

SACRED HEART COLLEGE (AUTONOMOUS)

Department of Aquaculture

MASTER OF AQUACULTURE AND FISH PROCESSING

Course plan

Academic Year 2018 - 19

Semester IV

16P4AQCT12 : Fishing Technology

PROGRAMME	MASTER OF AQUACULTURE AND FISH PROCESSING	SEMESTER	4
COURSE CODE AND TITLE	16P4AQCT12 Fishing Technology	CREDIT	4
HOURS/WEEK	4	HOURS/SEM	72
FACULTY NAME	Dr.V.C.George		

COURSE OBJECTIVES
To understand the basic principles of capture of fin fishes and crustaceans from inland ,marine as well as from closed water system
To describe different types of fishing crafts
To describe different types of fishing gears
To understand the different materials used for the construction of fishing crafts
To understand different materials used for the construction of fishing gears
To understand the marine fouling and corrosion in fishing boats and their maintenance
To understand the basic principles of navigation
To understand the different fish finding devices

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
MODULE I-Fishing craft				
1	Types of fishing crafts: in general.	Lecture		
2	Traditional fishing crafts	Lecture		
3	Motorized fishing crafts	Lecture		
4	Principles of operation of fishing crafts.	Lecture	Discussion	
5	Seminar			
6	Seminar			
7	General terms and parts of fishing vessel.	Lecture		
8	Different types of boat building materials.	Lecture	Discussion	
9	Wood as construction material.	Lecture		
10	Backbone assembly.	Lecture		
11	Preservation of wooden craft.	Lecture		
12	Maintenance of fishing boats	Lecture		
13	Fiber glass as boat building material.	Lecture		
14	Construction of boat using fiberglass material.	Lecture		
15	Ferro cement as boat building material.	Lecture	Discussion	
16	Construction of boat using ferro cement material.	Lecture		
17	Steel as boat building material.	Lecture		

18	Annual maintenance of boats.	Lecture		
19	Painting schedule.	Lecture		
20	Seminar	Lecture		
21	Seminar			
22	Seminar			
23	Seminar			
24	Seminar			
Module II Marine Fouling				
25	Classification of corrosion.	Lecture		
26	Marine corrosion and its control.	Lecture		
27	Marine Fouling	Lecture		
Module III Fishing Gear				
28	Classification of fishing gear system- in general	Lecture		
29	Fishing gear materials and their properties.	Lecture		
CIA I				
30	Yarn numbering system.	Lecture	Discussion	
31	Denier, Tex and British Count.	Lecture		
32	Conversion method.	Lecture		
33	S Twist and Z Twist.	Lecture		
34	Properties of synthetic gear materials.	Lecture		
35	Classification of fishing gear materials.	Lecture	Discussion	
36	Natural and synthetic fibers.	Lecture		
Module III- Fishing Gears				
37	Estimation of weight of netting.	Lecture		
38	Different types of fishing gear.	Lecture		
39	Classification of fishing gears.	Lecture		
40	Active and Passive gears.	Lecture		
41	Factors affecting the selection of different gears used in fishing.	Lecture		
42	Basic principles of gear design.	Lecture		
43	Capture mechanism of different fishing gears- in general.	Lecture		
44	Dip nets	Lecture		
45	Fishing gear for closed water systems.	Lecture		
46	Trawl nets- parts.	Lecture		
47	Different types of trawl nets, Trawling operation.	Lecture		
48	Purse seine.	Lecture		
49	Drag net	Lecture		
50	Shore seines.	Lecture		
51	light fishing- Squid jigging operation	Lecture	Discussion	
Module IV Low energy fishing				
52	Gillnets and Tangle nets.	Lecture		
53	Gillnet operation.	Lecture		
54	Tangle nets operation.	Lecture		

55	Cast nets.	Lecture	Q & Ans Session	
56	Trammel nets	Lecture	Q & Ans Session	
57	Traps	Lecture	Q & Ans Session	
58	Gillnets and Tangle nets.	Lecture		
59	Traditional fish capturing devices- harpoons, arrow, traps etc.	PPT/Lecture		
60	Responsible fishing	Lecture		
61	Responsible fishing- regulations.	Lecture		
62	IUU	Lecture		
63	By-catch reduction	Lecture		
64	Turtle Exclusion Device.	Lecture		
Module V Basic Principles of Navigation				
65	Basic principles of navigation	Lecture	Discussion	
66	Fish finding devices	PPT/Lecture	Discussion	
67	Modern fish aggregation devices	PPT/Lecture		
68	Seminar			
69	Seminar			
70	Seminar			
71	Navigation equipment's	Lecture	Discussion	
72	Lifesaving apparatus.	Lecture	Discussion	

GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines

	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	Motorized fishing vessels of India
2	Mechanized fishing vessels of India
3	SONAR
4	ECHOSOUNDER
5	Construction of steel fishing vessel
6	Seamanship and navigation
7	Classification of mechanized fishing vessels.
8	Deck arrangements of purse seines and trawlers
9	Antifouling and anticorrosion paints.
10	Fish finding and gear monitoring equipment

References

1. Brandt A.V. (1984). Fish catching Methods of the world.
2. Advances in harvest technology (2003). Winter school manual-ICAR CIFT
3. K.P. Biswas (1990) a text book of fish, fisheries and Technology
4. John C. Sainsbury (1971) – Commercial fishing methods- an introduction to vessels & gears.
5. M. Shahul Hameed (2000) & Boopendranath -Modern fishing gear Technology
6. Advances in harvest technology (2003). Winter school manual-ICAR CIFT

Web resource references:

1. <http://www.fao.org/fishery/geartype/search/en>
2. <http://www.fao.org/fishery/geartype/101/en>
3. <http://www.fao.org/3/a-t0367t.pdf>
4. <http://drs.cift.res.in/bitstream/handle/123456789/907/FAO%20classification%20of%20fishery%20vessel%20types.pdf?sequence=1>
5. http://eprints.cmfri.org.in/23/10/Chapter_8_New.pdf

16P4AQCT13: Fish Processing Technology

PROGRAMME	MASTER OF AQUACULTURE & FISH PROCESSING	SEMESTER	4
COURSE CODE AND TITLE	16P4AQCT13: Fish Processing Technology	CREDIT	3
HOURS/WEEK	4	HOURS/SEM	72
FACULTY NAME	Dr. Jose Joseph , Dr. Leena Raphael		

COURSE OBJECTIVES
To understand the handling of fishes both culture and capture
To understand the changes in the fish composition in relation to spoilage
To understand the freezing technology of fish
To understand the canning of fish
To understand the curing and drying of fish
To understand the value added fish products
To understand the Fishery By-products
To understand the Packaging of fish products

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
MODULE I-Freezing technology offish				
1	Refrigeration, Refrigeration load	PPT/Lecture	Q & A Session	
2	Cold storage of fish	PPT/Lecture		
3	Crystallization during freezing	PPT/Lecture		
4	Freezing curves for pure water and water in fish	PPT/Lecture		
5	Physical changes in freezing	PPT/Lecture		
6	Chemical changes in freezing	PPT/Lecture		
7	Effect of freezing on location and size of ice crystals	PPT/Lecture		
8	Technological aspects of freezing	PPT/Lecture		

9	Slow freezing and quick freezing	PPT/Lecture		
10	Air blast freezing	PPT/Lecture		
11	Tunnel freezing	PPT/Lecture		
12	Fluidized bed freezing	PPT/Lecture		
13	Spiral freezing	PPT/Lecture	Q & A Session	
14	Immersion freezing	PPT/Lecture		
15	Contact plate freezing	PPT/Lecture		
16	Cryogenic freezing	PPT/Lecture		
17	High pressure freezing	PPT/Lecture		
18	Freezing onboard fishing Vessels	PPT/Lecture		
19	IQF freezers	PPT/Lecture		
20	Selection of a freezing method	PPT/Lecture		
21	Cold store and cold storage	PPT/Lecture		
22	Chemical , physical and sensory changes during freezing	PPT/Lecture		
23	Chemical , physical and sensory changes during cold storage	PPT/Lecture		
24	Chemical treatment of fish prior to freezing, TTT and PPP factors	PPT/Lecture		
25	Packing of frozen products, processing and freezing of frozen sea food products for export from India	PPT/Lecture	Quiz	
26	Seminar		Discussion	
27	Seminar		Discussion	
28	Seminar		Discussion	
29	Seminar		Discussion	

CIA 1

Module II- Canning of fish

30	Principles of canning	PPT/Lecture	Q & A Session	
31	Heat transfer in canned fish	PPT/Lecture		
32	Thermal destruction of bacteria, D and Do value, Fo value, Z value	PPT/Lecture		
33	Determination of process time, cook value,	PPT/Lecture		
34	Aseptic packing	PPT/Lecture		
35	Containers for canning	PPT/Lecture		
36	Unit operations, equipment used for canning	PPT/Lecture		
37	Canning of sardine, tuna and prawns	PPT/Lecture		
38	Retort pouch packing	PPT/Lecture		
39	Waste management in canning industry	PPT/Lecture	Quiz	
40	Defects of canned product	PPT/Lecture		
41	Water content & water activity, Water activity and microbial spoilage	PPT/Lecture		
Module III-Curing of fish				
42	Drying of fish, Constant rate and falling rate, Drying period	PPT/Lecture	Q & A Session	
43	Salting & salting methods	PPT/Lecture		
44	Drying methods for fish, Packing and storage	PPT/Lecture		
45	Quality problems and solutions	PPT/Lecture		
46	Maillard reaction, lipid oxidation, microbial, fungal and insect's infestation	PPT/Lecture		
47	Packaging of dried products	PPT/Lecture		
48	Smoking: Objectives, smoke production, smoke components, quality, safety and nutritive value, processing and equipment	PPT/Lecture		
49	Freeze drying of fish, Accelerated freeze drying, Packaging of freeze dried products	PPT/Lecture		
Module IV-Fish By-products				

