

Subject: Zoology (ZOOL)				
BSc				
Semester	Course Units	Status	Pre-requisite	Co-requisite
1	BIOL 11542 Animal Form, Function and Behaviour	C	GCE(A/L) Biology	-
2	ZOOL 12512 Evolutionary Biology and Zoogeography	C	GCE(A/L) Biology	-
	ZOOL 12523 Animal Diversity and Sri Lankan Fauna	C	GCE(A/L) Biology	ZOOL 12531
	ZOOL 12531 Animal Diversity and Sri Lankan Fauna Laboratory	C	GCE(A/L) Biology	ZOOL 12523
3	ZOOL 21512 Animal Histology and Physiology	C	BIOL 11542	ZOOL 21521
	ZOOL 21521 Animal Histology and Physiology Laboratory	C	BIOL 11542	ZOOL 21512
	ZOOL 21532 Developmental Biology and Human Genetics	C	BIOL 11542	-
4	ZOOL 22543 Applied Ecology	C	ZOOL 12523	ZOOL 22552
	ZOOL 22552 Applied Ecology Laboratory	C	ZOOL 12531	ZOOL 22543
	ZOOL 22561 Geo-informatics for Zoological Studies	C	BIOL 11542	ZOOL 22543
5	ZOOL 31512 Fisheries Biology and Management ¹	C/O	ZOOL 12523	-
	ZOOL 31523 Entomology and Pest Management ²	O	ZOOL 12523	-
	ZOOL 31532 Environmental Impact Assessment ¹	C/O	ZOOL 22543/ ENCM 21543	-
	PRPL 31992 Professional Placement	O	All level 1&2 ZOOL courses	-
6	ZOOL 32543 Aquaculture ¹	C/O	ZOOL 12523	-
	ZOOL 32552 Parasitology ¹	C/O	ZOOL 12523	-
	ZOOL 32563 Conservation Biology and Wildlife Management ¹	C/O	ZOOL 12523 & ZOOL 22543	-

¹Compulsory for the BSc Hons (Zoology) Degree programme In order to claim Zoology as a subject for the BSc Degree programme, student should accumulate a minimum of 7 credits from the Level 3 ZOOL optional course units

²Not offered for the BSc Hons (Zoology) Degree programme

BSc Honours in Zoology				
Semester	Course Units	Status	Pre-requisite	Co-requisite
5	ZOOL 41512 Statistical Methods in Zoology	C	ZOOL 22543	-
	ZOOL 41524 Insect Systematics and Biology	C	ZOOL 12523	-
	ZOOL 43532 Essay and Seminar on Special Topics in Zoology	C	ZOOL 12523 & ZOOL 22543	-
6	ZOOL 42542 Research Methodology and Scientific Writing	C	ZOOL 41512	-
	ZOOL 42554 Molecular Genetics ¹	O	ZOOL 21532	-
	ZOOL 42564 Environmental Physiology and Ecotoxicology ¹	O	ZOOL 21512	-
7	ZOOL 41574 Aquaculture Management	C	ZOOL 32543	-
	ZOOL 41584 Ecological Interactions and Behavioural Ecology	C	ZOOL 22543	-
	ZOOL 41592 Zoology in Practice	C	All level 1 & 2 ZOOL courses	-
	ZOOL 41612 Herpetology ²	O	ZOOL 12523	-
	ZOOL 41622 Nematode Pest Management ²	O	ZOOL 12523	-
	ZOOL 43608 Research Project	C	ZOOL 41512 & ZOOL 42542	-
8	ZOOL 42632 Agricultural Entomology	C	ZOOL 41524	-
	ZOOL 42642 Medical and Veterinary Entomology	C	ZOOL 41524	-
	ZOOL 42654 Fish Stock Assessment and Fisheries Management	C	ZOOL 31512	-
	ZOOL 42662 Immunology ²	O	ZOOL 21512	-
	ZOOL 42672 Ornithology ²	O	ZOOL 12523	-
	ZOOL 42684 Ecology and Management of Wetlands ²	O	ZOOL 22543	-
	ZOOL 42692 Marine and Coastal Resources Management ²	O	ZOOL 22543	-

¹In the second semester, the student should accumulate only 4 credits from level 4 optional ZOOL course units

²The student should accumulate only 8 credits from level 4 optional ZOOL course units in the 4th year

BSc Degree Programme

Semester	1		
Course code	BIOL 11542		
Course Name:	Animal Form, Function and Behaviour		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	G.C.E. (A/L) Biology		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	26	08	66
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe hierarchical organization of animal body plans in relation to their functions, ➤ explain basic behavioural patterns of animals for their survival and reproduction, and ➤ demonstrate practical skills in recognizing different animal forms and relating them to functions and the environment, and ➤ demonstrate practical skills in recognizing basic behavioural patterns of animals in the field. 			
Course Content:			
Introduction to animal kingdom, variation in animal body size, plan and shape in relation to functions and environment, Material exchange with the environment, hierarchical organization of animal body plans, Basic principles of animal nutrition, Circulation and respiration, Osmoregulation and excretion, Homeostasis, neural and hormonal coordination, Reproduction and development.			
Introduction to animal behavior, Basic behavioural patterns, Fixed Action patterns, Learning, Animal communication, Communication in social insects, Animal rhythms including migration, hibernation and biological clocks, Sexual behavior, mate selection and parental care, Aggression, Motivation and drive, Social organization in higher vertebrates including territoriality, dominant hierarchical system, altruism and kin selection.			
Practical sessions on animal form and function, and animal behavior.			
Teaching /Learning Methods: A combination of lectures, practical sessions, computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 20%		Final Assessment 80%	
Details: Online/ in-class Tutorials 20%		Theory (%) 80%	Practical (%) NA Other (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Manning A. & M. S. Dawkins (1995). An Introduction to Animal Behaviour, Cambridge University Press. 2. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition. 3. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson (2011). Biology - Campbell, Global Edition. 9th Edition. Pearson Education Inc. 			

Semester	2		
Course code	ZOOOL 12512		
Course Name:	Evolutionary Biology and Zoogeography		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	G.C.E. (A/L) Biology		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	26	08	66
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ explain evolutionary concepts, evolutionary patterns and human evolution, and ➤ describe concepts in biogeography and regional distribution of biota, ➤ describe the effect of climate change on biogeography, and ➤ explain the adaptive radiation of selected organs in vertebrates 			
Course Content:			
History of evolutionary thought and biological evolution, Population genetics and genetic basis of evolution, Variation, Mechanism of evolution, Natural selection, Reproductive isolation mechanisms and speciation, Adaptive radiations, Theories of origin of life on earth, Diversification of prehistoric life, Plant and animal invasion into land, Human evolution, Extinction of life forms including mass extinctions.			
Brief biogeographic history of the earth, Continental drift and plate tectonics, Biogeographic regions of the world with associated fauna and flora, Dispersal of species and species distribution in the world, Theory of Island Biogeography, Regional distribution of biota with special reference to Sri Lanka and endemism, Climate change and its effects on biogeography. Practical sessions on evolutionary biology.			
Teaching /Learning Methods: A combination of lectures, practical sessions, computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 10%		Final Assessment 90%	
Details: Online quizzes, assignments 10%		Theory (%) 90%	Practical (%) NA
		Other (%) (specify) NA	
Recommended reading:			
<ol style="list-style-type: none"> 1. MacDonald, G. M. (2003). Biogeography-space, time and life. John Wiley and Sons. 2. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition. 3. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky and R. B. Jackson (2011). Campbell Biology, Global Edition. 9th Edition. Pearson Education Inc. 			

Semester	2		
Course code	ZOOL 12523		
Course Name:	Animal Diversity and Sri Lankan Fauna		
Credit Value:	3		
Core/Optional	Core		
Pre requisites	G.C.E. (A/L) Biology		
Co-requisites	ZOOL 12531		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	--	105
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe principles of taxonomy, ➤ explain structural organization and diversity of animal kingdom, and ➤ identify and classify animals with special reference to Sri Lankan fauna. 			
Course Content:			
Introduction to animal kingdom, Principles of taxonomy of animals, Structural organization and diversity of the following groups of Protists and animals with special reference to Sri Lankan fauna; Porifera , Cnidaria, Ctenophora, Platyhelminthes, Nematoda, Rotifera, Annelida, Lophophorate animals, Arthropoda, Mollusca, Echinodermata, Hemichordata, Urochordata, Cephalochordata, Chordata including fishes, amphibians, reptiles, birds and mammals. Adaptive radiation of different groups of vertebrates.			
Teaching /Learning Methods: A combination of lectures, computer based learning, self-studies, assignments, tutorial and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70 %	
Details:	Theory (%)	Practical (%)	Other (%) (specify)
Online assessment 20%	70%	NA	NA
Presentation 10%			
Recommended reading:			
<ol style="list-style-type: none"> 1. Hickman, C., L. Roberts, S. Keen & A. Larson Jr. (2011). Animal Diversity, 6th Edition, McGraw-Hill. 2. Kotagama, S. & G. Ratnavira (2010). An illustrated guide to the birds of Sri Lanka. Published by the Field Ornithology Group of Sri Lanka, University of Colombo. 3. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition. 4. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson (2011). Biology – Campbell. Global Edition. 9th Edition. Pearson Education Inc. 5. Study Guide for ZOOL 12523: Animal Diversity. Department of Zoology, University of Kelaniya. 			

