

SACRED HEART COLLEGE (AUTONOMOUS)

Department of Aquaculture

Master of Aquaculture and Fish Processing

Course plan

Academic Year 2015 - 16

Semester 1

SACRED HEART COLLEGE THEVARA , KOCHI

Course Plan – Post Graduate Programme-2015

Programme : M Sc Branch : Aquaculture and Fish Processing

Semester : 1 Course Code : ACT101

Course Title ; Taxonomy and Biology of Commercial and Cultivable Fin fish and Shell fish

Term – 1 (before I Internal Test)

Sl.No.	TOPIC / MODULE	No. of hours	Method of Teaching	Teacher / Invited Persons
	Biosystematics.			
	Module I: : Biosystematics			
1	Hierarchy of categories and higher taxa.	1		Binish C.P.
2	Taxonomy, procedure-collection, preservation.	1		
3	Taxonomy character of different kinds	1	Lectures, Assignments and Seminars	
4	Quantitative analysis of variation, process typification, different zoological types and their significance	2		
	Module II. Methods of biosystematics			
5	Classical and modern methods- typological, phonetic, evolutionary, phylogenetic cladistic and molecular taxonomy .	2		
		2		

6	International code of zoological nomenclature (ICZN), rules and formation of scientific names of different taxa concept of species taxonomic diversity within species			
7	Molecular phylogeny-use of proteins, DNA and RNA phylogentic trees	1		
	Taxonomy and biology of commercially important fin fishes and shell fishes			
	Module 1. Taxonomy and biology of commercially important fin fishes and shell fishes			
8	Commercially important fin fishes	3		K.R.Sangeetha
9	Commercially important shell fishes	3		Binish C.P.
10	Study of morphological characters and grouping up to species	2		
11	Study of scales, skin, teeth and fins and their use in taxonomy of fin fishes.	2		
	Module1 :Distribution of commercially important fin fishes and shell fishes			
12	Distribution of commercially important fin fishes and shell fishes in Indian and other parts of the world	7		V.C.George
	TERM II (40 % of syllabus)			
	Module2 : Digestive system:			K.R.Sangeetha

13	Digestive system:, Structure and function of digestive system and associated glands.	7		Binish C.P.
14	Food and feeding habits of finfishes ,prawns and bivalves, relative gut length	3		K.R.Sangeetha Binish C.P.
	Module3 :Respiratory system:		Lectures, Assignments and Seminars	
15	Structure and function of respiratory system and accessory respiratory organs in fin fishes	5		Binish C.P.
16	Respiration in prawns and bivalves	5		K.R.Sangeetha
	Module4:Circulatory systems :			
17	Structure and function of circulatory system	8		Binish C.P.
18	Blood pigments and its functions.	2		K.R.Sangeetha
	Module5 : Osmoregulation and Excretion:			
19	Osmoregulation, osmoregulatory organs in fin fishes and prawn and bivalves	4	Lectures, Assignments and Seminars	Binish C.P. K.R.Sangeetha
20	Excretion and excretory organs.	3		Binish C.P. K.R.Sangeetha

THIRD TERM (remaining 30 %) (Before the model exam)				

Assignments

	Module6 :Endocrine system:			
21	Structure and function of endocrine organs of fin fishes.	4		Binish C.P.
22	Hormones and their role in fin fishes and shell fishes	1		Binish C.P.
23	Role of hormones in reproduction in fishes and prawns	1		
24	Neuroendocrine system of prawns..	4		K.R.Sangeetha K.R.Sangeetha
25	Excretion as means of osmoregulation	3		
	Module7 :Reproductive system:			
26	Structure and function of reproductive systems of fin fishes and shell fishes	3		Binish C.P.
27	.Gametogenesis, ovulation and fertilization.	3		K.R.Sangeetha
28	Gonadosomatic index. Sex reversal and hermatophroditism	1	Lectures, Assignments and Seminars	
29	Phase of sexual maturity in fishes	3		Binish C.P.
	Distribution of commercially important fin fishes and shell fishes			
	Module1 :Distribution of commercially important fin fishes and shell fishes			
30	Definition of mud banks, wedge bank and parr. Upwelling and its importance to fisheries.	2		Dr.V.C.George
31				

1. Age determination in fishes

	Distributional shifts of fishery stock, climate change.	2		Dr.V.C.George
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2. External morphology of a typical fresh water prawn
3. External morphology of a typical crab
4. Feeding adaptations of fin fishes
5. Eye stalk ablation in shrimp
6. Identification characters of family Penaeidae and Palaemonidae
7. Digestive system of mollusc
8. Gametogenesis in fin fishes
9. Circulatory system of mollusc
10. True endocrine system in crustacean
11. Reproduction in mollusc
12. Nervous system of mollusc