50	Mince and surumi-Processing, packaging, freezing and storage	PPT/Lecture	Q & A Session	
51	Fish protein concentrate, fish meal and oil, fish liver oil	PPT/Lecture		
52	Fish hydrolysate, fish silage	PPT/Lecture		
53	Caviar, gelatin, glue, pearl essence, dehydrated jelly fish, squalene, fish maws and isinglass, ambergris, beche de mer	PPT/Lecture		
54	Chitin, chitosan and glucosamine hydrochloride	PPT/Lecture		
55	Seminar		Group discussion	
56	Seminar		Group discussion	
57	Seminar		Group discussion	
58	Seminar		Group discussion	
CIA 2				
59	Utilization of prawn wate and fish processing waste	PPT/Lecture		
60	Processing and extraction of align, alginic acid, alginates, agar, manitol and carragenan	PPT/Lecture		
Module V-Value added fish products				
61	Coated fish products, batter, bread crumbs and general procedure for preparation of battered and breaded products	PPT/Lecture	Q & A Session	
62	Objectives, packaging and storage, equipment for making coated products, quality of coated products	PPT/Lecture		
63	Types of coated products: Coated fish fillets, fish fingers, coated shrimp products, moulded products, fish cutlets, fish balls, fish buger (patties)	PPT/Lecture		
64	Seafood analogues and imitation products	PPT/Lecture		

Module VI-Other methods of preservation				
65	Fermented fish products, fish sauce, fish paste, fish sausage			
66	Radiation preservation, principles of radiation, ionizing radiations and their sources, units, applications of radiation, shelf life extension			
67	Radappertization, radurisation, radicidation and radiation doses for irradiation of different fish products			
68	Safety of irradiated fish			
69	Hurdle technology			
70	Seminar		Group discussion	
71	Seminar		Group discussion	
72	Seminar		Group discussion	

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Topic of Assignment & Nature of Seminar (Individual Presentation)
1	Air blast freezing
2.	Tunnel freezing
3	Fluidized bed freezing
4	Spiral freezing
5	Immersion freezing
6	Contact plate freezing
7	Cryogenic freezing
8	High pressure freezing

9	Different dried products & their packages
10	Processing of fish silage
11	Processing of Beche de mer
12	Processing of fish hydrosylate
13	Different types of value added products
14	Uses of chitin & Chitosan
15	Difference in fish sauce & fish paste
16	Byproducts from crustacean waste
17	Common byproducts from fish waste
18	Different drying products
19	Different products from Surumi

References

1. Gopakumar, K: (2000) Textbook of fish processing Technology
2. Balachandran, K.K.(2001) Post harvest technology of fish and fish products
3. Robertson, G.L (1993) Food packaging
4. Farber Jetty M & Todd Ewen C.D (2000) Safe handling of foods

Web resource references:

- <http://www.fao.org/3/V3630E/V3630E03.htm>
- <http://www.fao.org/3/R6918E/R6918E05.htm>
- http://aquafind.com/articles/Smoking_Fish.php
- https://agritech.tnau.ac.in/fishery/fish_valueaddition.html

16P4AQCT14: Fish Microbiology and Quality Assurance

PROGRAMME	MASTER OF AQUACULTURE & FISH PROCESSING	SEMESTER	IV
COURSE CODE AND TITLE	16P4AQCT14: Fish Microbiology and Quality Assurance	CREDIT	4
HOURS/WEEK	4	HOURS/SEM	72
FACULTY NAME	Dr. S. Sanjeev		

COURSE OBJECTIVES

- To understand the trace metals in fins fish and shell fish
- To understand the general aspects of seafood quality and quality problems
- To understand the biological hazards in seafoods
- To analyse the fish spoilage and quality assessments
- To understand the Good manufacturing practices in seafood processing
- To understand the Hazard analysis and critical control points in seafood industry
- To understand the National and international standards for fish and fish products
- To understand the Waste management in seafood plants

SESSION	TOPIC	LEARNING RESOURCES	VALUE ADDITIONS	REMARKS
MODULE I-Fish microbiology				
1	Native bacterial flora of fish	PPT/Lecture	Q & A Session	
2	Microbes causing fish spoilage	"		
3	Effect of low temperature, high temperature, salting, drying and hurdle technology on bacteria	"		