Semester	2		
Course code	ZOOL 12531		
Course Name:	Animal Diversity and Sri Lankan Fauna Laboratory		
Credit Value:	1		
Core/Optional	Core		
Pre requisites	G.C.E. (A/L) Biology		
Co-requisites	ZOOL 12523		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	42	08
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ use taxonomic keys to identify animals to the lowest taxonomic group possible, ➤ construct dichotomous keys to identify animals to the lowest taxonomic group possible, ➤ identify animals to the lowest possible taxon examining morphological characteristics, and ➤ appreciate the diversity of Sri Lankan fauna. 			
Course Content:			
Examination of the prominent morphological features of representative organisms belonging to following taxa; Porifera , Cnidaria, Ctenophora, Platyhelminthes, Nematoda, Rotifera, Annelida, Onychophora, Arthropoda, Mollusca, Echinodermata, Lophophorate animals, Hemichordata, Urochordata, Cephalochordata, Chordata including fish, amphibians, reptiles, birds and mammals.			
Use of taxonomic keys for animal identification, Construction of dichotomous keys to identify selected groups of animals giving special reference to Sri Lankan fauna.			
Teaching /Learning Methods: A combination of lectures, self-studies, assignments, tutorial and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Lab report 15% Field report and presentation 15%	Theory (%) NA	Practical (%) 70%	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. De Silva, A. (1990). A Colour Guide to the Snakes of Sri Lanka. Portishead Avon R. and A. Publication Limited. 2. De Silva, P. H. D. H. (1980). Snakes of Sri Lanka. Department of Government Printing, Colombo. 3. Dutta, S.K. & K. Mamamendra-Arachichi (1996). The Amphibian Fauna of Sri Lanka. Wild life Heritage Trust of Sri Lanka, Colombo. 4. Henry, G. M. (1978). A Guide to the birds of Ceylon. K.V.G. De Silva & Sons, Kandy. 5. Laboratory Manual for ZOOL 12531: Animal Diversity and Sri Lankan Fauna Laboratory, Department of Zoology, University of Kelaniya. 6. Pethiyagoda, R. (1991). Freshwater Fishes of Sri Lanka Wildlife Heritage Trust, Colombo. 7. Phillips, W. W. A. (1981). The Manual of Mammals of Sri Lanka. Volumes I-IV. Wildlife and Nature Protection Society of Sri Lanka, Colombo. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition. 8. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson (2011). Biology – Campbell. Global Edition. 9th Edition. Pearson Education Inc. 			

Semester	3		
Course code	ZOOL 21512		
Course Name	Animal Histology and Physiology		
Credit Value	2		
Core/Optional	Core		
Pre requisites	BIOL 11542		
Co-requisites	ZOOL 21521		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	--	70
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe and discuss histology of mammalian organ systems with special reference to humans and relate the histological structure to their functions, and ➤ explain the functioning of mammalian organ systems with special reference to humans. 			
Course Content:			
Animal Histology: Main tissue types; Epithelial, Connective, Muscle and, Nervous tissues; Histology of integumentary system, digestive system, respiratory system, excretory system and reproductive system of mammals with special reference to humans.			
Animal Physiology: Homeostasis, propagation and transmission of signals, sensory mechanisms, muscle contraction, blood circulation, digestion and nutrition, gas exchange, osmoregulation, excretion, reproduction, hormonal coordination and immunity in mammals with special reference to humans.			
Teaching /Learning Methods: A combination of lectures, computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 15%		Final Assessment 85%	
Details: Online and in-class quizzes assignments 15%	Theory (%) 85%	Practical (%) NA	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Randall, D., W. Burggren & K. French (2001). Eckert Animal Physiology, 5th Edition, W.H. Freeman & Co. New York. 2. Ross, M. H. & W. Pawlina (2010). Histology: A Text and Atlas, 6th Edition, Lippincott Williams & Wilkins, Maryland. 3. Tortora, G.J. & B. H. Derrickson (2012). Principles of Anatomy and Physiology, 13th edition, John Wiley & Sons, New Jersey. 			

Semester	3		
Course code	ZOOL 21521		
Course Name:	Animal Histology and Physiology Laboratory		
Credit Value:	1		
Core/Optional	Core		
Pre requisites	BIOL 11542		
Co-requisites	ZOOL 21512		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	45	05
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ recognize histological structure of mammalian organ systems with special reference to human based on microscopic observations and relate the structure to their functions, ➤ demonstrate essential skills required in studying functioning of animals with special reference to human, and ➤ analyze physiological data, interpret results and prepare laboratory reports in a scientific manner. 			
Course Content:			
Animal Histology: Laboratory studies on histological structure of main tissue types; Epithelial, Connective, Muscle and Nervous tissues. Histology of integumentary system, Digestive system, Respiratory system, Excretory system, Endocrine organs and reproductive system in mammals with special reference to human.			
Animal Physiology: Laboratory experiments on reflexes, Vision, Hearing and maintaining equilibrium, Cardiovascular physiology, Haematology, Respiratory physiology and urinalysis with special reference to humans			
Teaching /Learning Methods: A combination of laboratory studies and preparation of laboratory reports.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 20%		Final Assessment 80%	
Details: Online/in-class quizzes, 10% Lab reports 10%	Theory (%) NA	Practical (%) 80%	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Freeman, W. H. (1980). An Atlas of Histology, Heinemann Educational Book, London. 2. Animal Physiology Laboratory Manual (1998). Department of Zoology, University of Kelaniya. 3. Ross, M. H. & W. Pawlina (2010). Histology: A Text and Atlas, 6th Edition, Lippincott Williams & Wilkins, MD 4. Tortora, G.J., & B. H. Derrickson (2012). Principles of Anatomy and Physiology, 13th edition, John Wiley & Sons, NJ. 			

Semester	3		
Course code	ZOOL 21532		
Course Name:	Developmental Biology and Human Genetics		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	BIOL 11542		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe and discuss ontogenic development of different animal groups, ➤ explain embryonic and fetal development of human, ➤ recognize different stages of ontogenic development of selected animal groups by examining specimens, ➤ discuss basic principles of human genetics and applications of genetics and genomics in medicine, and ➤ describe the development stages of insects, <i>Amphioxus</i>, frog, chick and humans. 			
Course Content:			
Developmental Biology: Introduction to developmental biology, Gametogenesis, Patterns of development; Fertilization, Cleavage, Gastrulation, Formation of primary organ rudiments, Organogenesis, Growth and differentiation, Role of stem cells in development, Signal molecules that control development and growth, Metamorphosis leading to phenotypic transformations, Human embryonic and fetal development. Laboratory studies on different development stages of insects, <i>Amphioxus</i> , frog, chick and humans.			
Human Genetics: Genetic variations, Patterns of inheritance, Human genome, Multifactorial inheritance, Cancer genetics. Genetics and genomics in medical applications; Molecular diagnosis, new born screening.			
Teaching /Learning Methods: A combination of lectures, practical sessions, computer based learning, self-studies, assignments, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Group presentation 15% Laboratory work 15%	Theory (%) 50%	Practical (%) 20%	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Gibert, S.F. (2013). Developmental Biology, 10th Edition, Sinauer Associates Inc., Sunderland. 2. Korf, B.R. & M. B. Irons (2013). Human Genetics and Genomics, 4th Edition, John Wiley & Sons, NJ. 3. Müller, W.A. (1996). Developmental Biology, 6th Edition, Springer, NY 			

Semester	4		
Course code	ZOOL 22543		
Course Name:	Applied Ecology		
Credit Value:	3		
Core/Optional	Core		
Pre requisites	ZOOL 12523		
Co-requisites	ZOOL 22552		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	--	105
Course Aim/Intended Learning Outcomes: After completion of the course unit, the student will be able to; <ul style="list-style-type: none"> ➤ explain the basic structure and functioning of an ecosystem, ➤ explain the principles related to the structure and functioning of populations, ➤ discuss the dynamics of the global human population, ➤ explain the factors affecting community composition, ➤ discuss the global climate patterns and distribution of biomes, and ➤ discuss the ecological concepts related to structure and functioning of terrestrial & aquatic ecosystems. 			
Course Content: Basic structure and functioning of an ecosystem including energy flow, nutrient cycling and ecosystem productivity, Population ecology; Population size, Density and patterns of population dispersion, Demography including life tables, Survivorship curves and Reproductive rates, Exponential, geometric and logistic models of population growth, Utilization of patchy resources, Opportunistic organisms and life history patterns including r-selection and K-selection, Factors affecting population growth, Mechanisms of density independent and density dependent population regulation, Population dynamics including stability and functions and population cycles, The global human population, Community ecology; Community composition, Diversity indices, Species area relationships, Ecotones, Keystone and Flagship species, Concept of habitat and niche, Effect of environmental factors on biota, Concepts in stream/river ecology including Longitudinal zonation, River continuum concept, Flood-pulse concept and Serial discontinuity concept, Global climate patterns and climate change, Terrestrial and aquatic biomes, Structure and functioning of terrestrial, Freshwater, Brackish water, and Marine ecosystems. Life Tables and key factor analysis.			
Teaching /Learning Methods: A combination of lectures, computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 20%		Final Assessment 80%	
Details: Online/in-class tutorials 20%	Theory (%) 80%	Practical (%) NA	Other (%) (specify) NA
Recommended reading: <ol style="list-style-type: none"> 1. Begon M., C. R. Townsend & J. L. Harper (2005). Ecology; from individuals to ecosystems. 4th Edition, Wiley-Blackwell. 2. Day, J. W., W. M. Kemp, Alejandro Yanez-Arancibia & B. C. Crump (2012). Estuarine Ecology, 2nd Edition, Wiley-Blackwell. 3. Dobson, M. & C. Frid (2008). Ecology of Aquatic Systems. 2nd edition, Oxford Uni.Press. 4. Osborne, P. L. (2000). Tropical Ecosystems and Ecological Concepts. Cambridge Uni.Press. 5. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition. 6. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson (2011). Biology - Campbell, 9th Edition. Pearson Education Inc. 			

7. Tait, R.V. & F. A. Dipper (2000). Elements of marine ecology. Butterworth-Heinemann, Oxford.

Semester	4		
Course code	ZOOL 22552		
Course Name:	Applied Ecology Laboratory		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 12531		
Co-requisites	ZOOL 22543		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	70	30

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- sample terrestrial and aquatic habitats using appropriate techniques,
- use basic ecological techniques for understanding ecosystem functioning,
- apply ecological indices to assess communities,
- assess the ecological adaptations of animals in relation to their habitats, and
- analyse, interpret and present ecological data in scientific manner.

Course Content:

Sampling techniques for terrestrial, aerial, soil and aquatic animals; Study of soil ecosystems; Diversity indices; Estimation of the size of animal populations; Measurement of water quality; Limiting factors and their effect on animals; Identification of animals in the brackish water, freshwater and marine ecosystems and their ecological adaptations; Construction of life tables and key factor analysis, Climatic diagrams, Demography in terrestrial habitats
Field studies on terrestrial, freshwater, brackish water and marine ecosystems.

Teaching /Learning Methods: A combination of laboratory and field studies and computer based learning.

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 20%	Final Assessment 80%		
Details: Field reports 20%	Theory (%) NA	Practical (%) 80%	Other (%) (specify) NA

Recommended reading:

1. Brower, J. E., J. H. Zar, C. N. Von Ende (1997). Field and Laboratory methods for General Ecology. 4th Edition. McGraw-Hill, Boston.
2. Chalmers, N. & P. Parker (1996). Fieldwork and Statistics for Ecological Projects: The OU Project Guide, London.
3. Enger, E. D. & B. F. Smith (2012). Field laboratory exercises in environmental science, 7th edition. McGraw-Hill, New Jersey.
4. Krebs, C.J. (1999). Ecological Methodology, Addison-Welsey Educational Publishers, New York.
5. Magurran A. (2004). Measuring biological diversity, Wiley.
6. Southwood, T. R. E. & P. A. Henderson (2000). Ecological Methods, 3rd Edition, Wiley-Blackwell.

