquatic fauna and flora • Appraise the value of aquatic animals and plants 													
Course Contents:													
Identification and biology of the principal groups of commercially important aquatic animals; Biodiversity; Behavior; Physiological processes; Nutrition, Reproduction and their commercial values; Interaction between fauna and flora; Aquatic plants: Identification, distribution, abundance, harvesting techniques and propagation; Types of common harmful and poisonous aquatic animals.													
Teaching and Learning Methods:													
Lecture presentation, Group activity, tutorial discussion, Field trip, use of slides and preserved organisms, recording, spot exam													
Assessment Strategy:													
<p>Theory:</p> <table> <tr> <td>In – course assessment/s:</td> <td>30%</td> </tr> <tr> <td>End of Course Examination of two hours duration</td> <td>70%</td> </tr> </table> <p>Practical/ Field work:</p> <table> <tr> <td>In – course assessment/s:</td> <td></td> </tr> <tr> <td>Spot exam /Recording / Field Report / Field assessment</td> <td>30%</td> </tr> <tr> <td>End Course Examination of two hours duration</td> <td>70%</td> </tr> </table>				In – course assessment/s:	30%	End of Course Examination of two hours duration	70%	In – course assessment/s:		Spot exam /Recording / Field Report / Field assessment	30%	End Course Examination of two hours duration	70%
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End Course Examination of two hours duration	70%												
Overall mark for the unit = (3MT + 2MP)/ 5 Where MT and MP are the marks scored for theory and practical / field work respectively.													
References:													
<ul style="list-style-type: none"> • <i>Aquaculture: Farming Aquatic Animals and Plants</i>, John S. L. and Paul C. S. 2012. Wiley-Blackwell • <i>Biology of the Invertebrates</i>, Pechenik, J.A. 2014.7th Edition. Tufts University. 													

Course Title	Principles of aquatic ecology and fish behaviour												
Course Code	FIS203G2												
Credit Value	2												
Hourly Breakdown	Theory	Practical	Independent Learning										
	22	24	54										
Objectives:													
<ul style="list-style-type: none"> • Discuss the relationships among aquatic organisms and their environment • Understand the fish behaviour 													
Intended Learning Outcomes (ILO):													
<ul style="list-style-type: none"> • Summarize the characteristics of different types of aquifers • Recognize fundamentals of aquatic ecosystem and the changes occur in it • Compare the ecology of lentic and lotic water sources • Evaluate the interactions between aquatic organisms and aquatic environment • Describe the application of the scientific method to ecological experimentation • Discuss different behavioural patterns of fish in relation to ecological perspectives 													
Course Contents:													
Unit stock concept; Principles of aquatic ecology; Types - Lentic and lotic water bodies; Physico chemical factors; Habitats; Ecological niche; Food chains and webs; Ecological pyramids; Energy flow; r and k selection; Fish behavior; Feeding, Migration and foraging; Schooling behavior; fish aggregations.													
Teaching and Learning Methods:													
Lecture presentation, Group activity, open text book test, tutorial discussion, Field work, assignment, recording, spot exam, Photographs, laboratory experiments													
Assessment Strategy:													
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References:													
<ul style="list-style-type: none"> • <i>Freshwater Ecology: Concepts and Environmental Applications</i>, Walter K. D. 2002. Academic press. • <i>Freshwater Ecology. Concepts and Environmental Applications of Limnology</i>, Walter, D. and Matt, W. 2010. Academic Press. • <i>Marine Ecology: Concepts and Applications</i>, Martin R. S. and Peter A. H.2010.Wiley-Blackwell • <i>Fish behavior</i>, Carin, M., Victoria, A. and Braithwaite, E. F.2008. CRC Press 													

