SACRED HEART COLLEGE (AUTONOMOUS)

Department of Aquaculture

MSc Aquaculture and Fish Processing

Course plan

Academic Year 2018-19

Semester 1

	PROGRAMME OUTCOMES
PO 1	Exercise their critical thinking in creating new knowledge leading to innovation, entrepreneurship and employability
PO 2	Effectively communicate the knowledge of their study and research in their respective disciplines to their stakeholders and to the society at large.
PO 3	Make choices based on the values upheld by the institution, and have the readiness and know-how to preserve environment and work towards sustainable growth and development.
PO 4	Develop an ethical view of life, and have a broader (global) perspective transcending the provincial outlook.
PO5	Explore new knowledge independently for the development of the nation and the world and are able to engage in a lifelong learning process.

PROGRAM SPECIFIC OUTCOMES	
PSO 1	Understand the taxonomy and biology of cultivable fin fishes and other organisms.
PSO 2	Understand the ecology and cultural practices of cultivable fin fishes, shell fishes, sea cucumber, seaweeds and various engineering principles applied to aquaculture structures.
PSO 3	Understand the harvest and post harvest technology of aquaculture organisms.
PSO 4	Demonstrate their awareness of the Nutrition, physiology and pathology of aquaculture organisms.
PSO 5	Apply of statistical and computer tools in relevant research field pertaining to aquaculture.

COURSE STRUCTURE

Course Code	Title of the Course	No. Hrs./ Week	Credits	Total Hrs./ Sem
P1AQCT01	Taxonomy & biology of commercial and cultivable fin fish and shell fish	4	4	72
P1AQCT02	Biophysics, instrumentation, microtechniques and research methodology	4	4	72
P1AQCT03	Biostatistics and computer applications	4	4	72
P1AQCT04	Aquaculture engineering	3	3	72
P1AQCP01	Taxonomy & biology of fin fish and shell fish	5	2	72
P1AQCP02	Instrumentation, microtechniques, Biostatistics ,computer applications & Aquaculture Engineering	5	2	72

COURSE PLAN

PROGRAMME	**MASTER OF AQUACULTURE AND FISH PROCESSING**	**SEMESTER**	**1**
COURSE CODE AND TITLE	**P1AQCT01 &TAXONOMY & BIOLOGY OF COMMERCIAL AND CULTIVABLE FIN FISH AND SHELL FISH**	**CREDIT**	**4**
HOURS/WEEK	**4**	**HOURS/SEM**	**72**
FACULTY NAME	**LEENA RAPHAEL & SANGEETHA.K.R.**		

	COURSE OUTCOMES	**PO/ PSO**	**CL**
CO1	Identify the commercially important fin fish and shell fish through taxonomic studies and their distribution in Indian waters	PO4 PSO1	An
CO2	Understand the structural , functional and physiological features of digestive system and associated glands in fin fishes and shell fishes	PO4 PSO1	An
CO3	Determine food and feeding habits of fin fish and shell fish	PO4 PSO1	An
CO4	Understand the structural and functional features of circulatory system in fin fishes and shell fishes	PO4 PSO1	U
CO5	Understand the structural , functional and physiological features of respiratory system and accessory organs in fin fishes and shell fishes	PO4 PSO1	U
CO6	Understand the structure , function and role of excretory organs in osmoregulation of fin fishes and shell fishes	PO4 PSO1	U
CO7	Understand the structure and function of nervous system and endocrine system in fin fishes and shell fishes	PO4 PSO1	U
CO8	Understand the structure and function of reproductive system in fin fishes and shell fishes	PO4 PSO1	U

CL* Cognitive Level

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**COURSE OUTCOME**
	MODULE I			
1	Study of external morphology of a typical elasmobranch	PPT	video	CO1
2	Study of external morphology of a typical teleost	PPT/Lecture		CO1
3	Study of external morphology of a typical bivalve	PPT/Lecture		CO1