Semester	4		
Course code	ZOOL 22561		
Course Name:	Geo-informatics for Zoological Studies		
Credit Value:	1		
Core/Optional	Core		
Pre requisites	BIOL 11542		
Co-requisites	ZOOL 22543		
Hourly Breakdown	Theory	Practical	Independent Learning
	10	10	30
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe definitions, components and data models of GIS, ➤ collect input data from the available sources to solve spatial problems, ➤ select the appropriate output method for the presentation, and ➤ use ArcGIS software to suggest solutions to simple spatial problems. 			
Course Content:			
Introduction to GIS including definitions of GIS, components of GIS, Spatial questions, GIS applications, Data output methods, Raster and vector data models, Mapping the spherical Earth (3D) into 2D using projection systems, Data sources and data capturing methods, Simple data analysis methods, Remote sensing concept and applications, GPS concept and applications. Practical sessions on Geo-informatics using simple case studies.			
Teaching /Learning Methods: A combinations of lectures, hands on training with GIS software, assignments, self-studies and small group discussions.			
Assessment Strategy: In-course assessment and end of semester examination.			
Continuous Assessment 40%		Final Assessment 60%	
Details: Practical reports, assignments 40%	Theory (%) 60%	Practical (%) NA	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Burrough, P. A., & R. A. McDonnell (2011). Principles of Geographical Information Systems; Spatial Information Systems and Geostatistics. 2nd edition. Oxford University Press. UK. 2. Heywood, I., S. Cornelius, & S. Carver (2013). An Introduction to Geographical Information Systems. 4th edition. Pearson education Ltd., UK Korte, G. (1994). The GIS Hand Book, Third edition. On Word Press Camino Entrada. 3. Lo, C. P. & A. K. W. Yeung (2002). Concepts and techniques of Geographical Information Systems. Prentice-Hall of India. 4. Pascolo, P & C. A. Brebbia (1998). GIS technologies and their environmental applications. WIT Press, Southampton, Boston. 5. Schuurman, N. (2004). GIS -A Short Introduction, First edition- Blackwell Publishing. 6. Wilson, J. (2007). The Handbook of Geographic Information Science, 1st edition, Blackwell Publishing. 			

Semester	5		
Course code	ZOOL 31512		
Course Name:	Fisheries Biology and Management		
Credit Value:	2		
Core/Optional	Optional for the BSc Degree programme. Compulsory for the BSc (Honours) Degree programme in Zoology.		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe characteristics of fisheries, ➤ determine the population parameters of fish stocks, ➤ analyze the stomach contents of fish and identify the food habits of fish, ➤ analyze the reproductive strategies of fish, ➤ identify the common food fishes of Sri Lanka, ➤ describe the common fishing gear used in Sri Lanka, ➤ discuss the impacts of human activities and climate change on fisheries, ➤ analyze the impact of fisheries on the environment, ➤ describe the basic principles of fisheries management, and ➤ describe the fisheries regulations of Sri Lanka. 			
Course Content:			
Fishery as a renewable resource, Characteristics of fisheries, Artisanal fisheries, Commercial fisheries, Fishing gear, Common food fishes of Sri Lanka; Food and feeding, Reproductive Biology, Concept of unit stock, Age and Growth, Asymptotic length, Growth coefficient, Growth models, Natural and fishing mortalities, Basic concepts in fisheries management, Maximum sustainable yield, Fisheries of Sri Lanka, Environmental impacts of fisheries, Impacts of human activities, natural disasters and climate change on fisheries, Fisheries regulations. Laboratory and field studies including identification of food and feeding habits of fish with reference to their morphology, reproductive strategies of fish, identification of common food fishes of Sri Lanka, and the fishing gear of Sri Lanka.			
Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Online assessments 10%	Theory (%)	Practical (%)	Other (%) (specify)
Field report 10%	50%	20%	NA
Lab reports 10%			
Recommended reading:			
1. Gabriel, O. (2006). Fish catching methods of the world. Wiley.			
2. Hart, P. J. B. & J. D. Reynolds (2002). Handbook of Fish Biology and Fisheries: 2 Volume Set. John Wiley and Sons.			
3. Jennings, S., M. Kaiser & J. D. Reynolds (2001). Marine Fisheries Ecology. Wiley-Blackwell.			
4. Ommer, R., I. Perry, K. L. Cochrane & P. Cury (2011). World Fisheries: A Social-Ecological Analysis. Wiley-Blackwell.			
5. www.fisheries.gov.lk			

Semester	5		
Course code	ZOOL 31523		
Course Name:	Entomology and Insect Pest Management		
Credit Value:	3		
Core/Optional	Optional		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	30	90

Course Aim/Intended Learning Outcomes:

After completion of this course unit, the student will be able to;

- identify common insects and acarines to the lowest taxonomic group possible using keys,
- identify major insect and acarine pests of agriculture in Sri Lanka,
- describe damages and damage symptoms caused by,
- describe the life histories of common household and agriculturally important insect and acarine pests in Sri Lanka,
- explain procedures and techniques used in insect and acarine pest management,
- recommend suitable control measures for the management of insect and acarine pests in agriculture, and
- demonstrate practical skills in basic entomological techniques.

Course Content:

Introduction to insect morphology, major morphological features of the order Acarina and insect orders of Thysanura, Orthoptera, Isoptera, Blattodea, Hemiptera, Thysanoptera, Pthiraptera, Coleoptera, Neuroptera, Hymenoptera, Lepidoptera, Siphonaptera, Strepsiptera, and Diptera; Causes of insect pest outbreaks, Life history and habitats/ microhabitats and management of insect and acarine pests of rice, coconut, tea, sugarcane and selected fruit and vegetable crops in Sri Lanka. Life history and control of common insect pests of selected stored products. Concepts in insect pest management; General Equilibrium Level, Economic Threshold Level and Economic injury Level, Chemical, cultural and biological control of insect pests, Host plant resistance to insects, Integrated pest management, Life history and management of medically important vectors and household insect pests of Sri Lanka.

Practical sessions on identification of insect pests to the lowest taxonomic level, Life stages and damage symptoms of major insect and acarine pests of rice, coconut, tea, sugarcane, selected vegetables, fruits and stored products; Life history of medically important insect vectors and household insect pests; Insecticides and application equipment; Biological control programs of insect pests in Sri Lanka, Entomological techniques including insect rearing methods, and insect collection and sampling techniques.

Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.

Assessment Strategy: In-course assessment, end of semester examination.

Continuous Assessment	40%	Final Assessment		60%
Details:		Theory (%)	Practical (%)	Other (%) (specify)
Online and/or in-class assignment/quizzes	40%	40%	20%	NA

Recommended reading:

1. Gullen, P.J. & P.S. Cranston (2010). The Insects, an outline of Entomology, 10th Edition, Blackwell Science.

2. Mullen, G. & L. Durden (2009). Medical Entomology, Academic Press.
3. Pedigo L.P. & M. Rice (2006). Entomology and Pest Management Pearson, NJ, USA.
4. Triplehorn, C. & N. F. Johnson (2006). Borror and DeLong's Introduction to the Study of Insects, 7th Edition, Thomson Publishers, USA.

Semester	5		
Course code	ZOOL 31532		
Course Name:	Environmental Impact Assessment		
Credit Value:	2		
Core/Optional	Optional for the BSc Degree programme. Compulsory for the BSc (Honours) Degree programme in Zoology.		
Pre requisites	ZOOL 22543 / ENCM 21543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- describe and discuss Environmental Impact Assessment process, and
- demonstrate competencies in planning and executing EIA process.

Course Content:

Introduction to Environmental Impact Assessment (EIA); EIA and quality of life, Principles of EIA, History of EIA, The Nature of EIA, Purpose of EIA, Origin and development of EIA process and worldwide spread of EIA, Developmental projects, environment and impacts; EIA procedures and managing EIA process, EIA methodologies: Optimization of resources, cost-benefit analysis, cost-effectiveness analysis, opportunity cost, 'the multiplier', contingent valuation, travel cost approach, Hedonic price technique, ecological evaluation, matrices and checklists, the multidisciplinary team, best professional judgment, Impact prediction, evaluation and mitigation, Principal stakeholders in EIA; developers, affected parties, regulators, facilitators, institutional interactions, Public consultation and participation in EIA process; EIA presentation, Monitoring and auditing, Problems associated with EIA process in developing countries and potential solutions, Issues related to scope of assessment, the nature of methods of assessment, the relative role of participants in the process, and the quality of assessments, Myths about EIAs, Incorporation of impacts and their mitigation into the process, Use of EIA as a decision making tool for achieving sustainable development; Improving the effectiveness of project assessment; Widening the scope of EIA (Strategic Environmental Assessment; SEA); Case studies.

Teaching /Learning Methods: A combination of lectures, assignments, self-studies, computer based learning, and small group discussions.

Assessment Strategy: Continuous assessment and end of semester examination.

Continuous Assessment 30%	Final Assessment 70%		
Details: Online and/or in-class assignment/quizzes 30%	Theory (%) 70%	Practical (%) NA	Other (%) (specify) NA

Recommended reading:

1. Canter, L.W., (1996) Environmental Impact Assessment, Second Edition, McGraw Hill Publishing Company, Inc., New York.
2. CEA Report: Handbook on strategic Environmental Assessment (SEA). www.cea.lk/web/images/pdf/SEAGuideline.pdf

3. CEA (2013). EIA Procedure in Sri Lanka.
4. www.cea.lk/web/index.php/en/environmental-impat-assessment-eia-procedure-in-sri-lanka
5. EIA reports of various development projects.
6. Gilpin, A., (1995). Environmental Impact Assessment (EIA) –Cutting edge for the Twenty First Century, Cambridge University Press, Cambridge, England.
7. Vanclay, F., and Bronstein, D.A., (1995) Environmental and Social Impact Assessment, JohnWiley and Sons Ltd., Chichester, England.
8. Glasson, J., R. Therivel and A. Chadwick (1999) Introduction to Environmental Impact Assessment. University College London Publication, Tayler and Francis Group.
9. Zubair, L. (2001). EIA procedure: Challenges for Environmental Impact Assessment in Sri Lanka. Environmental Impact Assessment Review. 21:469-478.

