

SACRED HEART COLLEGE (AUTONOMOUS)

Department of Aquaculture

Master of Aquaculture and Fish Processing

Course plan

Academic Year 2015 - 16

Semester 2

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*ICT enabled, Lecture method (conventional)

Term – III – 30 % of the syllabus (before the model examination)					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	<p>Module III Aquatic Biology.</p> <p>Ecological energetic of ponds. Effect of organic/inorganic fertilizers on pond productivity. Carrying capacity of culture systems. Lotic and lentic aquatic systems. Mud banks and monsoon trawling. Eutrophication.</p> <p>Module II Aquatic Microbiology</p> <p>Pathogenic bacteria in culture systems. Role of microbes in regeneration of nutrients and hydrogen sulphide production in ponds, special groups of bacteria relevant in culture systems.</p> <p>Module IV Aquatic environment and Fisheries Oceanography Objective, scope and relation to fishery science, major oceans, chemical composition of sea water.</p>	<p>6hrs.</p> <p>10hrs.</p> <p>6hrs.</p>	<p>Dr. T.V. Anna Mercy</p> <p>Dr. Sanjeev</p> <p>Dr. V.C.George</p>	<p>ICT enabled, Lecture method (conventional)</p>	<p>Smith .E.I.et al .(1983) Principles of Biochemistry General Aspects McGraw –Hill Book Company, New Delhi.</p>

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Assignments: 11

1. Rivers of Kerala and scope of fish culture in rivers
2. Carrying capacity of a pond.
3. Sludge accumulation and fish culture
4. Factors affecting the productivity of a fresh water fish pond
5. Present status & future prospects of fresh water fish culture in Kerala
6. Aerobic and Anaerobic degradation of organic matter in fresh water fish ponds
7. Role of Macro and micro benthos in culture ponds
8. Major estuaries of India
9. Physic chemical characteristics of marine environment
10. Effect of trawl ban on the fisheries of Kerala
11. Chemical composition of sea water
12. Mud banks and monsoon trawling

SACRED HEART COLLEGE THEVARA, KOCHI

Course Plan –Post Graduate Programme

Programme : **MSc Branch – Aquaculture and Fisheries**

Semester: **SEMESTER II-ACT 202: Biochemistry and Nutrition of fin fish and shell fish**

Term – I (Before I Internal tests) – 30 % of the syllabus					
Sl No	Topic/Module	Hour / session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
1	<p>Module I: Prerequisites: Atoms, bonds, concepts of PH and buffers.</p> <p>Carbohydrates: classification, monosaccharides, reaction of monosaccharides with acid and alkali. Disaccharides, Oligosaccharides and Polysaccharides.</p>	7hrs.	Dr. P.M. Sherief	ICT enabled, Lecture method (conventional)	Lehinger, A.I, Nelson D.J., and Cox, M.M. 2000. Principles of Biochemistry.Worth Publishers
2	<p>Module II: Lipids. Classification, General properties, Oxidation, iodine number, Fatty acids: Classification of saturated and unsaturated, PUFA, MUFA, Simple lipids, Compound lipids phospholipids, Glycolipids, Spingolipids. Steroids, Cholesterol, Prostaglandins. Metabolism of lipids: fatty acid break down, fatty acid synthesis</p>	10 hrs	Dr. P.M. Sherief	Do	Voet D and Voet ,I .G.(1990)Biochemistry ,John Wiley and sons , New York.
3.	<p>Module VI: Nutritional physiology. Principles of nutrition. Adaptations to various types of feeding in finfish, crustaceans and molluscs. Mechanism of food capture, nutritional bioenergetics in finfish and shellfish.</p>	8hrs	Sangeetha K.R	Do	

	Nutritional requirements: Gross protein requirements, nitrogen balance; essential and non essential amino acids and their quantitative requirements, protein quality and sources				
	Module III: Proteins .:Amino acids,	2			