4	Study of external morphology of a typical gastropod	PPT/Lecture	e-resource	CO1
5	Study of external morphology of a typical cephalopod.	PPT/Lecture		CO1
6	Study of external morphology of a typical prawn	PPT/Lecture		CO1
7	Study of scales	Lecture		CO1
8	Study of skin	Lecture		CO1
9	Study of teeth	Lecture		CO1
10	Study of mouth	Lecture		CO1
11	Study of fins	PPT/Lecture		CO1
12	Uses of scales ,skin, teeth ,mouth &fins in taxonomy of fin fishes	PPT/Lecture		CO1
13	Taxonomy of commercially important Penaeid species	PPT/Lecture		CO1
14	Taxonomy of commercially important Metapenaeid species	PPT/Lecture		CO1
15	Taxonomy of commercially important fresh water prawn species	PPT/Lecture		CO1
16	Taxonomy of commercially important fin fishes of family - Clupeidae	PPT/Lecture		CO1
17	Taxonomy of commercially important fin fishes of family - Engraulidae	PPT/Lecture		CO1
18	Taxonomy of commercially important fin fishes of family:- Serranidae(grouper)	PPT/Lecture		CO1
19	Taxonomy of commercially important fin fishes of family:- Percidae(perch)	PPT/Lecture		CO1
20	Taxonomy of commercially important fin fishes of family:- Cyprinidae	PPT/Lecture		CO1
21	Taxonomy of commercially important fin fishes of family: Pangaciidae	PPT/Lecture		CO1
22	Taxonomy of commercially important fin fishes of family: Siluridae	PPT/Lecture		CO1
23	Taxonomy of commercially important fin fishes of family: Claridae	PPT/Lecture		CO1
24	Taxonomy of commercially important fin fishes of family:Soleidae	PPT/Lecture		CO1
25	Taxonomy of commercially important fin fishes of family:Cyanoglosidae	PPT/Lecture		CO1
26	Taxonomic features of different lobsters	PPT/Lecture		CO1
27	Taxonomy of commercially important fin fishes of families of the orders: Palinuridae	PPT/Lecture		CO1
28	Taxonomy of commercially important fin fishes of families of the orders: Scyllaridae	PPT/Lecture		CO1
29	Taxonomy of commercially important fin fishes of families of the orders:Portunidae	PPT/Lecture		CO1

CIA I				
MODULE II				
30	Structure and function of digestive system of fish	PPT/Lecture		CO2
31	Physiology of digestive system and associated glands in fish	Lecture		CO2
32	Structure and function of digestive system in shrimp and physiology of digestive system	Lecture		CO2
33	Food and feeding habits of shrimp	Lecture		CO3
34	Structure and function of respiratory system in fishes	Lecture		CO5
35	Structure and function of respiratory system in shrimp	PPT/Lecture		CO5
36	Circulatory systems of fishes : Structure and function	PPT/Lecture		CO4
37	Circulatory systems of shrimp : Structure and function	PPT/Lecture		CO4
38	Blood, blood cells, plasma, plasma proteins in fishes	PPT/Lecture		CO4
39	Excretory system of fish : structure and functions,	Lecture		CO6
40	Excretory system of shrimp : structure and functions,	Lecture		CO6
41	Nervous system in fishes	Lecture		CO7
42	Structure and function of endocrine glands in fishes	Lecture		CO7
43	Role of hormone in relation to reproduction in fishes	PPT/Lecture		CO7
44	Structure and function of reproductive systems of fin fishes	PPT/Lecture		CO7
45	Role of hormone in relation to reproduction in prawns	PPT/Lecture		CO7
46	Structure and function of reproductive systems of fin fishes			CO8
47	Neurosecretory cells in crustaceans	PPT/Lecture		CO7
48	Neurohaemal organs in shrimp	PPT/Lecture		CO7
49	True endocrine organs in shrimp	PPT/Lecture		CO7
50	Sense organs in shrimp	Lecture	Quiz	CO7
51	Structure of exoskeleton in shrimp	Lecture	Q & Ans Session	CO1
52	Molting and its steps	PPT/Lecture		CO8
MODULE III				
53	Definition of mud banks, wedge bank and parr. Upwelling and its importance to fisheries.	PPT/Lecture		CO8

54	Distributional shifts of fishery stock	PPT/Lecture		CO7
55	Climate change and its effects on fisheries	PPT/Lecture		CO7
56	Seminar	Lecture	Q & Ans Session	
57	Seminar	PPT/Lecture	Q & Ans Session	
58	Seminar	PPT/Lecture	Q & Ans Session	
CIA - II				
59	Seminar	PPT/Lecture	Q & Ans Session	
60	Seminar	PPT/Lecture	Q & Ans Session	
61	Seminar	PPT/Lecture	Q & Ans Session	
62	Seminar	PPT/Lecture	Q & Ans Session	
63	Seminar	PPT/Lecture	Q & Ans Session	
64	Seminar	PPT/Lecture	Q & Ans Session	
65	Seminar	PPT/Lecture	Q & Ans Session	
66	Seminar	PPT/Lecture	Q & Ans Session	
67	Seminar	PPT/Lecture	Q & Ans Session	
68	Seminar	PPT/Lecture	Q & Ans Session	
69	Seminar	PPT/Lecture	Q & Ans Session	
70	Seminar	PPT/Lecture	Q & Ans Session	
71	Seminar	PPT/Lecture	Q & Ans Session	
72	Seminar	PPT/Lecture	Q & Ans Session	