Semester	5		
Course code	PRPL 31992		
Course Name:	Professional Placement		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	All Level 1 and Level 2 ZOOL course units		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	--	100
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to demonstrate;			
<ul style="list-style-type: none"> ➤ knowledge on the basic management procedures in a selected industry / institution, ➤ experience in selected functioning area of the industry / institution, and ➤ generic skills needed to function effectively in a professional working environment. 			
Course Content:			
The student will be placed in a selected industry/ institution where practical applications of biological science knowledge preferably Zoology are applied so that he/she will obtain experience in the professional working environment. It is intended that the student develops inter-personal and self-management skills to adapt to a professional working environment while gaining experience on selected functioning aspects of the industry/institute during the training period.			
Teaching /Learning Methods: Training under the supervision and guidance of competent personnel in an industry or institution related to biological sciences preferably Zoology.			
Assessment Strategy: Evaluation of the progress report submitted by the trainer and the student's technical report and oral presentation on student's experience at the work place.			
Continuous Assessment	80%	Final Assessment	20%
Details:		Theory (%)	Practical (%)
Student's dairy report	60%	NA	NA
Trainer evaluation	20%		Other (%) (specify) Oral presentation 20%
Recommended reading:			
Reading and reference materials will be recommended/ provided by the relevant industry /institute where necessary.			

Semester	6		
Course code	ZOOL 32543		
Course Name:	Aquaculture		
Credit Value:	3		
Core/Optional	Optional for the BSc Degree programme. Compulsory for the BSc (Honours) Degree programme in Zoology.		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	30	45	75
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the scientific procedures, tools and techniques used in edible & ornamental fin fish culture and shrimp culture in a sustainable manner, and ➤ demonstrate practical skills on tools and techniques used in breeding, rearing and diagnosing diseases encountered in edible & ornamental fin fish culture and shrimp culture. 			
Course Content:			
Theory sessions: Introduction to aquaculture and aquaculture practices, Sustainable aquaculture systems, Breeding of selected freshwater edible fin fish and ornamental fish, Rearing the hatchlings and fry up to marketable size under correct management of environment, Rearing ornamental fish with compatible aquarium plants, Provision of correct nutrition to different development stages of aquarium fish, Prevention/ control of common diseases of aquarium fish, Packing live fish for local and international markets. Production of post-larvae of cultured shrimp, <i>Penaeus monodon</i> , Rearing the post-larvae up to marketable size under correct management of environment, Provision of correct nutrition to different development stages of <i>Penaeus monodon</i> , Prevention and control of common diseases of cultured shrimp, Processing of harvested shrimp for export.			
Practical sessions: Identification of cultured edible, fin fish and shell fish, Freshwater ornamental fish and aquarium plants that could be cultured in Sri Lanka. Setting up of an observation unit using a glass aquarium with selected, compatible ornamental fish species and aquarium plants, Feeding, monitoring water quality and maintenance of health of fish with suitable treatment whenever necessary. Symptoms of common diseases and disease causing agents recorded in freshwater, edible and ornamental fishes in Sri Lanka. Field study at a commercial ornamental fish farm. Identification of development stages of <i>Penaeus monodon</i> . Symptoms of common diseases in larval stages, juveniles and brood shrimp recorded in Sri Lanka. Field study at a shrimp hatchery and grow-out farm and a processing plant.			
Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Online and/or in-class assignment/quizzes 30%		Theory (%) 50%	Practical (%) 20%
		Other (%) (specify) NA	
Recommended reading:			
<ol style="list-style-type: none"> 1. Lightner, D.V. (1996). Hand book of shrimp pathology. World Aquaculture Society, USA. 2. Mills, D. (1998). Popular guide to tropical aquarium fishes. Salamander Books Limited, London. 3. Noga, E.J. (2000). Fish Diseases: Diagnosis and treatment. Blackwell Science, Oxford. 4. Pillay, T.V.R. (1990). Aquaculture: Principles and Practices. Fishing News Books, Oxford. 			

Semester	6		
Course code	ZOOL 32552		
Course Name:	Parasitology		
Credit Value:	2		
Core/Optional	Optional for the BSc Degree programme. Compulsory for the BSc (Honours) Degree programme in Zoology.		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the host parasite relationship, and the definitions used in parasitology, ➤ identify the parasites of the human and domestic animals, ➤ describe the pathogenicity of the diseases caused by parasites of human and domestic animals, ➤ explain the modes of transmission of parasites and their sources, ➤ describe the epidemiology of the parasitic diseases and recommend preventive measures, ➤ demonstrate practical skills to identify life cycle stages of parasites, and ➤ explain the use of immunoassays, DNA probes (hybridization technique) and PCR based techniques used to identify life stages of the parasites, 			
Course Content:			
Introduction to Parasitology. morphology, life cycle and mode of infections of parasites of gastrointestinal and urino-genital tracts, blood and tissues of human and domestic animals including amoebic parasites, flagellated parasites, apicomplexans, ciliate parasites, nematodes, flukes and tapeworms; arthropod vectors responsible for transmission of infections, epidemiology of parasitic diseases and preventive measures; Different techniques used to identify parasites including morphological methods, immunoassays, DNA probes (hybridization technique) and PCR based techniques.			
Practical sessions on identification of life cycle stages of parasites of human and domestic animals. Parasite survey of rumen/ intestine/liver of cattle, preservation of parasites; identification of cysts and helminth eggs in stool samples; techniques used to identify parasites including immunoassays, DNA probes (hybridization technique) and PCR based techniques.			
Teaching /Learning Methods: A combination of lectures, laboratory studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of semestecourse examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Practical course 10% Theory assignments 20%		Theory (%) 50%	Practical (%) 20% Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Laboratory manual for Parasitology (2011). Department of Zoology, University of Kelaniya. 2. Liu, D. (2012). Molecular Detection of Human Parasitic Pathogens. CRC Press. 3. Lynne S.G. (2011). Diagnostic Medical Parasitology. Almere; American Soc. of Microbiology. 4. Roberts, L. Jr., J. Janovy & S. Nadler (2012). Foundations of Parasitology, 9th Edition, McGraw-Hill Science. 5. Study guide of Parasitology (2011). Department of Zoology, University of Kelaniya. 6. Sullivan, J. T. (2009). A Color Atlas of Parasitology. 			

Semester	6		
Course code	ZOOL 32563		
Course Name:	Conservation Biology and Wildlife Management		
Credit Value:	3		
Core/Optional	Optional for the BSc Degree programme. Compulsory for the BSc (Honours) Degree programme in Zoology.		
Pre requisites	ZOOL 12523 & ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	40	20	90
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ explain the principles of conservation biology and aims of wildlife management, ➤ describe the issues associated with the biodiversity loss, ➤ prioritize conservation efforts using qualitative and quantitative techniques, ➤ evaluate habitats and recommend strategies for habitat management for target wildlife, ➤ suggest strategies for management of wildlife using population data and field experiments, and ➤ demonstrate skills in application of specific techniques used in wildlife conservation and management. 			
Course Content:			
Principles of Conservation Biology, Change of biological diversity with time, Species extinction and formation, IUCN categories for the conservation status of taxa, Threats to biological diversity, Habitat destruction, Habitat fragmentation, Over harvesting, Invasive species, Climate change, Problems of small populations, Measuring and comparing biodiversity, Abundance time series, Risk prediction, Genetic principles and rules in Conservation Biology, Conservation at the species and population level, Conservation planning and priority selection, Management of endangered species, Conservation of plant animal mutualism, Conservation of pollinators, Conservation in human modified landscapes.			
Introduction to wildlife Management, Aims of wildlife management, Wildlife management in Sri Lanka, Protected areas, Habitat management strategies, Wildlife and water, predators and predation, Hunting and trapping, Human-elephant conflict, elephant conservation, Management of crocodiles and marine turtles. Population analysis, Life tables, Patterns of population growth, Wildlife diseases, Wildlife surveys including animal capture/marketing, surveys, aging and sexing and experiments, The role of society in conservation, <i>In-situ</i> and <i>ex-situ</i> conservation. International trade of wildlife and CITES, Ecotourism, Legal aspects, Flora and fauna protection ordinance in Sri Lanka and international efforts of wildlife management.			
Two field studies at nature reserves.			
Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Online/in-class Tutorial 1 or 2 10% Field report 10% Group Presentation 10%		Theory (%) 70%	Practical (%) NA Other (%) (specify) NA
Recommended reading:			

1. Bolen, E. G. & W. Robinson (2002). *Wildlife Ecology and Management*, 5th edition, Benjamin Cummings, USA.
2. Flora and fauna protection ordinance in Sri Lanka.
3. Navjot, S. S. & E. R. Paul (2011). *Conservation biology for all*, Oxford University Press, New York.
4. Primack, R. B. (2010). *Essentials of conservation biology*, 5th edition. Sinauer Associates, Inc. Publishers Sunderland, Massachusetts U.S.A.
5. Silvy, N. J. (2002). *The Wildlife Techniques Manual: Volume 1: Research. Volume 2: Management* 2-vol. set. John Hopkins University Press.
6. Sinclair, A. R. E., J. M. Fryxell & G. Caughley (2005). *Wildlife Ecology, Conservation and Management*, 2nd Edition, Wiley-Blackwell.

BSc Honours Degree in Zoology

Semester	5		
Course code	ZOOL 41512		
Course Name:	Statistical Methods in Zoology		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	25	15	60
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ apply appropriate statistical methods for the analysis of numerical data relevant to biological studies, ➤ use appropriate software packages to analyse biological data, and ➤ interpret biological data in a scientific manner. 			
Course Content:			
Introduction to scientific method and the statistical approach, Introduction to types of biological data, Sample statistics and population parameters, Probability and cumulative density functions, Models of probability distributions including binomial distribution, hypergeometric distribution, Poisson distribution and normal distribution. Confidence intervals, Error-bound, Hypothesis testing. Chi-square test, Kolmogorov-Smirnov test, Product moment correlation, Simple linear regression, Probit analysis, One-way ANOVA, Two-way ANOVA. Multiple comparison procedures including Tukey's test, Scheffe's test. Non-parametric statistics including; Mann-Whitney U test, Kruskal Wallis test, Wilcoxon signed rank test, Rank correlation, Multivariate statistics including similarity matrix, cluster analysis, MDS and PCA.			
Practical sessions on the use of statistical software packages for data analysis.			
Teaching /Learning Methods: A combination of lectures, computer based learning on the use of statistical software packages, assignments, self-studies, small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 20%	Final Assessment 80%		
Details: Online and/or in-class assignment/quizzes 20%	Theory (%) 80%	Practical (%) NA	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Fowler, J. & L. Cohen (1994). Practical Statistics for Field Biology: Wiley & Sons, Chichester. 2. Sokal, R. R. & F. Rohlf (1995). Biometry. W.H. Freeman and company, New York. 3. Zar, J. H. (1999). Biostatistical Methods. Prentice-Hall, New Jersey. 			