Reference

1. J. R.Norman & W.P.C. Tenison,1963 History of Fishes ,Asian Publishing Hse,Delhi
2. Karl.F. Lagler,John.E. Bardach, Robert R.Miller (1969) Ichthyology ,John Wiley & Sons ,New York
3. Munro I.S.R. (1982) The Marine and Fresh water fishes of India and Ceylon.Sony Reprints Agency,New Delhi
4. Santhosh Kumar and Manju Tembhe(1996) Anatomy and Physiology of fishes ,Vikas publishing co.
5. Kotpal Mollusca
6. Kotpal Arthropoda
7. FAO Sopecies identification key
8. Fish and Fisheries , Kamaleshwar Pandey and J.P.hukla

<p>SACRED HEART COLLEGE THEVARA, KOCHI Course Plan –Post Graduate Programme 2015 Programme :M.Sc Branch : aquaculture and Fish Processing Semester : I Course Code : ACT- 102 Course Title : Biophysics, Instrumentation, Microtechniques, and Research Methodology</p>				
Term -1 (Before I Internal Test) (30% of syllabus)				
Sl.No.	TOPIC/ MODULE	No. of hours (90hrs)	Method of Teaching	Teacher / Invited Persons

1	Biophysics Module 1: Diffusion and Osmosis			Ms. Sangeetha K. R.
2	Diffusion, Kinetics of diffusion,	5		"
3	concentration gradient and Fick's Law.			"
4	Diffusion coefficient, stocks-Einstein equation, electrical gradient, pressure gradient and	5		"
5	Graham's Law, Gibbs-Donnam equilibrium, Facilitated diffusion. Osmosis, Vant Hoff's Law, Osmotic concentration and osmotic pressure. Biological significance of osmosis in fishes.	2.5		"
		2.5		
6	Module II Biophysics of cell membrane :		Lectures , Assignments	"
7	Physical-chemical	1	"	"
8	properties of cell membrane.	3	"	"
9	Conformational properties of membrane,	1	"	"
10	membrane receptors, factors affecting the passage of materials across cell membranes.		"	

	Artificial membranes.			
11	Instrumentation. Module I		Lectures , Assignments	"
12	Colorimetry and spectrophotometry Colorimetry, spectrophotometer	2		"
13	(U.V. visible, infrared and double beam),	2		"
14	pH and Eh meter. Oxygen and temperature probe,	2		"
15	conductivity meter, salinometer and refractometer. Atomic absorption spectrophotometer. Module II Protein purification : Basic methods involved in protein purification.	1		"
Term –II (40 % of Syllabus)				
16	Acoustic and electronic equipments for behavioural studies.	2	Lectures , Assignments	Ms. Sangeetha K. R.
17		2		
18	Flourimetry, flame photometry and NMR.	2	"	"
19	Chromatography, adsorption and partition chromatography ion exchange and affinity chromatography.	2	"	"
20		4		"
21		3		

22	Gas liquid and high performance (pressure) liquid chromatography, gel filtration	3		"
23	chromatography.	2		"
24	Module III	3		
25	Electrophoresis : General principles and different gel materials for electrophoresis. Different electrophoresis, different methods of electrophoretic techniques. Isoelectric focusing. ModuleIV Microscopy: Principles of microscopy. Bright field, dark field and phase contrast microscopy. Fluorescence microscopy, microphotography. Electron micrograph, principles of electron microscopy.	3		"
26	Ultra structure studies using electron microscopy.	2	Lectures , Assignments "	Ms. Sangeetha K. R.
27	Micro techniques Module 1- Micro techniques Fixation of invertebrates and vertebrates, fixation	4	Lectures , Assignments	Ms. Sangeetha K. R. "

28	of tissues, organs, larvae and embryos, isolated cells and bacteria. Dehydration methods, embedding, clearing and sectioning, including cryosectioning.	4		"
Term –III (remaining 30 %) (before the model exam)				
29	Staining of sections, preparation of whole mounts.	3	Lectures , Assignments	Ms. Sangeetha K. R.
30	Histochemical methods for location of carbohydrates, lipids and protein fixation and processing of tissues for electron microscopy studies.	4	"	"
31	Research methodology	3	"	Dr. Jose Joseph
32	Module I: Introduction of Research methodology:	3		"
33	Meaning and importance of research, Types of research-selection and formulation of research problem.	2		"
34	Research design-need-features, different research designs, concepts relating to research design.	3		Dr. Jose Joseph