INDIVIDUAL ASSIGNMENTS/SEMINAR – DETAILS & GUIDELINES

	Date of completion	**Topic of Assignment & Nature of seminar (Individual – Presentation)**	**Couse Outcome**
1	29/9/2018	Lateral line system of fish	CO7
2	29/9/2018	Mechanism and biology of neuron co-ordination	CO7

3	3/10/2018	Hermaphroditism	CO8
4	3/10/2018	Eyestalk ablation	CO8
5	4/10/2018	Defence mechanism and healing in fishes	CO7
6	4/10/2018	Adaptive modification of digestive tract in fishes	CO2
7	5/10/2018	Structure and function of reproductive system in fishes	CO8
8	8/10/2018	Parental care in fishes	CO8
9	9/10/2018	Accessory respiratory organs in fishes	CO5
10	10/10/2018	Digestive system of bivalves	CO2
11	11/10/2018	Osmoregulation in marine fishes	CO7
12	12/10/2018	External morphology of a typical crab	CO1
13	15/10/2018	External morphology of a typical lobster	CO1
14	16/10/2018	Gametogenesis	CO8
15	22/10/2018	Spermatogenesis	CO8
16	23/10/2018	Nervous system in prawn	CO7
17	24/10/2018	Upwelling and its importance in fisheries	CO8
18	25/10/2018	Climate change and its impact in fisheries	CO7
19	26/10/2018	Food and feeding habit of fishes	CO3
20	27/10/2018	Respiration in bivalves	CO5

REFERENCES

- J.R.Norman &W.P.C.Tenison.1963 History of fishes. Asian Publishing House ,Delhi
- Munro I.S.R.(1982) The Marine and Fresh water fishes of Inda and Ceylon.Sony Reprints Agency,New Delhi.
- Santhosh KumaR AND Manju Tembhre(1996)Anatomy and Physiology of fishes .Vikas Publishing co.
- Kotpal Mollusca
- Kotpal Arthropoda

WEB RESOURCE REFERENCES:

- http://www.fao.org/3/w7192e/w7192e00.htm

- https://www.biologydiscussion.com/invertebrate-zoology/phylum-arthropoda/study-notes-on-prawn/33417
- http://www.biozoomer.com/2014/11/palaemon-respiratory-system.html

COURSE 2

PROGRAMME	**MASTER OF AQUACULTURE AND FISH PROCESSING**	**SEMESTER**	**1**
COURSE CODE AND TITLE	**P1AQCT02: BIOPHYSICS, INSTRUMENTATION, MICROTECHNIQUES AND RESEARCH METHODOLOGY**	**CREDIT**	**4**
HOURS/WEEK	**4**	**HOURS/SEM**	**72**
FACULTY NAME	**DR. JOSE JOSEPH**		

	COURSE OUTCOMES	**PO/ PSO**	**CL**
CO1	Understand the principles and operation of octoelectric equipment's in biological research	PO1 PSO2	U
CO2	Create information on biophysics and instrumentation as applied to aquaculture	PO1 PSO2	U
CO3	Evaluate detailed anatomic studies with the help of micro techniques	PO1 PSO2	E
CO4	Understand the basic principles of physiology as applied to aquaculture systems	PO4 PSO2	U
CO5	Understand introduction to research methods as a prelude to research work at higher level.	PO1 PSO2	U

CL* Cognitive Level

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**COURSE OUTCOME**
	MODULE I			
1	Diffusion, Kinetics of diffusion	PPT	video	CO2, CO4
2	Concentration gradient and Fick's Law	PPT/Lecture		CO2
3	Diffusion coefficient	PPT/Lecture		CO2
4	Stocks-Einstein Equation	PPT/Lecture	e-resource	CO2
5	Electrical gradient & pressure gradient	PPT/Lecture		CO2
6	Graham's Law & Vant Hoff's Law	PPT/Lecture		CO2
7	Gibbs-Donnam equilibrium	Lecture		CO2
8	Facilitated diffusion , Osmosis	Lecture		CO2, CO4
9	Seminar	PPT/Lecture	Q.A.	
10	Seminar	PPT/Lecture	Q.A.	
11	Osmotic concentration and osmotic pressure	PPT/Lecture		CO2,CO4
12	Physical and chemical properties of cell	PPT/Lecture		CO2,CO4