Semester	5		
Course code	ZOOL 41524		
Course Name:	Insect Systematics and Biology		
Credit Value:	4		
Core/Optional	Core		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	40	60	100

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- describe the morphology of a typical insect,
- describe diagnostic features of insects belonging to common selected orders,
- explain structure and functioning of insect organ systems,
- describe post- embryonic development of insects,
- classify insects to the relevant orders and selected families,
- construct insect taxonomic keys, and
- demonstrate skills in procedures and techniques relevant to insect preservation.

Course Content:

Morphology of a typical insect; Integument and associated structures, Types of antennae, Mouthparts and legs. Morphological features and life history of Thysanura, Blattodea, Mantodea, Neuroptera, Orthoptera, Hemiptera, Coleoptera, Lepidoptera, Thysanoptera, Diptera including chironomidae and simuliidae, Mallophaga, Dermaptera, Phasmatodea, Siphonaptera, Isoptera, Ephemeroptera, Odonata, Plecoptera and Trichoptera. Biological aspects of selected insect families.

Exoskeleton, Muscular system, Nervous system and perception, Endocrine system, Sound and light producing organs, Digestive system, Nutrition and digestion, Respiratory system, Circulatory system, Excretory system and Reproductive system. Exocrine glands, Insect Pheromones, Insect hormones and their role in metamorphosis and post-embryonic development.

Practical sessions on; Techniques of collection, preservation and mounting of insects, morphology of adult insects of the above orders and Internal anatomy of selected life stages of insects, Laboratory rearing of insects. Post embryonic development, Use of taxonomic keys to sort insects to order and family levels, Preparation of insect keys.

Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.

Assessment Strategy: In-course assessment and end of semester examination.

Continuous Assessment 10%	Final Assessment 90%		
Details: Practical course work compilation 10%	Theory (%) 65%	Practical (%) 25%	Other %)(specify) NA

Recommended reading:

1. Borror, D. J., C. A. Triplehorn & N. F. Johnson (1989). Introduction to the study of insects. 6th edition. Saunders College Publication.
2. Gullan, P.J. & P. S. Crantson (2010). The insects- an outline of entomology, 10th edition, Chapman and Hall, London.

Semester	5/6		
Course code	ZOOL 43532		
Course Name:	Essays and Seminar on Special Topics in Zoology		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 12523 & ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	--	100
Course Aim/Intended Learning Outcomes:			
After the completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ demonstrate a coherent overview of a given topic in Zoology, ➤ present the overview in the form of an essay, and ➤ defend the contents of the essay in the form of a seminar to the academic audience. 			
Course Content: A topic, which will be assigned at the beginning of the course.			
Teaching /Learning Methods: Self-studies including relevant literature survey and computer assisted learning.			
Assessment Strategy: Evaluation of the essay and seminar.			
Continuous Assessment --		Final Assessment 100%	
Details: NA		Theory (%) NA	Practical (%) NA
		Other %)(specify) Essay 60% Oral presentation 40%	
Recommended reading:			
Reading material will be assigned at the beginning of the course and/ or should be found by the student.			

Semester	6		
Course code	ZOOL 42542		
Course Name:	Research Methodology and Scientific Writing		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 41512		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	08	70
Course Aim/Intended Learning Outcomes:			
After the completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the sequential steps in the research process, ➤ explain a range of research methodologies used in scientific investigations and discuss the applicability of these methodologies in biological research, ➤ demonstrate competencies in using different sampling strategies in biological investigations, ➤ explain the procedure of developing a research proposal for solving an identified research problem, ➤ identify the stipulated requirements for scientific writing of a dissertation, research papers, abstracts/extended abstracts for research conferences, ➤ quote references appropriately in the scientific documents based on stipulated requirements, ➤ identify ethical issues in the context of research. 			
Course Content:			
<p>Nature of scientific research: Inductive and deductive reasoning; scientific method; Sequential steps in the research process, Locating scientific literature using electronic search engines, Reviewing scientific literature, Formulating a research problem and postulating hypotheses; Conceptualizing a research design and data collection methods; Introduction to populations, samples, sampling units; Sampling techniques; simple random sampling, stratified sampling, systematic sampling and cluster sampling, determination of sampling size, Research designs based on number of contacts, reference period, and nature of investigation; Research methods in pure and applied sciences, descriptions, comparative studies, experiments modeling, surveys, case studies, meta-analysis; Experimental design; Complete Randomized Design and Randomized Block Design, Latin Square design.</p> <p>Compiling a research proposal for solving the identified research problem, Scientific writing for dissemination of research findings: Academic writing, Formatting and Referencing requirements. Effective presentation methods; Guidelines for writing a dissertation, Guidelines for writing a research paper, guidelines for preparation of abstracts and extended abstracts for presentations at research conferences/symposia.</p> <p>Research ethics: Role and responsibilities of being a researcher, honesty and integrity; Ethical concerns related to the research process, Ethics of publication of research findings.</p>			
Teaching /Learning Methods: A combination of lectures, computer based learning, assignments, self-studies, presentations and discussions			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	

Details: In-class assignments 30%	Theory (%) 70%	Practical (%) NA	Other (%) (specify) NA
Recommended reading:			
1. Creswell, J. W. (2009). Research Design. Sage Publications Inc. California.			
2. Hofmann, A. H. (2009). Scientific writing and communication: Papers, proposals and presentations, Oxford University Press.			
3. Kumar, R. (2005). Research Methodology, Pearson Education, Australia.			

Semester	6		
Course code	ZOOL 42554		
Course Name:	Molecular Genetics		
Credit Value:	4		
Core/Optional	Optional		
Pre requisites			
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	30	125

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- describe molecular processes in cells relevant to transcription, translation and control of gene expression,
- explain the manipulation of biological molecules in bacteria for detection, identification and genome transformation,
- discuss the application of molecular genetics techniques in real life situations and
- demonstrate practical skills to apply the most suitable molecular biological technique to diagnose genetic disorders.

Course Content:

Introduction to molecular processes in cells relevant to transcription, translation and control of gene expression. Manipulation of biological molecules in bacteria for detection, identification and genome transformation. Molecular biological techniques used to isolate, separate, and probe for specific proteins and nucleic acids and their interactions. Selection of appropriate molecular genetics technique for diagnosis processes and treatment to human genetics disorders. Limitations of molecular biological techniques. Genetically modified organisms; Introduction to bioinformatics.

Practical sessions on application of molecular genetics techniques; recombinant therapeutic proteins; applications of recombinant DNA technology; applications of molecular biological techniques in selected infectious diseases. Introduction to PCR based molecular diagnostic assays; DNA fingerprinting for human identification; applications of molecular diagnostics in clinical practice; nucleic acid based therapeutics; recombinant protein antigens in diagnostics including ELISA. Monoclonal antibodies.

Teaching /Learning Methods: A combination of lectures, laboratory sessions, computer based learning, seminars and assignments, self-studies and small group discussions.

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 25%	Final Assessment 75%		
Details: Online/in-class tutorials/Assignments 10%	Theory (%) 75%	Practical (%) NA	Other (%) (specify) NA

Practical reports 15%			
Recommended reading:			
1. Wilson, K. & J. Walker (2010). Principles and Techniques of Biochemistry and Molecular Biology, 7 edition, Cambridge University Press.			
2. Cox, M. M., J. Doudna & M. O'Donnell (2011). Molecular Biology: Principles And Practices. 1 st Edition. W. H. Freeman,			
3. Freifelder, D. (1998). Molecular Biology. Jones & Bartlett Publishers, Inc.			
4. Samebrook, J. Fritch, F.F. & T. Maniatis (1989). Molecular Cloning- A Laboratory Manual (3 volume set). Cold Spring Harbor Laboratory, USA.			

Semester	6		
Course code	ZOOL 42564		
Course Name:	Environmental Physiology and Ecotoxicology		
Credit Value:	4		
Core/Optional	Optional		
Pre requisites	ZOOL 21512		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	44	32	124

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- describe and discuss physiological strategies adopted by animals for specific environmental problems emphasizing mechanistic basis of adaptations,
- discuss impacts of environmental contaminants on biota at molecular, cellular, individual, population, community and ecosystem levels and assess the ecological health risks posed by environmental contaminants, and
- apply selected techniques/tools for monitoring/assessing environmental stress to biota, analyze laboratory based physiological/toxicological data and interpret and present the results in a scientific manner.

Course Content:

Specific problems in different types of environments and physiological adaptations for survival: Strategies to survive in hypoxic and anoxic conditions; Temperature relations of ectotherms in cold and hot environments; Temperature strategies of Heterotherms; Temperature relations of endotherms in cold and hot environments; dormancy in unfavorable ambient temperatures; Osmoregulatory strategies in freshwater, marine, brackish and hypersaline waters and terrestrial environments; nitrogen waste excretion strategies.

Ecotoxicology- scientific/technological and practical goals; Major classes of contaminants, inorganics, organics and radiation, genetic contaminants; Contaminant uptake, biotransformation/detoxification, elimination and accumulation, Bioaccumulation from food and trophic transfer; Toxicant effects at molecular, cellular, tissue and organ levels; acute and chronic effects on individuals; Effects on populations, communities and ecosystems; Global effects of environmental contaminations; Evaluation of toxic effects, bioassays and biomarkers; Risk assessment of contaminants: human health risk assessment, ecological risk assessment; radiation risk assessment.

Practical sessions on monitoring biological effects of environmental stress, toxic effects of selected environmental contaminants at molecular, cellular and organ levels; bioassays and

estimation of toxicity thresholds; prediction of hazardous concentrations and species protection levels based on species sensitivity distribution analysis

Teaching /Learning Methods: A combination of lectures, computer based learning, laboratory studies and preparation of scientific reports, self-studies, assignments, tutorial and small group discussions.

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 30%	Final Assessment 70%		
Details: Practical Reports: 20% Assignments and Presentations: 10%	Theory (%) 70%	Practical (%) NA	Other (%) (specify) NA

Recommended reading:

1. Newman, M.C. (2010). Fundamental of Ecotoxicology. Third Edition. CRC Press, New York.
2. Willmer, P., G. Stones & I. Johnston (2009). Environmental Physiology of Animals, Wiley-Blackwell Publishers.
3. Withers, P. C. (1992). Comparative Animal Physiology. Saunders College publishing. New Jersey.
4. Wright, D. A. & P. Welbourne (2002). Environmental Toxicology. Cambridge.