35	Analysis of literature review, primary and secondary sources, web sources-critical	3		Dr. Jose Joseph
36	literature reviews. Module II data collection and analysis:	3		"
37	Collection of primary and secondary data, selection of appropriate methods of data collection, data preparation, important steps, types of analysis. Module II: Interpretation and report writing. Meaning of interpretation, techniques of interpretation, and precautions in interpretation. Significance of report writing, different steps in report writing. Types of reports; technical and popular. Lay out of research report preliminary pages, main text, and end matter. Reproduction of published materials-plagiarism-citation and acknowledgement, reproducibility and accountability.	3		"

Assignment.

1. Properties of cell membrane.
2. Protein purification.
3. Methods and processing of tissues for electron microscopy.
4. Methods of fixing tissues.
5. Application of remote sensing in fisheries.
6. Colorimetry and spectrophotometry.
7. Methods of electrophoretic techniques.
8. Electron microscopy.
9. Histochemical methods for locating lipids.
10. Histochemical methods for locating carbohydrates.
11. Principles of electron microscopy.
12. Physio- chemical and conformational properties of cell membrane.

SACRED HEART COLLEGE THEVARA , KOCHI

Course Plan – Post Graduate Programme

Programme : M Sc Branch : Aquaculture and Fish Processing- 2015

Semester : 1 Course Code : ACT 103

Course Title : Biostatistics and Computer Applications

Term – 1 (before I Internal Test) (30% of syllabus)

Sl.No.	TOPIC / MODULE	No. of hours	Method of Teaching	Teacher / Invited Persons
1.	<p><u>Biostatistics.</u></p> <p>Module I Measures of central tendencies and dispersion.</p> <p>Introduction, Mean and combine arithmetic mean.</p>	5hrs	Lectures, Assignments and Seminars.	H.Krishna Iyer
2.	<p>Median, Mode.</p> <p>Measures of Dispersion Range, Quartile deviation, Mean deviation, Standard deviation.</p> <p>Variance, Relative measures of dispersion.</p> <p><u>Computer Application</u></p> <p>Module I: Introduction to computers</p> <p>Functions and components, characteristics of computers;</p>	3hrs 2hrs 2hrs	“ “	“ Shybe Telson

4.	generation of computers, types of computers. Computer system organization- Hardware and Software.	3hrs	“	
	Types of languages, programming concepts, memory (brief account only);	2hrs	“	“
5.	Recent developments in input-output devices.	3hrs	“	
	Commercially used storage devices-hard disc floppy disc, CD, flash memory.	1hr		“
	Advances in microprocessor technology, Operating system-a comparative study.	2hrs		
	Correlation, Kinds of correlation, degree of correlation, types of correlation.	2hrs		
	TERM II (Before II Internal Test) 40% of syllabus			
3	Biostatistics. Module II Correlation and Regression analysis Graphic method of correlation analysis, scatter diagram, simple graph (correlogram). Mathematical methods, Kari Pearson’s coefficient of correlation, Spearman’s rank correlation. Regression, Types of regression, methods of regression, study of basic static softwares like SPSS and RSM.	3hrs 4hrs 4hrs	“ “ “	H.Krishna Iyer “ “

4	<p>Computer Application</p> <p>Module II -Computer and communications</p> <p>MS Office.</p> <p>MS word.</p> <p>MS excel.</p> <p>MS power point.</p> <p>Photoshop, Page Maker.</p> <p>Analysis of variance and Co-variance.</p> <p>Basic concepts in sampling and estimation of marine fish landings.</p> <p>Test of significance, normal, t, chi square and F test,</p>	2hrs 2hrs 2hrs 2hrs 2hrs 4hrs 3hrs 8hrs	“ “	“ Shybe Telson
THIRD TERM (Before the model exam) 30% of syllabus				
6	<p>Biostatistics</p> <p>Module III Concepts in sampling</p>	8hrs		

7	Probability. Measures of probability, theorems, probability	7hrs	Lectures, Assignments and Seminars	H.Krishna Iyer
	Distribution- binomial, poisson and normal.	2hrs	“	
	Basic concepts in design of experiments.	1hr		
	Introduction to bioassay.	2hrs	“	“
	Fundamentals of population dynamics.		“	Shybe Telson
	Computer Application			
	Module II -Computer and communications	4hrs		
Network, internet, World Wide Web, email.	3hrs			
	www.Fishbase-org . P.h.stat			

Assignment

1. Programming languages.
2. Utility of MS WORD.
3. Statistical functions in a spread sheet.
4. Regression analysis.
5. Data processing by computer.
6. Sampling procedure in estimation of marine fish landings.
7. Statistical packages.
8. Salient features of MS EXCEL.
9. Salient features of MS POWER POINT.
10. Salient features of MS Access.
11. Correlation.
12. Types of printers.