	membrane			
13	Conformational properties of membrane	Lecture		CO2,CO4
14	Membrane receptors	Lecture		CO2,CO4
15	Factors affecting the passage of materials across cell membranes	Lecture		CO2,CO4
16	Seminar	PPT/Lecture		
17	Calorimetry	Lecture		CO1 ,CO2
18	Mas spectroscopy	Lecture		CO1 ,CO2
19	Spectrophotmeter (infrared and double beam)	PPT/Lecture		CO1 ,CO2
20	pH meter & Oxygen probe	PPT/Lecture		CO1 ,CO2
21	Seminar	PPT/Lecture		
22	Conductivity meter	PPT/Lecture		CO1 ,CO2
23	Salinometer and refractometer	PPT/Lecture		CO1 ,CO2
24	LC- MS	PPT/Lecture		CO1 ,CO2
25	Mas spectroscopy	PPT/Lecture		CO1 ,CO2
26	Chromatography	Lecture		CO1 ,CO2
27	Seminar	PPT/Lecture	Q.A.	
28	Ion exchange chromatography	Lecture		CO1 ,CO2
29	Affinity chromatography	Lecture		CO1 ,CO2
CIA I				
	MODULE IV			
30	Adsorption chromatography	PPT/Lecture		CO1 ,CO2
31	Partition chromatography	PPT/Lecture		CO1 ,CO2
32	Seminar	PPT/Lecture	Q.A.	
33	Seminar	PPT/Lecture	Q.A.	
34	Seminar	PPT/Lecture	Q.A.	
35	Seminar	PPT/Lecture	Q.A.	
36	General principles of electrophoresis	PPT/Lecture		CO2
37	Different gel materials used for electrophoresis	PPT/Lecture		CO2
38	Isoelectric focusing	Lecture		CO2
39	Principles of microscopy	Lecture		CO2
40	Bright field microscopy	PPT/Lecture		CO2
41	Dark field microscopy	Lecture		CO2
42	Phase contrast microscopy	Lecture		CO2
43	Seminar	PPT/Lecture	Q.A.	
44	Seminar	PPT/Lecture	Q.A.	
45	Fluorescence microscopy			CO2
46	Microphotography	PPT/Lecture		CO2
47	Electron micrograph	PPT/Lecture		CO2
48	Principles of electron microscopy	PPT/Lecture		CO2
49	Ultra structure studies using electron microscopy	Lecture	Quiz	CO2

50	Fixation of invertebrate tissues and organs	PPT/Lecture		CO3
51	Fixation of vertebrate tissues and organs	PPT/Lecture		CO3
52	Dehydration methods	PPT/Lecture		CO3
53	Embedding, clearing and sectioning	PPT/Lecture		CO3
54	Staining of sections	Lecture		CO3
55	Preparation of whole mounts	PPT/Lecture		CO3
56	Fixation and processing of tissues for electron microscopy studies	PPT/Lecture		CO3
57	Seminar	PPT/Lecture	Q.A.	
58	Preparation of permanent slide			CO3
CIA - II				
59	Meaning and importance of research	PPT/Lecture		CO5
60	Types of research-selection	PPT/Lecture		CO5
61	Different research designs, concepts relating to research design.	PPT/Lecture		CO5
62	Analysis of literature review, primary and secondary sources, web sources-critical literature reviews	PPT/Lecture		CO5
63	Selection of appropriate methods of data collection, data preparation, important steps	PPT/Lecture	Video	CO5
64	Meaning of interpretation, techniques of interpretation, and precautions in interpretation	PPT/Lecture		CO5
65	Significance of report writing, different steps in report writing. Types of reports; technical and popular	Lecture	Debate	CO5
66	Lay out of research reports, preliminary pages, main text, and end matter. Reproduction of published materials-plagiarism-citation and acknowledgement, reproducibility and accountability.	Lecture		CO5
67	Seminar	PPT/Lecture	Q.A.	
68	Seminar	PPT/Lecture	Q.A.	
69	Seminar	PPT/Lecture	Q.A.	
70	Seminar	PPT/Lecture	Q.A.	
71	Seminar	PPT/Lecture	Q.A.	
72	Seminar	PPT/Lecture	Q.A.	