Semester	7		
Course code	ZOOL 41574		
Course Name:	Aquaculture Management		
Credit Value:	4		
Core/Optional	Core		
Pre requisites	ZOOL 32543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	40	60	100

Course Aim/Intended Learning Outcomes:

After completion of this course unit, the student will be able to;

- describe and discuss the procedures, tools and techniques relevant to brood stock management, water quality, feed and health management of fin fishes and shell fishes used in aquaculture,
- describe and discuss post-harvest technologies used for fishery products,
- demonstrate skills in designing a hatchery, feed formulation and preparation, disease diagnosis and treatment used in aquaculture, and
- demonstrate skills in aquaculture management practices at farm level and post-harvest technologies at the processing plants.

Course Content:

Theory sessions: Management of brood stocks to obtain good quality egg and first feeding fry, Production of good quality seed in required number at required time by environmental manipulation, Hormonal induction, Cryopreservation of gametes. Improvement of stocks by selective breeding, Sex control. Feed formulation and preparation. Culture of microalgae, rotifers and other live food used in rearing different development stages of cultured organisms, *Artemia* decapsulation to improve hatching efficiency. Water quality management in re-circulating systems, closed systems and integrated culture systems. Environmental management in coastal aquaculture. Health management in different aquaculture systems by environmentally friendly methods with minimum impacts on the environment. Food Safety Regulations in aquaculture according to ISO 22,000, Hazard Analysis of Critical Control Point System (HACCP) in processing fin fishes and shell fishes. Aquaculture Economics.

Practical sessions: Designing a hatchery for edible carps, Feed formulation and preparation of feed, Use of anaesthetic agent to anaesthetize fin fishes, Culture of microalgae, Estimation of hatching efficiency of commercially available *Artemia* cysts, Antibiotic Sensitivity Test, Identification of common fin fish and shrimp diseases by histopathology and molecular biological techniques, prevention and control methods. Field study at Udawalawa Carp Breeding Center and Tilapia Breeding Center, Field study at *Macrobrachium* breeding Center, Field study at a shrimp processing plant, Field study at a tuna processing plant.

Teaching /Learning Methods: A combination of lectures, laboratory and field practical sessions, computer based learning, self-studies, assignments and small group discussions.

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 30%	Final Assessment 70%		
Details: Online/in-class tutorials/Assignments 30%	Theory (%) 50%	Practical (%) 20%	Other (%) (specify) NA

Recommended reading:

1. Brag, U. (1992). Guidelines for the promotion of Environmental Management of Coastal Aquaculture Development. FAO Fisheries Technical Paper No: 328.

2. Beveridge, M. C. M (1987). Cage Aquaculture. Blackwell Science, Oxford.
3. Bromage, N. R. and Roberts, R. J. (1995). Broodstock Management and egg and larval quality. Blackwell Science, Oxford.
4. Lightner, D.V (1996). Hand book of shrimp pathology. World Aquaculture Society, USA.
5. Post, G. (1987). Text Book of Fish Health. TFH Publications, Oxford.

Semester	7		
Course code	ZOOL 41584		
Course Name:	Ecological Interactions and Behavioural Ecology		
Credit Value:	4		
Core/Optional	Core		
Pre requisites	ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	40	60	100

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- determine the community structure using diversity indices,
- discuss the effect of dominant, keystone and foundation species on the community structure
- discuss the effect of biogeographic factors on the community structure,
- discuss the competition, predation, symbiotic relationships, pathogens and zoonotic diseases in animal communities,
- discuss the functional significance of foraging, territorial and mating behaviour,
- explain the social organization of aquatic mammals, canids and felids, elephants, primates and ungulates in relation to their ecology,
- demonstrate skills in analyzing food habits of mammals and birds in relation to their morphology,
- carry out ecological surveys in rivers/streams and rocky/sandy shore ecosystems, and
- demonstrate skills in studying play behaviour, aggression, anti-predatory behaviour and territorial behaviour of some animals in a scientific manner.

Course Content:

Ecological Interactions: Community ecology; Habitat, niche and multidimensional niche theory. Diversity and trophic structure in communities; species diversity and analysis of community structure using diversity indices, Trophic structure of a community and limits on food chain length, Impact of dominant, keystone and foundation species on the community structure, Bottom-up and top-down control of food chains. Biogeographic factors affecting community diversity; latitudinal gradients, area effects and the Island Equilibrium Model.

Community interactions: Competition; types of competition, the competitive exclusion principle, temporal and spatial partitioning of resource, Character displacement (morphological resource partitioning). Predation and herbivory; Predator-prey relationships including predator and prey strategies. Symbiotic community interactions; parasitism, mutualism, and commensalism. Ecology of disturbance and patch dynamics, Intermediate disturbance hypothesis. Ecological succession. Pathogens and zoonotic diseases on animal communities. Community assembly theory and ecology of habitat selection.

Behavioural Ecology: Functional significance of behaviour; Optimality theory and quantification of optimal behaviour through cost-benefit analysis, Measurement of function of behaviour. Foraging behaviour; Feeding tactics in animals including feeding at different trophic levels, modifying food supply, trapping and detecting food, tool use and co-operate hunting,

Abundance and availability of food and search image formation. Ecology of reproduction; Mating behaviour, sexual selection and mate choice, Mating systems, Inclusive fitness, infanticide, altruism and kin selection, Parental care. Game theory. Social organization of; aquatic mammals, canids and felids, elephants, primates and ungulates in relation to their ecology. A generalized model to explain the social organization of higher animals. Genetic basis and evolution of behaviour.

Practical sessions on: Study of food habits of mammals and birds in relation to their morphology, Field survey to study ecological interactions in a river/stream ecosystem, Field survey to study ecological interactions in a rocky shore intertidal ecosystem, Field study on the play behaviour of dogs, Laboratory study on the aggressive and anti-predatory behaviour of fishes, Territorial behaviour of dogs.

Teaching /Learning Methods: A combination of lectures, laboratory and field practical sessions, computer based learning, self-studies, assignments and small group discussions

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 30%	Final Assessment 70%		
Details: IN-class assignments 30%	Theory (%) 70%	Practical (%) NA	Other (%) (specify) NA

Recommended reading:

1. Alcock, J. (2005). Animal behaviour: An evolutionary approach. Sinauer Associates Publishers, Massachusetts.
2. Hauer, E. F. & G. A. Lamberti (2007). Methods in Stream Ecology. Academic Press.
3. Krebs, J. R. & N.B. Davies (1993). Behavioural ecology. Blackwell.
4. Osborne, P. L. (2000). Tropical Ecosystems and Ecological Concepts. Cambridge University Press.
5. Raven, P. H. & G. B. Johnson (2010). Biology. 8th Edition. Tata McGraw-Hill Edition
6. Reece, J. B., L. A. Urry, M. L. Cain, S. A. Wasserman, P. V. Minorsky & R. B. Jackson (2011). Campbell Biology, Global Edition. 9th Edition. Pearson Education Inc.

Semester	7		
Course code	ZOOL 41592		
Course Name:	Zoology in Practice		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	All level 1, Level 2 & Level 3 ZOOL course units		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	--	100
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to demonstrate;			
<ul style="list-style-type: none"> ➤ knowledge on the basic management procedures in a selected industry / institution related to Zoology, ➤ experience in practical applications of knowledge of Zoology in selected functioning area/s of the industry / institution, and ➤ generic skills needed to work effectively in a professional working environment 			
Course Content:			
The student will be placed in a selected industry/institution where practical applications of biological science knowledge preferably Zoology are applied, to undergo training to obtain experience at the professional working environment. It is intended that the student develops inter-personal and self-management skills to adapt to a professional working environment while gaining experience on selected functioning aspects of the industry/institute during the training period.			
Teaching /Learning Methods: Training under the supervision and guidance of competent personnel in an industry or institution related to Zoology.			
Assessment Strategy: Evaluation of the progress report submitted by the trainer and the student's technical report and oral presentation on student's experience at the work place.			
Continuous Assessment 80%		Final Assessment 20%	
Details: Student diary report 60% Trainer evaluation 20%		Theory (%) NA	Practical (%) NA Other %(specify) Oral presentation 20%
Recommended reading: Reading and reference materials will be recommended/ provided by the relevant industry /institute where necessary.			

Semester	7		
Course code	ZOOL 41612		
Course Name:	Herpetology		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	24	54
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the global distribution and diversity of herpetofauna, ➤ describe the general anatomy of amphibians and reptiles, ➤ explain the physiological processes of amphibians and reptiles, ➤ demonstrate competencies in identifying herpetofauna of Sri Lanka to the lowest possible taxon using field techniques in herpetology, and ➤ discuss the economic and ecological importance of herpetofauna. 			
Course Content:			
Introduction to herpetology, Biogeography of herpetofauna, Systematics of amphibians and reptiles, Herpetofauna in Sri Lanka, General anatomy of amphibians and reptiles, Water balance and gas exchange, Thermoregulation, spacing movements and orientation, Communication and social behavior, Foraging ecology and diets, Defense and escape, Predators and parasites, Reproduction and life histories, Threats, need for conservation and future of herpetofauna. Laboratory sessions on systematics of amphibians and reptiles, field techniques in herpetological studies including marking and individual recognition techniques.			
Teaching /Learning Methods: A combination of lectures, laboratory and field practical sessions, computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 40%		Final Assessment 60%	
Details: Online and/or in-class assignment/quizzes 40%	Theory (%) 60%	Practical (%) NA	Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. De Silva, P. H. D. H. (1980). Snakes of Sri Lanka. Department of Government Printing, Colombo. 2. Dutta, S.K. & K. Mamamendra-Arachichi (1996). The Amphibian Fauna of Sri Lanka. Wild life Heritage Trust of Sri Lanka, Colombo. 3. Pough, F.H., R. M. Andrews, J. E. Cadle, M. L. Crump, A. H. Savitzky & K. D. Wells (2004). Herpetology, 3rd Edition, Pearson Prentic Hall. 4. Vitt, L.J. & J. P. Caldwell (2013). Herpetology; An Introductory Biology of Amphibians and Reptiles. 4th Ed. Elsevier 			

Semester	7		
Course code	ZOOL 41622		
Course Name:	Nematode Pest Management		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	24	54

Course Aim/Intended Learning Outcomes:

After completion of the course unit, the student will be able to;

- identify plant parasitic nematodes as pests of agriculture and horticulture crops.
- describe the types of injury and the damage symptoms caused by plant parasitic nematodes with special reference to economically important crops in Sri Lanka,
- determine the threshold injury level and the crop loss due to nematode infestation,
- apply/recommend and suggest suitable management practices and preventive measures against plant parasitic nematode infestations in a given crop,
- discuss quarantine regulations implemented in Sri Lanka against plant parasitic nematodes,
- demonstrate practical skills in morphological identification of plant parasitic nematodes
- quantify nematode population in field using the appropriate sampling technique.