4	Fecal indicator organisms	"		
5	Pathogenic E.coli	"		
6	S. aureus	"		
7	Salmonella	"		
8	Shigella	"		
9	Pathogenic Vibrios	"		
10	L. monocytogenesis	"		
11	Clostridium	"		
12	Microbial analysis of water	"		
13	Fish contact surfaces	"	Quiz	
14	Isolation and identification of various bacterial pathogens from fish and fishery products	"		
15	Biological hazards in seafood	"		
MODULE II-Quality control				
16	General aspects of seafood	"	Q & A Session	
17	General aspects of quality and quality problems	"		
18	Fish spoilage and quality assessment.	"		

19	Bacteriology of spoilage of fish	”		
20	Bacteriology of spoilage of shell fish	”		
21	Faecal indicator bacteria in fish	”		
22	Bacteria of public health significance	”		
23	Salmonella in sea foods	”		
24	Seafood toxins	”		
25	Quality of water for seafood processing	”		
26	Quality of ice for seafood processing	”		
27	Trace metals in fish	”		
28	Trace metals in shell fish	”		
29	Good manufacturing practices in seafood processing	”		
CIA-1				
Module III-Quality assurance in seafood trade				
30	Safety foods	”	Q & A Session	
31	End product quality and process control	”		

32	Hazards analysis and critical control points in sea food industry	"		
33	National standards for and fish products	"		
34	International standards for and fish products	"		
35	Quality management in seafood plants	"		
36	ISO 9000 series of standards	"		
37	Waste management	"		
38	Prerequisite programmes for waste management	"		
39	SOP	"		
40	SSOP	"		
41	GMP	"		
42	BUREAU OF INDIAN STANDARDS (BIS)	"		
43	Product traceability and recall	"		
44	Sanitizers	"		
45	Detergents, Cleaning agents	"		
46	Disinfectants	"		
47	Sensory methods for quality	"		

	evaluation of seafoods			
48	Seminar			
49	Seminar			
50	Seminar			
51	Seminar			
52	Seminar			
53	Seminar			
54	Seminar			
55	Seminar			
56	Seminar			
57	Seminar			
58	Seminar			
59	Seminar			
CIA- 2				
60	Heavy metals in seafoods	"	Q & A Session	
61	Environmental factors that affect bacterial growth	"		
62	Seminar			
63	Seminar			

64	Seminar			
65	Seminar			
66	Seminar			
67	Seminar			
68	Seminar			
69	National and international standards for frozen fishery products	"		
70	Chemical hazards in seafoods	"		
71	Physical hazards in seafoods	"		
72	Revision	"		

INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

	Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc)
1	Principle of acid fast staining reaction
2	Sensory evaluation for prawn
3	Raw material check list in HACCP
4	Physical methods for assessing fish quality
5	Bacteriological standards of seafood for export
6	Implementing SSOP's during processing

7	Different types of hazards in seafood
8	Qualities of indicator organisms
9	Principles of gram staining organisms
10	Three important species of <i>Staphylococcus</i> causing food poisoning
11	Growth phases of bacteria
12	TPC
13	Cleaning schedule in a processing plant
14	Difference between intoxication and food infection
15	MPN
16	Trace metals in fish and shellfish
17	Different methods used for the demonstration of spores
18	Codex standards
19	Different methods used for sterilization

References

1. Robinson, R.K.1985 **Microbiology of frozen foods**. Elsevier Applied Science publishers
2. Devadasan K, Mukundan, M.K, Antony P.D and Jose Joseph.1997. **Nutrients and bioactive substances in aquatic organisms**. SOFT (I)
3. Bonnell, A.D. 1994. **Quality Assurance in seafood processing**. Chapman and Hall, USA
4. T.S. Gopalakrishna Iyer, Candoran M.K., Mary Thomas and Mathew P.T. 2000. **Quality assurance in seafood processing** CIFT.

5. M.P.Doyle, L.K.Beuchat and T.J. Montyille (Eds.) 1997.Food Microbiology, Fundamentals and frontiers.

6.T.S.G. Iyer,M.K. Kandoran ,Mary Thomas and P.T.Mathew(Eds.)2002 Quality assurance in seafood processing ,CIFT, Cochin

Web resource references:

1. <https://annalsmicrobiology.biomedcentral.com/articles/10.1007/s13213-015-1102-5>

2. https://link.springer.com/chapter/10.1007/978-1-4615-2181-5_11

3.[rs.cift.res.in/bitstream/handle/123456789/987/National%20and%20international%20quality%20standards%20for%20fish%20and%20fishery%20products.pdf?sequence=1&isAllowed=](rs.cift.res.in/bitstream/handle/123456789/987/National%20and%20international%20quality%20standards%20for%20fish%20and%20fishery%20products.pdf?sequence=1&isAllowed=y)

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