INDIVIDUAL ASSIGNMENTS/SEMINAR – DETAILS & GUIDELINES

	Date of completion	Topic of Assignment & Nature of seminar (Individual – Presentation)	Couse Outcome
1	28/9/2018	Permeability of membranes.	CO4

2	28/9/2018	Biological significance of osmoregulation.	CO4
3	29/9/2018	Types and techniques of electrophoresis.	CO1 ,CO2
4	29/9/2018	Acoustic and electronic equipment used for behavioral studies	CO1
5	3/10/2018	Properties of cell membrane.	CO4
6	4/10/2018	Protein purification.	CO2
7	5/10/2018	Methods and processing of tissues for electron microscopy.	CO3
8	8/10/2018	Methods of fixing tissues.	CO3
9	9/10/2018	Collection and analysis of data.	CO5
10	10/10/2018	Fluid mosaic model.	CO2
11	11/10/2018	Different types of microscopic techniques.	CO2
12	12/10/2018	UV- visible spectrophotometer with emphasis on the parts of the instrument.	CO2
13	15/10/2018	Histochemical stains for differentiation and location of macromolecules in cells.	CO3
14	16/10/2018	Principle and application of gel filtration chromatography.	CO1, CO2
15	22/10/2018	Procedures of permanent slide preparation.	CO2
16	23/10/2018	Principle and working of HPLC.	CO1, CO2
17	24/10/2018	Design and problems of research.	CO5
18	25/10/2018	SDS PAGE	CO1 ,CO2
19	26/10/2018	AAS	CO1,CO2
20	29/10/2018	Histochemical method for locating lipids.	CO5

REFERENCES

- Roy.A.N.1996.A text book of Biophysics, New Central Book agency pvt.Ltd., Calcutta.
- Das,D. 1991.Biophysics and Biophysical Chemistry .Academic Publishers, Calcutta.

- Hoppe, et.al.(Eds.)Biophysics, Springer Verlag, Berline

WEB RESOURCE REFERENCES:

- http://www.ewingdigital.com/text_content/115875395635e9fee6bc8286.pdf

COURSE - 3

PROGRAMME	**MASTER OF AQUACULTURE AND FISH PROCESSING**	**SEMESTER**	**1**
COURSE CODE AND TITLE	**P1AQCT03: BIOSTATISTICS AND COMPUTER APPLICATIONS**	**CREDIT**	**4**
HOURS/WEEK	**4**	**HOURS/SEM**	**72**
FACULTY NAME	**KRISHNA IYER AND SHYBI TELSON**		

	COURSE OUTCOMES	**PO/ PSO**	**CL**
CO1	Application of statistical tools for experimental practices	PO1 PSO5	Analyze
CO2	Basic awareness on statistical tools in research and analysis of biological phenomenon	PO1 PSO5	Analyze
CO3	Computer knowledge are imparted as applicable to aquaculture practices	PO2 PSO5	Analyze
CO4	Computer knowledge at preliminary level for further studies	PO2 PSO5	U
CO5	Appropriate use of internet and communication system	PO5 PSO5	U
CO6	Sampling methods useful in estimation of marine fish landings	PO6 PSO5	U

CL* Cognitive Level

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**COURSE OUTCOME**
	MODULE I			
1	Primary and secondary data- formation of length and weight frequency distribution	PPT		CO1, CO2
2	Absolute and relative measures of dispersion.	PPT/Lecture		CO1, CO2
3	Mean deviation and standard deviation.	PPT/Lecture		CO1, CO2
4	Scatter diagram	PPT/Lecture		CO1, CO2
5	Karl Pearson's coefficient of correlation-	PPT/Lecture		CO1, CO2