Course Content:

Introduction to nematodes and general characteristics of plant parasitic nematodes (2) nematode interactions with the host plant (1). Root-knot nematodes, lesion and burrowing nematodes, cyst nematodes (4). Ectoparasitic nematodes as plant virus vectors (1). Injury caused by plant parasitic nematodes to host plant and their symptoms (1). The economic threshold level of nematode infestation and calculation of crop loss (2). Nematode parasites of tea, rice, fruit and vegetable crops and other economically important crops in Sri Lanka and their management (5). Globally reported nematode parasites as regulated pests of Sri Lanka and quarantine practices adopted against them (1). Soil/plant sampling and extraction for accurate identification and population studies of parasitic nematodes (3).

Practical sessions on identification of root-knot, lesion, burrowing and cyst nematodes. Handling plant parasitic nematodes, preservation and slide mounting. Soil survey and extraction of nematodes; Visit to the National Plant Quarantine Services Centre

Teaching /Learning Methods: A combination of lectures, laboratory and field sessions, assignments, self-studies, computer assisted learning, and small group discussions.

Assessment Strategy: Continuous assessment and end of course examination.

Continuous Assessment 30%	Final Assessment 70%		
Details: Online assignments 10% Presentation 10% Laboratory course work 10%	Theory (%) 50%	Practical (%) 20%	Other (%) (specify) NA

Recommended reading:

1. Laboratory Manual for nematology (2014). Department of Zoology, University of Kelaniya.
2. Luc, M., R. A. Sikora & J. Bridge (2004). Plant Parasitic Nematodes in Subtropical and Tropical Agriculture, CAB International, Wallingford, UK.
3. Nickle, W.R. (1991). Manual of Agricultural Nematology, Marcel Dekker Inc., New York.

Semester	7/8		
Course code	ZOOL 43608		
Course Name:	Research Project		
Credit Value:	8		
Core/Optional	Core		
Pre requisites	ZOOL 41512 & ZOOL 42542		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	--	--	400
Course Aim/Intended Learning Outcomes:			
After the completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ develop a research proposal on an identified research problem related to special field of Zoology, ➤ carry out a research project on a specific area of Zoology according to the scientific method, ➤ analyse experimental data using appropriate statistical tests and interpret results in a scientific manner, and ➤ present the research result in the form of dissertation and defend the findings to the academic audience. 			
Course Content:			
A short term research project based on scientific method that involves field and/or laboratory work in any of the following areas: Aquaculture, Conservation biology, Ecology, Entomology, Ecotoxicology, Fish biology, Fisheries Management, Herpetology, Ornithology, Parasitology, Physiology and Plant nematology; Literature review; Development and presentation of a research proposal on the identified research problem; Preparation of the dissertation based on stipulated requirements; Oral presentation and defense of the research findings.			
Teaching /Learning Methods: Literature survey, research proposal preparation, laboratory and/or field work, data gathering, data analysis and interpretation, preparation of dissertation.			
Assessment Strategy: Dissertation and oral presentation.			
Continuous Assessment --	Final Assessment 100%		
Details: NA	Theory (%) NA	Practical (%) NA	Other (%) (specify) Dissertation 70% Oral Presentation 30%
Recommended reading: Peer reviewed literature related to the assigned research topic.			

Semester	8		
Course code	ZOOL 42632		
Course Name:	Agricultural Entomology		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 41524		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	20	30	50
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ identify insect and mite pests of agriculture crops, plantation crops and stored food/products in Sri Lanka, ➤ describe injuries caused by insect and mite pests and their damage symptoms in the host/host plant, ➤ design strategies and recommend appropriate control measures for the management of insect or mite pests of a given crop or a stored product, ➤ explain procedures and techniques used in integrated pest management and ➤ demonstrate practical skills to identify life history stages of insect and mite pests of agriculture crops, plantation crops and stored food/products in Sri Lanka, and ➤ demonstrate practical skills to identify damage symptoms caused by above insect and mite pests. 			
Course Content:			
Introduction to Agricultural Entomology; identification and life histories of insect and mite pests of agriculture and plantation crops such as coconut, tea, sugarcane, rice and selected fruit and vegetable crops in Sri Lanka and identification of their injuries to the crop and damage symptoms; management practices adopted against individual pest situation including use of biological control agents; Identification and life histories of insect pests of stored rice, paddy, flour and legumes and selected other dry/stored food and preventive measures and management practices adopted against pest situation in storage and warehouses; Causes of insect pest outbreaks; concepts in insect pest management including, General Equilibrium Level, Economic Threshold Level and Economic Injury Level; Integrated Pest Management.			
Laboratory and field practical sessions on identification of life history stages of insect and mite pests of rice, coconut, tea, sugarcane, selected fruit and vegetable crops and stored food/food products and identification of damage symptoms caused by them. Use of insect taxonomic keys for the identification of polyphagous insect pests such as aphids; Types of insecticides and application utensils and equipment.			
Teaching /Learning Methods: A combination of lectures, laboratory and field sessions, assignments, self-studies, computer assisted learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 40%		Final Assessment 60%	
Details: Online and/or in-class assignment/quizzes 40%	Theory (%) 60%	Practical (%) NA	Other %)(specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Hill, D.S. (1983). Agricultural insect pests of the tropics and their control. 2nd edition Cambridge University Press, Cambridge. 2. Pedigo L.P. & M. Rice (2006). Entomology and Pest Management Pearson, NJ, USA. 			

Semester	8		
Course code	ZOOL 42642		
Course Name:	Medical and Veterinary Entomology		
Credit Value:	2		
Core/Optional	Core		
Pre requisites	ZOOL 41524		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	20	30	50
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ identify insects and acarines that are of importance to man and domestic animals and describe their life histories, ➤ describe vector-host-pathogen relationship in vector borne diseases, ➤ recommend strategies to control insect and acarines that are of importance to man and domestic animals, ➤ discuss vector surveillance techniques, ➤ demonstrate practical skills to identify major vector mosquito species using key characteristics and, ➤ demonstrate practical skills to identify parasitic insects, mites and tick species of animals using key characteristics. 			
Course Content:			
Introduction to Medical Entomology; arthropods as vectors of disease agents and as pests of hygiene, including mosquitoes, flies, fleas, lice, bugs, cockroaches, ticks and mites; life histories of blood sucking insects and mites, including mosquitoes, sandflies, lice, sand fleas, itch mite and chigger mite that serve as vectors of several diseases in humans including malaria, filariasis, Japanese encephalitis, dengue, chickengunya, relapsing fever, typhus fever, leishmaniasis, plague and scrub typhus, epidemiology and methodologies adopted in prevention and management of each vector borne disease; climate change and vector-borne diseases;			
Introduction to Veterinary Entomology; identification, classification and life history pattern and the injury caused by fleas, biting lice and sucking lice of domestic animals and poultry; identification, classification and life history pattern and the injury caused by blowflies and flesh flies causing myiasis in animals; identification, life histories and injury caused by mite species causing sarcoptic mange and tick species in animals.			
Practical sessions on collection and sampling techniques of medically important insects; identification of major vector mosquito species; Identification of flea species and tick species of animals using keys.			
Teaching /Learning Methods: A combination of lectures, laboratory and field sessions, assignments, self-studies, computer assisted learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 40%		Final Assessment 60%	
Details: Online and/or in-class assignment/quizzes 40%		Theory (%) 40%	Practical (%) 20%
Continuous			
Recommended reading:			
1. Eldridge, B.F. & J. Edman (2003). Medical Entomology: A Textbook on Public Health and Veterinary Problems Caused by Arthropods, Kluwer academic publishers.			

2. Lehane, M. (2005). The Biology of Blood Sucking Insects. 2nd Edition, Cambridge University Press.
3. Mullen, G.R. & L. A. Durden (2009). Medical and Veterinary Entomology, Second Edition, Academic Press.
4. Service, M. (2012) Medical Entomology for students, 5th Edition, Cambridge University Press.

Semester	8		
Course code	ZOOL 42654		
Course Name:	Fish stock Assessment and Fisheries Management		
Credit Value:	4		
Core/Optional	Core		
Pre requisites	ZOOL 31512		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	45	110
Course Aim/Intended Learning Outcomes:			
After the completion of this course unit the student will be able to;			
<ul style="list-style-type: none"> ➤ evaluate the trends in world fisheries, ➤ explain the impact of anthropogenic activities on fisheries, ➤ explain the legal regime of the sea, ➤ describe the fisheries of the Indian ocean and Sri Lanka, ➤ effectively participate in the development of management procedures for Sri Lankan fisheries, ➤ describe and critically discuss fish population dynamics, ➤ apply knowledge in fish stock assessment in the management of capture fisheries, ➤ use stock assessment software packages, and ➤ demonstrate skills in the management of fisheries. 			
Course Content:			
Recent trends in world fisheries, Anthropogenic activities on world fisheries, Tuna and tuna like fisheries, Effects of legal regime of the sea on fisheries, Shared stocks, Untapped resources, Enhancement strategies in fisheries, Fisheries of the Indian Ocean, Fisheries of Sri Lanka, Concept of unit stock, Methods of fish stock identification, Age and growth of fish, Gear selection, Recruitment, Stock-recruitment relationships, Mortality, Estimation of population size, Estimation of past population size using virtual population analysis and cohort analysis, VPA and gear selection, Concepts of Maximum sustainable yield, Surplus yield models, Maximum Economic Yield and Maximum Social Yield, Yield per recruit models, Semi-quantitative methods in fish stock assessment, Ecosystem Approach to Fisheries, Introduction to fisheries management, Problems associated with the management of fisheries, Fisheries management process, Community-based fisheries management, Fisheries co-management, Fisheries regulations in Sri Lanka. Laboratory Practical and field studies.			
Teaching /Learning Methods: A combination of lectures, laboratory and field practical sessions, use of stock assessment software and computer based learning, self-studies, assignments and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	