SACRED HEART COLLEGE THEVARA , KOCHI
 Course Plan – Post Graduate Programme - 2015
 Programme : M Sc Branch : Aquaculture and Fish Processing
 Semester : 1 Course Code : ACT104
 Course Title : Aquaculture Engineering

Term – 1 (before I Internal Test)

Sl.No.	TOPIC / MODULE	No. of hours	Method of Teaching	Teacher / Invited Persons
1	<p>Module I Water source ,supply and control Water hydrology, run-off and utilization, factors affecting run-off, qualitative and quantitative water requirements. Canal water and tide water comparisons, conditions of stability of bunds, dykes etc. Fluid pressure and its measurements, hydrodynamics, rate of discharge and types of flows.</p> <p>Module II Properties of physical and mechanical soil Types of soils, structure and textural classification Gram size distribution, bearing strengths, methods of physical and mechanical analysis and their impact on qualitative appraisal of soils.</p> <p>Modul IV Site selection, survey and farm layout Analysis of sites and factors important in site selection, importance of engineering survey in layout and construction, methods of survey necessity of topographic map, micro level surveys and their comparison lay out of different farms and their relative advantage Farm design, estimation, construction and maintenance.</p>	9	Lectures, Assignments and Seminars	Mathew M.John
		10		Mathew M.John
		8	Lectures, Assignments and Seminars	Asha Babu R
	TERM II (Before II Internal Test)			
4	<p>Module I Water source ,supply and control Discharge measurement notches, weirs flumes and related measuring devices, flow through pipes and nozzles, flow through open channels of different shapes.</p>	8		Mathew k

5	<p>Principles of waves and currents, water flow and control structures; monks, spillways, sluice gates, water flow and level measurement.</p> <p>Module II Properties of physical and mechanical soil Physicochemical properties and their impact on construction and maintenance of ponds</p>	5	Lectures, Assignments and Seminars	Asha Babu R
6	<p>Module III Equipments and selection of materials Selection of materials for enclosure, support, retention and other structures based on their physical, mechanical, thermal and chemical properties.</p> <p>Earth moving equipment, work, power, energy efficiency, elastic properties, hand tools, manually and mechanically operated equipment.</p>	10	Lectures, Assignments and Seminars	Asha Babu R
7	<p>Module V Design consideration for farms for various ecosystems Design and construction of hatcheries and nurseries , design and layout , material selection and construction ,</p>	13		Mathew k
THIRD TERM (Before the model exam)				

6	Module I Water source ,supply and control Bernoulli's equation and its application. Storage tanks, types, fittings and accessories, water requirement calculations. Types of corrosion including stress cracking and development of brittleness, fouling and their control.	8	Lectures, Assignments and Seminars	Mathew. K
7				Mathew.K
8	Module III Equipments and selection of materials Principles, operation and maintenance of pumps, blowers, compressors wind and solar energy systems, principles, operation and maintance of filters and aerators.	10	Lectures, Assignments and Seminars	Asha Babu R
	Modul IV Site selection, survey and farm layout Ponds, rafts, rackes, long lines, cages, pens and their designs. Pond dimension orientation access ways and structures. Site selection for hatcheries; survey and location of suitable sites for hatcheries	7		
	Module V Design consideration for farms for various ecosystems Rearing facilities ,aeration.	2		

Assignments

1. Site selection for aquaculture farms
2. Corrosion
3. Biofouling and its control
4. Design and working of gravity sand filter
5. Pond scaling
6. Facilities required for a shrimp hatchery

7. Principle and methods of engineering surveys for farm construction
8. Different types of pond used in aquaculture
9. Importance of survey in layout and construction of farms
10. Types of soil suitable for aquaculture
11. Different types of machinery and equipments used in aquaculture farms
12. Different earth moving equipments

Reference

1. Thomas B.Lawson, Fundamentals of Aquaculture Engineering
2. Wheaton ,F.W. Aquaculture Engineering
3. Bose et.al Coastal Aquaculture Engineering
4. Aquaculture Engineering published by FAO
5. Pillay ,T.V.R. and Kutty M.N. Aquaculture Principles and Practices