6	Spearman's Rank Correlation coefficient	Lecture		CO1, CO2
7	Coefficient of determination	Lecture		CO1, CO2
8	Regression analysis	Lecture		CO1, CO2
9	Linear regression equations and their uses	Lecture		CO1, CO2
10	Length –weight relationship	PPT/Lecture		CO1, CO2
11	von Bertalanffy growth equation	PPT/Lecture		CO1, CO2
12	Frequency approach and Axiomatic approach to probability	Lecture		CO1, CO2
13	Mutually Exclusive and independent events	Lecture		CO1, CO2
14	Addition and Multiplication theorems	Lecture		CO1, CO2
15	Binomial and Poisson distribution	Lecture		CO1, CO2
16	Process control and product control	Lecture		CO1, CO2
17	Control chart for variables and attributes	Lecture		CO1, CO2
18	Mean and range charts	Lecture		CO1, CO2
19	Fraction defective chart	Lecture		CO1, CO2
20	('p' chart) and 'c' charts	Lecture		CO1, CO2
21	Functions and components of computers	PPT/Lecture		CO3 ,CO4
22	Characteristics of computers	PPT/Lecture		CO3 ,CO4
23	Computer system organization-Hardware and Software.	PPT/Lecture		CO3 ,CO4
24	Seminar	PPT/Lecture		
25	Seminar	PPT/Lecture		
26	Seminar	PPT/Lecture		
27	Seminar	PPT/Lecture		
28	Seminar	PPT/Lecture		
29	Seminar	PPT/Lecture		
	CIA I			
MODULE V				
30	Null and alternative hypothesis	PPT/Lecture		CO1,CO2
31	Two types of errors in testing of hypothesis	Lecture		CO1,CO2
32	Large and small sample tests	Lecture		CO6
33	Z' test	Lecture		CO6
34	't' test	Lecture		CO6
35	X^2 test	Lecture		CO6
36	F-test	Lecture		CO6
37	Analysis of variance Techniques	Lecture		CO6
38	Single factor – ANOVA	Lecture		CO6
39	Population of sample	Lecture		CO6
40	Determination of the sample size	Lecture		CO6
41	Sampling techniques	Lecture		CO6
42	Programming concepts	Lecture		CO4
43	Computer memory	PPT/Lecture		CO3

44	Recent developments in input-output devices	PPT/Lecture		CO3
45	Commercially used storage devices-hard disc floppy disc	PPT/Lecture		CO3, CO4
46	Commercially used storage devices -, CD & flash memory	PPT/Lecture		CO3, CO4
47	Advances in microprocessor technology	Lecture	Quiz	CO5
48	Operating system-a comparative study	PPT/Lecture		CO4
49	MS Office	PPT/Lecture		CO4
50	MS word	PPT/Lecture		CO4
51	MS excel	PPT/Lecture		CO4
52	MS power point	PPT/Lecture		CO4
53	Page Maker.	PPT/Lecture		CO4
54	World Wide Web,	PPT/Lecture		CO4
55	Internet	PPT/Lecture		CO5
56	Network	PPT/Lecture		CO5
57	**www.Fishbase**-org	PPT/Lecture		CO5
58	email	PPT/Lecture		CO5
CIA - II				
59	Seminar	PPT/Lecture		
60	Seminar	PPT/Lecture		
61	Seminar	PPT/Lecture		
62	Seminar	PPT/Lecture		
63	Seminar	PPT/Lecture		
64	Seminar	PPT/Lecture		
65	Seminar	PPT/Lecture		
66	Seminar	PPT/Lecture		
67	Seminar	PPT/Lecture		
68	Seminar	PPT/Lecture		
69	Seminar	PPT/Lecture		
70	Seminar	PPT/Lecture		
71	Seminar	PPT/Lecture		
72	Seminar	PPT/Lecture		

INDIVIDUAL ASSIGNMENTS/SEMINAR – DETAILS & GUIDELINES

	Date of completion	**Topic of Assignment & Nature of seminar (Individual – Presentation)**	**Couse Outcome**
1	11/9/2018	Procedure for the estimation of marine fish landings in India.	CO6

2	12/9/2018	Measures of dispersion- merits and demerits.	CO2
3	13/9/2018	Experimentation- principles, designing and analysis.	CO1 ,CO2
4	14/9/2018	Photo shop.	CO5
5	17/9/2018	Types of memory.	CO3
6	18/9/2018	Normal distribution.	CO3 ,CO4
7	19/9/2018	Generations of computer.	CO5
8	20/9/2018	Methods of survey.	CO4
9	21/9/2018	Spread sheet.	CO4
10	24/9/2018	Procedure in testing a hypothesis.	CO6
11	25/9/2018	Different parts of computer.	CO3
12	26/9/2018	Analysis of variance.	CO6
13	27/9/2018	Types of computers.	CO3
14	28/9/2018	General characteristics of computer.	CO3
15	1/10/2018	Measures of central tendencies-merits and demerits.	CO1 ,CO2
16	3/10/2018	Working of various components of computer system.	CO1 ,CO2
17	4/10/2018	SPSS	CO4
18	5/10/2018	Programming languages.	CO4
19	8/10/2018	Methods of data collection.	CO6
20	9/10/2018	Networking topologies.	CO5

REFERENCES

- Campell R.C. 1978.Statistics for biologists,Blackie and sons publishers **,**Bombay
- Caswell,F. 1982.Success in statistics ,John Murray Publishers,Bombay.
- Agarwal.W.L.1986.Basc statistics.New Age International pvt.Ltd.Publishers,New Delhi,Baily
- Jain.V.K.,1983.Computer fundamentals ,BPB publishers ,New Delhi
- Neswin D 1998. Microsoft windows at a glance .BPH publishers,New Delhi.
- Sebasta R.W. 1999.Concepts of programming languages ,Addition-Wesely, Massachesettes.