Details: Online assignment 10% Presentation 10% Field report 10%	Theory (%) 50%	Practical (%) 20%	Other (%) (specify) NA
Recommended reading: <ol style="list-style-type: none"> 1. King, M. (1995). Fisheries Biology, Assessment and Management, Fishing News Books, Oxford. 2. Pitcher, T.J. & P. J. B. Hart (1982). Fisheries Ecology, Croom Helm, London. 3. Pauly, D. (1984). Fish Population Dynamics in Tropical Waters: A manual for use with programmable calculators, ICLARM, Manila. 4. Sparre, P. & S. C. Venema (1999). Introduction to tropical fish stock assessment, Parts 1 and 2. FAO Fisheries Technical Paper 306/1 and 306/2 (Rev. 2), FAO, Rome. 5. Gayanilo, Jr., F.C. & D. Pauly (1997). FAO-ICLARM stock assessment tools: Reference manual. FAO Computerized Information Series, Fisheries. FAO, Rome. 6. ftp://ftp.fao.org/docrep/fao/009/a0699e/a0699e.pdf 			

Semester	8		
Course code	ZOOL 42662		
Course Name:	Immunology		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	ZOOL 21512		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After the completion of this course unit the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the development and elements of the immune system in different groups of animals, ➤ discuss roles of different components of the immune system with special reference to human, ➤ discuss mechanisms for innate and adaptive immune responses and role of immune system in health and diseases, and ➤ demonstrate competencies in recognizing histological structure of immunological tissues, applications of selected haematological and serological techniques for assessing immunity, present and interpret the results in a scientific manner. 			
Course Content:			
Development of immune system in the animal kingdom; Elements and basic concepts of the immune system; Organs and tissues of the immune system; Innate immunity and nonspecific resistance; constitutive defenses, role of complement, defensins, interferon, phagocytic cells, mast cells, natural killer cells; inflammation; Adaptive immunity and specific resistance; role of antigens, antibodies, T cell receptors, Major Histocompatibility Complex; Antigen processing and presentations, T cells and B cells development; T-cell mediated immunity; B cells and antibody mediated immunity; immunologic memory; Immune system in health and diseases: infections and vaccines, hypersensitivity, immunodeficiency, transplantations; stress and immunity. Practical sessions on histology of immune-competent organs of selected vertebrates, selected haematological and serological assays for evaluating immune responses.			
Teaching /Learning Methods: A combination of lectures, laboratory studies and preparation of laboratory reports, assignments, self-studies, computer based learning and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 15%		Final Assessment 85%	
Details: Lab reports 10% Presentations 5%		Theory (%) 85%	Practical (%) NA Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Owen, J., J. Punt & S. Stanford (2013). Kuby Immunology, 7th edition W.H. Freeman publishers. 2. Paul, W.E. (2008). Fundamental Immunology. Lippincott Williams and Wilkins. 3. Parham, P. (2009). The immune system. 3rd edition, Taylor and Francis, New York. 			

Semester	8		
Course code	ZOOL 42672		
Course Name:	Ornithology		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	ZOOL 12523		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After the completion of this course unit the student will be able to;			
<ul style="list-style-type: none"> ➤ describe the global distribution of birds, ➤ describe the general anatomy of birds, ➤ explain the unique physiological processes of birds, ➤ describe the bird flight and adaptations for flight, ➤ demonstrate competencies in using field techniques in avian studies, and ➤ discuss the economic and ecological importance of bird. 			
Course Content:			
Biogeography of birds, Origin and early evolutionary history, Diversity of birds, Avian structure including skin, exoskeleton, sense organs and general anatomy. Physiological processes unique to birds, Flight, Migration and navigation. Avian communication, Nesting biology, Mating systems and parental care, Field techniques in avian studies, Economic and ecological importance of birds, Threats and need for conservation of local and migratory birds. Laboratory Practical and field studies.			
Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: course work 10% Assignments 20%		Theory (%) 70%	Practical (%) NA Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Harrison, J. (2011). A Field Guide to the Birds of Sri Lanka. 2. Kazimierczak, K. (2006). A Field Guide to the Birds of India, Sri Lanka, Pakistan, Nepal, 3. Newton, I. (2003). Speciation and Biogeography of Birds, Academic Press. Bhutan, Bangladesh and the Maldives, New Delhi, Om Book Service. 4. Scott, G. (2010). Essential Ornithology, Oxford University Press. 5. Sutherland, W. J., I. Newton & R. Green (2004). Birds - Ecology and Conservation: A Handbook of Techniques (Techniques in Ecology & Conservation), Oxford University Press. 			

Semester	8		
Course code	ZOOL 42684		
Course Name:	Ecology and Management of Wetlands		
Credit Value:	4		
Core/Optional	Optional		
Pre requisites	ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	45	30	125
Course Aim/Intended Learning Outcomes:			
After the completion of this course unit the student will be able to;			
<ul style="list-style-type: none"> ➤ discuss the values and functions of different types of wetlands, ➤ discuss the effects of biological and physico-chemical factors on wetland community development and wetland properties, ➤ identify potential threats to wetlands and propose appropriate wetland management strategies, ➤ discuss the importance of wetland restoration, constructed wetlands, and sustainable utilization of wetlands, and ➤ demonstrate skills in identifying wetlands for conservation, wise use of wetlands and wetland restoration. 			
Course Content:			
<p>Definition of wetlands, Wetland classification, Wetland hydrology, Wetland soils, Wetland vegetation and adaptations, Wetland biogeochemistry with special reference to the importance of N, C, S, P, Fe and Mn transformations in wetlands, Wetland zonation, Wetland functions, Threats to wetlands: Natural and anthropogenic impacts on wetlands, Factors affecting community development in wetlands: Biological diversity of wetlands, Rank abundance curves, Factors affecting animal and plant diversity in wetlands, species pool hypothesis, Hydrology as a factor controlling wetland properties, Wetland fertility and primary productivity, Effects of disturbances on wetlands, Effects of herbivory on wetlands.</p> <p>Wetland restoration, Constructed wetlands: Types of constructed wetland systems for use in various landscapes, Hydrologic and ecological features of constructed wetlands, Design and optimization to treat a wide range of waste waters, Monitoring and assessment for water treatment efficiency, Potential uses of biomass produced in constructed wetlands, Case studies on wetland restoration projects and constructed wetlands, Wetland conservation and management, Sustainable use of wetlands.</p> <p>Field studies on characteristics of selected wetlands and identification of potential threats and impacts.</p>			
Teaching /Learning Methods: A combination of lectures, laboratory and field studies, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Assignments 20% Practical course work 10%		Theory (%) 70%	Practical (%) NA Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Keddy, P. A. (2010). Wetland Ecology: Principles and Conservation. Cambridge Uni. Press. 2. Mitsch, W. J. & J. G. Gosselink (2007). Wetlands. Wiley. 3. Selected current review papers published by reputed publishers. 4. Wetland site report series, Central Environmental Authority, Sri Lanka. 			

Semester	8		
Course code	ZOOL 42692		
Course Name:	Marine and Coastal Resource Management		
Credit Value:	2		
Core/Optional	Optional		
Pre requisites	ZOOL 22543		
Co-requisites	None		
Hourly Breakdown	Theory	Practical	Independent Learning
	22	16	62
Course Aim/Intended Learning Outcomes:			
After completion of the course unit, the student will be able to;			
<ul style="list-style-type: none"> ➤ discuss the ecological and economical importance of marine and coastal production systems, ➤ describe the major threats to marine and coastal production systems and the methods used to manage the threats, ➤ discuss the role of international conventions, government, NGOs and local coastal communities on the management and sustainable utilization of marine and coastal resources, and ➤ assess the integrated coastal zone management practices in selected coastal regions through field surveys. 			
Course Content:			
Critical appraisal of the marine and coastal production systems including the Open sea, Coral reefs, Mangroves, Sea grass beds, Estuaries and lagoons, Marshes, Sand dunes and Associated terrestrial forests and their ecological and economic importance. Impacts of anthropogenic activities including Coastal tourism, Sewage outfalls, Oil spills, Aquaculture, Global warming, Maritime transport and ballast water disposal, Coral mining and over-fishing on coastal production systems. Natural events including Tsunamis and tidal waves on coastal production systems. Marine pollution Prevention Act of Sri Lanka, Use of remote sensing and mapping on the evaluation and assessment of coastal resources, Environmental impact assessment on marine and coastal systems, Participation and role of the government, NGOs and the coastal communities in the sustainable utilization, management and governance of coastal resources. Economics and environmental politics of coastal natural resources. Revenue-generation mechanisms in coastal production systems, Coastal erosion, Marine protected areas. Principles and practice of integrated coastal zone management (ICZM). Incentives for coastal resources management and conservation. Field surveys and report preparation on the sustainable utilization, management and governance of coastal resources in selected coastal regions in Sri Lanka.			
Teaching /Learning Methods: A combination of lectures, field surveys, assignments, self-studies, computer based learning, and small group discussions.			
Assessment Strategy: Continuous assessment and end of course examination.			
Continuous Assessment 30%		Final Assessment 70%	
Details: Assignments 20% Practical course work 10%		Theory (%) 70%	Practical (%) NA Other (%) (specify) NA
Recommended reading:			
<ol style="list-style-type: none"> 1. Central environmental Authority, Sri Lanka (1994). Wetlands are no wastelands; A manual and strategy for conservation and development of wetlands. Wetlands conservation project, Central environmental Authority, Sri Lanka. 2. Clark, J. R. (1995). Coastal Zone Management Handbook. CRC press, 1st edition, 720 pages. 			

3. Clark, R. B. (2001). Marine Pollution, Oxford University Press, 5th edition, 248 pages.
4. Conservation management plan, Muthurajawela marsh and Negombo Lagoon (1994). Wetlands conservation project, Central environmental Authority, Sri Lanka.
5. Conservation management plan, Mundel lake and Puttalam corridor channel (1994). Wetlands conservation project, Central environmental Authority, Sri Lanka.
6. Dobson, M. & C. Frid (2009). Ecology of Aquatic Systems. Oxford University press. 2nd edition. 336 pages.
7. Frid, C. & M. Dobson (2013). Ecology of Aquatic Management. Oxford University Press. 2nd edition. 352 pages.
8. Kidd, S., A. Plater & C. Frid (2011). The Ecosystem Approach to Marine Planning and Management. Published by Routledge. 1st edition. 230 pages.
9. Tucker, C. S. & J. A. Hargreaves (2008). Environmental Best Management Practices for Aquaculture. Wiley-Blackwell, 1st edition. 592 pages.