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Term – II – 40 % of the syllabus (before the second Internal tests)					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
4	Module III: Proteins . structural organisation of proteins. Globular and fibrous proteins. Metabolism of proteins	6hrs	Dr. P.M. Sherief	Do	Lehinger, A.I, Nelson D.J., and Cox, M.M. 2000. Principles of Biochemistry.Worth Publishers
5.	Module IV: Enzymes . Enzyme classification. Enzyme kinetics Types of enzyme inhibition. Isoenzymes, co-enzymes.	8hrs.	Dr. P.M. Sherief	Do	Lehinger, A.I, Nelson D.J., and Cox, M.M. 2000. Principles of Biochemistry.Worth Publishers
6	Module VI lipids, their functions; essential fatty acids, phospholipids and sterol requirements; protein sparing action of lipids, negative aspects of lipids, carbohydrates; their sources and utilization. Water and fat soluble vitamins; their positive functions, minerals, recommended dietary allowances, deficiency and hyper dosage syndromes.	7hrs	Dr. P.M. Sherief & Sangeetha K.R.	Do	Smith .E.I.et al .(1983) Principles of Biochemistry Geneal Aspects McGraw –Hill Book Company, New Delhi.
7	Module VII: Feed ingredients Classification of feed stuff . Antinutritional factors in feed	10hrs.	Sangeetha K.R.		Recent advances in fin fish and shell fish nutrition ,CMFRI

	<p>ingredients and their effect on finfish and shell fish. Additives in fin fish and shell fish.</p> <p>Feed formulation strategies and methods. Feed manufacture process; storage and quality control of feeds.</p>				
8	<p>Module V: Nucleic acid Nucleotides. Replication of DNA, transcription and translation process.</p>	5hrs	Dr. P.M. Sherief	ICT enabled, Lecture method (conventional)	Lehinger, A.I, Nelson D.J., and Cox, M.M. 2000. Principles of Biochemistry.Worth Publishers

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Term – III – 30 % of the syllabus (before the model examination)					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
9	<p>Module V: Nucleic acids. Bases and sugars</p>	2	Dr. P.M. Sherief	ICT enabled, Lecture method (conventional)	Lehinger, A.I, Nelson D.J., and Cox, M.M. 2000. Principles of Biochemistry.Worth Publishers
10	<p>Module VII Larval nutrition- Nutritional requirements of finfish, crustacean and molluscan larvae.</p> <p>Nutritive value of phytoplankton and their mass culture. Nutritive value of cladocerans and rotifers; their mass culture. Live and artificial feed , nutritive value of artemia ; their mass culture and cyst production; micro diets for larvae. Recent advances in larval nutrition.</p>	10hrs.	Sangeetha K.R		
11	<p>Module VIII: Feed management. Feeding strategies. Chemical</p>	15hrs.	Sangeetha K.R.		

	methods of evaluation; biological methods of evaluation. PER,BV,NPU,NPR,FCR/ECR.Feed dispensing methods.				
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*ICT enabled, Lecture method (conventional)

Assignments

1. Enzyme inhibition
2. Protein quality, and sources, nitrogen balance and gross protein requirements
3. Essential fattyacids, phospholipids and sterol requirements
4. Recommended dietary allowances of minerals and its functions
5. Hyper and hypo dosage syndromes of vitamins
6. Hyper and hypo dosage syndromes of minerals
7. Nutritional requirements of brood stock and factors influencing nutritional requirements
8. Mass culture of micro algae
9. Feeds and feed management in sustainable shrimp farming
10. Feeding strategies of larvae and post larvae in hatcheries and nurseries
11. Vitamins and their functions in nutrition of fishes
12. Classification of lipids and their role in aquaculture nutrition

SACRED HEART COLLEGE THEVARA, KOCHI

Course Plan –Post Graduate Programme 2015

Programme :M.Sc Branch : aquaculture and Fish Processing

Semester : II Course Code : ACT- 203

Course Title : **Physiology and pathology of fin fish and shell fish**

Term -1 (Before I Internal Test) (30% of syllabus)