WEB RESOURCE REFERENCES:

- http://web.stanford.edu/class/bios221/book/introduction.html
- https://www.tutorialspoint.com/basics_of_computers/basics_of_computers_introduction.htm

COURSE 4

PROGRAMME	**MASTER OF AQUACULTURE AND FISH PROCESSING**	**SEMESTER**	**1**
COURSE CODE AND TITLE	**P1AQCT04: AQUACULTURE ENGINEERING**	**CREDIT**	**4**
HOURS/WEEK	**4**	**HOURS/SEM**	**72**
FACULTY NAME	**MATHEW.M.JOHN**		

	COURSE OUTCOMES	**PO/ PSO**	**CL**
CO1	Describe the criteria for selection of site for freshwater, brackish water and mariculture systems.	PO4 PSO2	U
CO2	Understand the engineering principles which is helpful in design and construction of aqua farms	PO1 PSO2	U
CO3	Evaluate the basic features of soil by sampling method for classification ,distribution and strength	PO4 PSO2	U
CO4	Understanding the working of different aquaculture equipment including hand tools	PO6 PSO2	U
CO5	Understand engineering principles which is helpful in design and construction of hatcheries	PO4 PSO2	U
CO6	Understand preparation of aquacultural projects	PO1 PSO2	C
CO7	Understanding the management pond and hatcheries	PO1 PSO2	U
CO8	Understand the application of feeding systems in aquaculture	PO4 PSO2	U

CL* Cognitive Level

SESSION	**TOPIC**	**LEARNING RESOURCES**	**VALUE ADDITIONS**	**COURSE OUTCOME**
	MODULE I			
1.	Selection of Site for freshwater aquaculture	PPT	video	CO1
2.	Selection of Site for brackishwater aquaculture	PPT/Lecture		CO1
3.	Selection of Site for mariculture	PPT/Lecture		CO1
4.	Chain survey	PPT/Lecture		CO2
5.	Plain table survey	Lecture		CO2

6.	Contouring and leveling	Lecture		CO2
7.	Calculation of area of land by trapezoidal and Simpsons rule	Lecture		CO2
8.	Importance of engineering survey	Lecture		CO2
9.	Design and construction of aquafarms	PPT/Lecture		CO2
10.	Type of ponds, shape, size and their orientation from meteorological point	PPT/Lecture		CO2
11.	Design of peripheral dykes, secondary dykes	PPT/Lecture		CO2
12.	Design of , feeder canals, drainage canals			
13.	Water intake and outlet systems	PPT/Lecture		CO2
14.	Calculation of earthwork for constructing ponds	PPT/Lecture		CO2
15.	Requirement of water during water exchange	PPT/Lecture		CO2
16.	Types of soil	PPT/Lecture		CO3
17.	Soil sampling methods	PPT/Lecture		CO3
18.	Structural and textural classification of soils	Lecture		CO3
19.	Grain size distribution, bearing strength, prevention of erosion	Lecture		CO3
20.	Methods of soil compaction and seepage reduction	Lecture		CO3
21.	Design and construction of pens	Lecture		CO2
22.	Design and construction of raceways	Lecture		CO2
23.	Design and construction of flow through systems	PPT/Lecture		CO2
24.	Design and construction of re-circulatory systems	PPT/Lecture		CO2
25.	Selection of materials for mariculture facilities	PPT/Lecture		CO1
26.	Sea farming	PPT/Lecture		CO7
27.	Site selection for enclosure aquaculture	PPT/Lecture		CO1
28.	Cage farming	PPT/Lecture		CO7
29.	Selection of structures for enclosure aquaculture	PPT/Lecture		CO1
	CIA I			
30.	Equipment used for water treatment	PPT/Lecture		CO4
31.	Role of aeration in culture ponds	Lecture		CO4
32.	Methods of water disinfection	Lecture		CO7
33.	Weed cutters and harvesters	Lecture		CO4
34.	Bulldozers, excavators, rollers	PPT/Lecture		CO4
35.	Refrigerated vans and mechanized fish harvesters	PPT/Lecture		CO4
36.	Design of shrimp hatcheries	Lecture		CO5
37.	Source of water and water treatment methods used in shrimp hatchery	Lecture		CO5
38.	Disinfection, heating and cooling equipments in shrimp hatcheries	PPT/Lecture	Debate	CO5