Course Title	Fish biology and embryology		
Course Code	FIS204G2		
Credit Value	2		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	24	54
Objectives:			
<ul style="list-style-type: none"> • Understand the factual knowledge on fish biology • Discuss the fish embryologic development 			
Intended Learning Outcomes (ILO):			
<ul style="list-style-type: none"> • Describe the basic anatomy of fishes by observing a general dissection • Explain the process of growth in individual as well as populations • Distinguish the patterns of fish reproduction • Estimate Gonado Somatic Index and Hepato Somatic Index • Explain the stages during the embryonic developmental process of typical fish • Elaborate the sequence of pre and post events in the fish development 			
Course Contents:			
Meristic and morphometric characters of fishes; Age and growth determination of fish: Growth curves; Food and feeding; Patterns of reproduction: Oviparous, viviparous, ovoviviparous; Maturity and spawning of fishes, Fecundity, Parental care of fishes, Migration; Sexual dimorphism; Seasonal changes in ovary and testis; Gonado Somatic Index (GSI) and Hepato Somatic Index (HIS); Condition factor; Spermatogenesis; Oogenesis; Fertilization: internal or external; Embryonic development stages of fishes, Cleavage, Gastrulation and Differentiation.			
Teaching and Learning Methods:			
Lecture presentation, Group activity, tutorial discussion, models, written book report, flow chart, Text book assignment, laboratory experiment, recording			
Assessment Strategy:			
<p>Theory:</p> <p style="padding-left: 40px;">In – course assessment/s: 30%</p> <p style="padding-left: 40px;">End of Course Examination of two hours duration 70%</p> <p>Practical/ Field work:</p> <p style="padding-left: 40px;">In – course assessment/s:</p> <p style="padding-left: 80px;">Spot exam /Recording / Field Report / Field assessment 30%</p> <p style="padding-left: 40px;">End Course Examination of two hours duration 70%</p> <p>Overall mark for the unit = (3MT + 2MP)/ 5 Where MT and MP are the marks scored for theory and practical / field work respectively.</p>			
References:			
<ul style="list-style-type: none"> • <i>Methods for fish biology</i> , Schreck, C.B. and Moyle, P.B. eds., 1990. Bethesda, Maryland: American Fisheries Society. • <i>Biology of Fishes</i>, Quentin, B. and Richard H. M. 2007. Taylers and Francis. 			

Course Title	Fish Parasitology and Diseases		
Course Code	FIS205G2		
Credit Value	2		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	24	54
Objectives:			
<ul style="list-style-type: none"> • Understand holistic knowledge on fish and shellfish parasites and pathogens • Illustrate correct diagnosis and appropriate control measures 			
Intended Learning Outcomes (ILO):			
<ul style="list-style-type: none"> • Outline the occurrence and types of fish parasites • Describe the ecology of fish parasites • Determine the relationship between parasites and host • Select correct diagnostics techniques for each fish diseases • Discuss prevention / treatment / control measures against fish parasitic diseases 			
Course Contents:			
<p>Significance of finfish and Shellfish diseases in aquaculture. Host, Pathogen and Environment Interaction. Disease development process. Stress in aquaculture and its role in disease development. Pathological processes: Cellular response to injury, Inflammatory response to diseases, Pathogenicity mechanism of parasite, bacteria, virus and fungus. Case history and clinical sign in disease diagnosis. Role of physical (injuries, health, cold) chemical (pH, salinity, toxins, ammonia, nitrogenous waste, endogenous chemicals and metabolites, free radicals, oxidants) soil and water parameters in fish health. Nutritional diseases and Non-infectious diseases. General characteristics, life cycle, diagnosis, prevention and treatment of parasitic, bacterial, fungal and viral diseases of finfish and shellfish. Disease surveillance and reporting. Quarantine and health certification in aquaculture. Health management strategies in Aquaculture: Vaccines, Immuno-stimulants, Bioremediation, Probiotics, Crop rotation, Good and Best management practices. Principles of disease diagnosis, conventional, molecular and antibody based diagnostic methods, Rapid diagnostic methods</p>			
Teaching and Learning Methods:			
Lecture presentation, Group activity, Recitation oral questions, Class projects, Tutorial discussion			
<p>Theory:</p> <p style="padding-left: 40px;">In – course assessment/s: 30%</p> <p style="padding-left: 40px;">End of Course Examination of two hours duration 70%</p> <p>Practical/ Field work:</p> <p style="padding-left: 40px;">In – course assessment/s:</p> <p style="padding-left: 80px;">Spot exam /Recording / Field Report / Field assessment 30%</p> <p style="padding-left: 40px;">End Course Examination of two hours duration 70%</p> <p>Overall mark for the unit = (3MT + 2MP)/ 5 Where MT and MP are the marks scored for theory and practical / field work respectively.</p>			
References:			
<ul style="list-style-type: none"> • <i>Marine parasitology</i>, Rohde, K. 2005., Collingwood, Vic.: CSIRO. • <i>Fish diseases and disorders</i> , Woo, P.T., Leatherland, J.F. and Bruno, D.W. eds., 2011., (Vol.3) 			

List of resource persons contributed to develop these course units

Course Code	Course title	Resource Persons
FIS201G2	Laboratory Techniques	Prof. Mrs. S.Kuganathan Mr.N.Ragavan
FIS202G2	Aquatic Fauna and Flora	Prof. Mrs. S.Kuganathan Mrs. S.Sathyaruban
FIS203G2	Principles of Aquatic Ecology and Behaviour	Prof. Mrs. S.Kuganathan Mr.K. Gunaalan
FIS204G2	Fish Biology and Embryology	Prof. Mrs. S.Kuganathan Mrs. S.Sathyaruban
FIS205G2	Fish Parasitology and Diseases	Prof. Mrs. S.Kuganathan Mrs. S.Sathyaruban