Sl.No.	TOPIC/ MODULE	No. of hours (90hrs)	Method of Teaching	Teacher / Invited Persons
1	Physiology Module 1: Physiology. Physiology of respiratory, circulatory system.	4	Lectures , Assignments	Asha Sabu
2	Digestive system.	1	"	"
3	Excretory and Osmoregulation.	4		
4	Hormonal control of osmotic regulation.	6		
5	Organisation of the neurons and neuromuscular system. Mechanism of the neurons and neuromuscular system.	5		
6	Mechanism and biology of neuron co ordination.	1		
7	Sense organs-receptive mechanisms and effector systems.			

8	Biological rhythm. Ecophysiology,	2		
9	Environmental requirements, effect of salinity, oxygen and other abiotic factors for metabolism.	1		
10	Molting and growth.	1		
11	Effect of environmental factors on acid base regulation and biotic interactions.	1		
		1		
Term –II (40 % of Syllabus)				
	Endocrinology	30hrs		
	Module II: Endocrinology		Lectures , Assignments	
12	General morphology, structure and function of neurosecretory system .	2		Asha Sabu
			"	"
13	Reproductive systems and secondary sexual characters, process of gametogenesis.	2		"
			"	"
14	Neuroendocrine control of reproduction.	2		"
			"	"
15	Hermaphroditism, parasitic castration,	2		
16	Endocrine system of fishes - their organization, morphology and structure	2		
16	Organization, morphology Neurosecretory system structure of sinus gland complex . 'x' organ, 'y' organ and androgenic gland.	3		
		2		

17	Neurosecretory cells in molluscs.			
18	Pituitary and endocrine organs of fish, pituitary hormones- Their storage, release and control of reproduction.	2		
19	The chemical aspects of hormone action: Molting, growth and reproduction in crustaceans.	2		
20	Induced maturation and spawning in finfish, crustaceans and mollusks.	2		
21	Induced ovarian maturation and spawning through physical, chemical and biological method.	2		
22	Use of hormonal analogues, Hypophysation in finfish.	2		
23	Eyestalk ablation techniques-its principles and application in crustacean hatcheries.	2		
	Pathology.			
	Module I: Pathology.	2		
24	Introduction. Definition of terms, classification of disease, causes of diseases, aetiology.			
25	Role of abiotic and biotic factors, Intrinsic factors, generic, species and strain; extrinsic factors environment, nutritional status, role of stress in disease process.	2		

26	Microbial disease- Viral, Bacterial and Fungal Diseases and their control	2		
27	Nutritional disease, toxic diseases, prophylactic and control measures, biological and chemical treatment of disease.	2		
		3		
Term –III (remaining 30 %) (before the model exam)				
	Pathology.		Lectures , Assignments	Asha Sabu
	Module I: Pathology.		"	"
28	Nonspecific immunity: agglutinin and precipitins, C-reactive protein, complement in fish, phagocytosis:	3	"	"
29	Acquired immunity; cell mediated immunity-Role of thymus, T-cell; receptors.	3		
30	Mechanism of cell mediated immunity, cytokines, T-helper function, role of macrophages, recirculation and ecotaxis of T-cell; T-cell markers.	3		
31				
32	Humoral immunity-origin of B-cell, differentiation of B-cells into plasma cells, T and			

33	B-cell interaction, antigenic stimulation; memory cells, Structure of antibody; types of antibody; types of antibodies produced in fish.	3 1		
34	Immunization in fish and vaccination.			
35	Basic vascular and cellular alterations, disturbance in circulation	1 2		
36	cell metabolism and cell growth, necrosis, inflammation; defenses of the body against injury, healing and neoplasms.	2		
37	Parasitology. Parasitic diseases and their control	5		
38	Integrated disease management.	2 2		

Assignment.

