



University of Kerala

Discipline	ZOOLOGY				
Course Code	UK4DSEZOO201				
Course Title	Fisheries Science II - Principles of Aquaculture				
Type of Course	DSE				
Semester	IV				
Academic Level	200 -299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours/Week
	4	4 hours	-	-	4
Pre-requisites	Pass in Class XII				
Course Summary	This course will provide the basics and history of aquaculture to the students. A wide range of aspects of aquaculture like aquaculture practices, design and construction of hatcheries, pond management, selection of candidate species for aquaculture, study of monoculture, polyculture and integrated culture systems etc. are dealt in this course.				

Detailed Syllabus:

Module	Unit	Content	60Hrs
I	Introduction to Aquaculture		12
	1.1	Present status and Scope of aquaculture in India and Kerala, Consumption scenario and Emerging trend in Aquaculture.	2
	1.2	Criteria for the selection of sites (nutrient and soil quality, water supply and water circulation, water quality, Environment Impact Assessment) for various aquaculture practices, (Freshwater, Brackish water and Marine Water)	5
	1.3	Criteria for selection of species for culture – biological, economic and market considerations.	2

	1.4	Commercially important common cultivable species and Introduction of exotic species (Brief account only)	3
II	Systems of aquaculture		11
	2.1	Type of farming Methods: - pond culture, tanks, raceways, pen culture, cage culture and zero water exchange system.	4
	2.2	Different Systems of Aquaculture: Traditional, Extensive, semi-intensive, intensive and super intensive aquaculture in freshwater, brackish water and marine environments.	3
	2.3	Monoculture, polyculture, Sewage fed Farming, Integrated culture systems, Recirculated aquaculture Systems (RAS) (Related activity: Make a report on any systems of aquaculture by visiting the culture areas and submit the report)	4
III	Pond Construction and Seed Resources		14
	3.1	Size, shape, lay out of pond farms, dyke design and construction, water supply and drainage system.	4
	3.2	Pond productivity, estimation, physical, chemical and biological factors affecting productivity of ponds	3
	3.3	Types, design and construction of hatcheries	3
	3,4	Seed resources – wild collection, induced breeding of fishes, shrimps and bivalves in hatcheries	4
IV	Pond Management		15
	4.1	Pre-stocking Pond management – sun drying, repairing, desiltation, ploughing, liming, eradication of predators and weeds, water filling, fertilization. Importance of bloom	4
	4.2	Transportation, acclimatisation of seeds and release, species combinations, stocking density (Related activity: Calculate stocking density of shrimp pond based on type of culture)	2
	4.3	Feed management – Types of feed, formulated feed, feeding rate, feed conversion ratio, feed additives, binders, nutraceuticals, microencapsulated feeds, brooder diet and Live Feed.	4
	4.4	Monitoring physical and chemical parameters of water, Rate and time of water exchange.	2
	4.5	Monitoring Health of stock , Regular sampling and disease Management. (Related activity: Assessment of stock and feeding regime in a shrimp pond based on sampling)	3
V	Harvesting and sustainability		8
	5.1	Harvesting of drainable and undrainable ponds, cages, molluscan farms. Handling and preservation.	4
	5.2	Sustainability and environmental management	4

References

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4. Bardach JE, Rhyther JH and Mc. Larney WO. 1972. Aquaculture Farming and Husbandry of Freshwater and Marine Organisms. John Wiley and Sons.
5. Beets WC. 1990. Raising and Sustaining Productivity of Small- Holder Farming Systems in the Tropics. Agbe Publ.
6. Bose AN. 1991. Coastal Aquaculture Engineering. Oxford and IBH Publ.
7. Bregnballe J. 2015. A Guide to Recirculation Aquaculture. FAO Publ.
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Course Outcomes

No.	Upon completion of the course, the graduate will be able to	Cognitive Level	PSO addressed
CO-1	Understand the definition and history of aquaculture, Status of aquaculture in India and Kerala and criteria for selection of species for culture	U, R, An	4,5
CO-2	Understand systems of aquaculture and different types of aquaculture practices.	U, R, An	4,5
CO-3	Acquire knowledge in design and construction of culture systems and hatcheries	R, U, An	4,5
CO-4	To get familiarised with pre-stocking pond management, seed available and seed stocking.	AP, An, E	4,5
CO-5	To get an awareness on post stocking management practices for a profitable culture.	U, Ap,An	4,5

R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create

Name of the Course: Credits: 3:0:1 (Lecture: Tutorial:Practical)

CO No.	CO	PO/PSO	Cognitive Level	Knowledge Category	Lecture (L)/ Tutorial (T)	Practical (P)
1	Understand the definition and history of aquaculture, Status of aquaculture in India and Kerala and criteria for selection of species for culture	PO2,3,7/ PSO4,5	U, R, An	C, P, M	L	

2	Understand systems of aquaculture and different types of aquaculture practices.	PO2,3,7/ PSO4,5	U,R, An	C, P, M	L	
3	Acquire knowledge in design and construction of culture systems and hatcheries	PO2,3,7/ PSO4,5	R, U, An	C, P, M	L	
4	To get familiarised with pre-stocking pond management, seed available and seed stocking.	PO2,3,7/ PSO4,5	AP, An, E	C, P, M	L	
5	To get an awareness on post stocking management practices for a profitable culture.	PO1,2,3, 7/PSO4,5	U, An	F, C, P	L	

F-Factual, C- Conceptual, P-Procedural, M-Metacognitive

Mapping of COs with PSOs and POs:

	PS O1	PS O2	PS O3	PS O4	PS O5	PS O6	PS O7	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	-	-	-	3	3	-	-	-	2	3	-	-	-	3	-
CO 2	-	-	-	3	3	-	-	-	2	3	-	-	-	3	-
CO 3	-	-	-	3	3	-	-	-	2	3	-	-	-	3	-
CO	-	-	-	3	3	-	-	-	2	3	-	-	-	3	-
4															
CO 5	-	-	-	3	3			3	2	3	-	-	-	3	-

Correlation Levels:

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

Assessment Rubrics:**Assignment / Seminar topics**

1. Aquaculture vs Agriculture
2. Environmental Impact Assessment (EIA)
3. Water quality management
4. Multiple uses of water in aquaculture
5. Use of agro-industrial waste and biofertilizer in aquaculture

Field activities

1. Visit to aquaculture farms & submission of report on farm layout and cultivable species
2. Make a report on culture and management practices in any farming systems after personal visit.

Continuous comprehensive Assessment

1. Assignment/ Quiz/ Discussion / Seminar
2. Submission of specimen collection report
3. Submission of Field report

End semester Evaluation

1. Very short answer questions
2. Short answer questions
3. Essay type questions
4. Practical examinations

Mapping of COs to Assessment Rubrics :

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓			✓
CO 3	✓	✓		✓
CO 4	✓			✓
CO 5	✓	✓		✓