39.	Design of hatchery building	PPT/Lecture		CO5
40.	Water supply and drainage systems, inlets and outlets			CO5
41.	Aeration grid, FRP tanks, cement tanks and waste water treatment	Lecture		CO5
42.	Preparation of aquaculture projects	Lecture		CO6
43.	Estimation of efficiency of aquaculture project	PPT/Lecture		CO6
44.	Management of pond and hatchery machineries	PPT/Lecture		CO4
45.	New technologies in aquaculture engineering	PPT/Lecture		CO2
46.	Tank basins and other closed production unit	Lecture		CO2
47.	Feed control systems	PPT/Lecture		CO8
48.	Dynamic feeding systems	PPT/Lecture		CO8
49.	Adjustment of pH	Lecture		CO7
50.	Removal of particles	PPT/Lecture		CO4
51.	Ammonia removal	PPT/Lecture		CO7
52.	Seminar	PPT/Lecture	Q.A.	
53.	Seminar	PPT/Lecture	Q.A.	
54.	Seminar	PPT/Lecture	Q.A.	
55.	Seminar	PPT/Lecture	Q.A.	
56.	Seminar	PPT/Lecture	Q.A.	
57.	Seminar	PPT/Lecture	Q.A.	
58.	Seminar	PPT/Lecture	Q.A.	
CIA II				
59.	Seminar	PPT/Lecture	Q.A.	
60.	Seminar	PPT/Lecture	Q.A.	
61.	Seminar	PPT/Lecture	Video	
62.	Seminar	PPT/Lecture	Q.A.	
63.	Seminar	PPT/Lecture	Q.A.	
64.	Seminar	PPT/Lecture	Q.A.	
65.	Seminar	PPT/Lecture	Q.A.	
66.	Seminar	PPT/Lecture	Q.A.	
67.	Seminar	PPT/Lecture	Q.A.	
68.	Seminar	PPT/Lecture	Q.A.	
69.	Seminar	PPT/Lecture	Q.A.	
70.	Seminar	PPT/Lecture	Q.A.	
71.	Seminar	PPT/Lecture	Q.A.	
72.	Revision			

INDIVIDUAL ASSIGNMENTS/SEMINAR – DETAILS & GUIDELINES

	Date of completion	Topic of Assignment & Nature of seminar (Individual – Presentation)	Couse Outcome
1	11/9/2018	Different types of aerators used in aquaculture system	CO4
2	12/9/2018	Different classes of pumps	CO4
3	13/9/2018	Merits and demerits of cage culture	
4	14/9/2018	Textural classification of soil	CO3
5	17/9/2018	Criteria for site selection for a shrimp hatchery	CO1, CO5
6	18/9/2018	Uses of blowers and compressors	CO4
7	19/9/2018	Main components of an aquaculture farm	
8	20/9/2018	Different methods of discharge measurements	CO2
9	21/9/2018	Different materials used for enclosures in a pond	CO2
10	24/9/2018	Fouling and their control	CO7
11	25/9/2018	Types of channel lining employed in aquaculture	CO2
12	26/9/2018	Different fish feeding equipments used in aquaculture	CO8
13	27/9/2018	Layouts of different farms and their advantages	CO2
14	28/9/2018	Rack culture and its merits	CO7
15	1/10/2018	Different steps involved in construction of ponds	CO2
16	3/10/2018	Physico-chemical properties of soil in the construction and maintenance of ponds	CO3
17	4/10/2018	Importance of site selection in aquaculture engineering	CO1
18	5/10/2018	Different disinfection methods of water	CO7
19	8/10/2018	Importance of engineering survey	CO2
20	9/10/2018	Selection of materials for mariculture facilities	CO1

REFERENCES

- Thomas B Lawson. Fundamentals of Aquaculture Engineering
- Wheaton ,F.W. Aquaculture Engineering 1942 Wiler Interscience publication
- Bose et.al. Coastal Aquaculture Engineering
- Pillay, TVR and Kutty.M.N. Aquaculture : Principles and Practices

WEB RESOURCE REFERENCES:

- http://www.fao.org/3/x5744e/x5744e00.htm
- http://www.fao.org/3/E7171E/E7171E00.htm
- http://www.fao.org/3/AC003E/AC003E00.htm