1. Bacterial diseases of fish.
2. Vaccination in aquaculture.
3. Homeostasis in fish.
4. Integrated disease management.

5. Viral diseases of fish.
6. Nutritional diseases in fishes.
7. Induced breeding in fishes.
8. Molting and growth in prawns.
9. Endocrine control on reproduction.
10. Gametogenesis in fish.
11. Basal metabolic rate in fishes.
12. Effects of environmental factors on acid base relation.

SACRED HEART COLLEGE THEVARA, KOCHI

Course Plan –Post Graduate Programme 2015

Programme: M.Sc. Aquaculture and Fish Processing

Semester: SEMESTER IV-ACT204: Genetics and Bio-technology of finfish and shellfish

90hrs

Term – I (Before I Internal tests) – 30 % of the syllabus					
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching	Remarks: Books, reference etc
	Module I Introduction to genetics	27	Dr. Mohita		
1.	Introduction to genetics		“	ppt	1.Gall G.A.E & Busak, C.A (1986). Genetics in Aquaculture
2.		2	“	“	
3.	Practical application of Mendelian Genetics		“	“	
4.		4	“	“	
4.	Fish cytogenetics, principles of genetics techniques in cyto genetics		“	“	
5.	Evolution of fish karyotypes sex linked genes and sex limited phenotypes,	3	“	“	
6.	quantitative phenotypes, pleiotropy, recent trends in genetic mutations	4	“	“	
7.					2.Collin, E.(1993). Genetics and Fish breeding

8.	Types of mutations and mutagens				
9	Gene expression and regulation.				
	Genetic improvement.	2			
	Need for genetic improvement inheritance, inbreeding and cross breeding selection methods, basis of selection and its effects.	2			
	Hybridisation: Types of hybridisation, naturally occurring and artificially produced cyprinid hybrids.	1			
	Cultural traits of hybrids.	4			
		5			

Term – II – 40 % of the syllabus (before the second Internal tests)					
	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books, reference etc
	Module I Introduction to genetics	23	Dr. Mohita	ppt	
10.	Genetic manipulation: Sex-reversal and sex control, role of steroids in sex reversal, chromosomal manipulate, polyploidy.	5	“	“	
	Androgenesis and Gynogenesis, cryopreservation of gametes, gametic manipulation.		“	“	
11.	Genetic engineering: General principles of genetic engineering, recombinant DNA and gene cloning methods, restriction.	4	“	“	
	Modification enzymes, PCR, sequencing, DNA, fingerprinting, recombinant vaccines, transgenic fish, gene transfer.		“	“	
12.	Module II Biotechnology in aquaculture	6	“	“	
	Biotechnology in aquaculture.		“	“	

13.	<p>Introduction to tools and techniques in modern biotechnology.</p> <p>Different types of probiotics. Use of probiotics and biofertilization in aquaculture.</p>	8	“		
14.		3			
15.		5			
16.		5			

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	Term – III – 30 % of the syllabus (before the model examination)				
Sl No	Topic/Module	Hour/ session	Teacher/invited persons etc.	Method of teaching *	Remarks: Books,

					reference etc.
	Module II Biotechnology in aquaculture	27	Dr. Mohita	ppt	
17.		4			
18.	Immunostimulants used in aquaculture.	4	"	"	
19.	Bioremediation in aquaculture systems.				
		12	"	"	
20.	General principles of cell and tissue culture, culture of primary cells secondary culture (subcultures) and cell lines, Fish cell culture development of cell lines and their applications.	7			
	Solid state Fermentation, disease diagnosis using PCR.				

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Assignments

1. Bioremediation in aquaculture farms
2. Use of probiotics in aquaculture
3. Androgenesis and gynogenesis
4. Modification enzymes
5. Genetic manipulation
6. Solid state fermentation
7. Genetic engineering

8. Recombinant DNA
9. Hybridization
10. Fish cytogenetics
11. Cryopreservation
12. Polyploidy