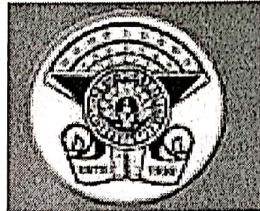


Two Years Diploma Course Fish Breeding
(Hatchery Production Worker)

University Grants Commission's
Community College Scheme
M. C. College, Barpeta, Assam



CURRICULUM/SYLLABUS

This program is aimed to train the candidates to produces /supervise the fish seed in the hatcheries after producing seed in production and maturation stage, which is then transferred to the final, grow out stage for farming considering labor and capital as major factor.

The job requires the individual to have manual and finger dexterity good eye sight, attention to details, physical, mental, mechanical ability to lift weight, arm-hand steadiness, stamina to work for long hours.

1st Semester

This course encompasses “5” out of “5” National Occupational standards (NOS) of “Hatchery Production Workers”.

Qualification Pack issued by ASCI. Duration of programme: 560 hrs.

This semester is about fulfilling the effective requirements for the hatchery production.

S. No	Topic/Module	Duration (In hrs)	Key Learning Outcomes	Corresponding code
•	<i>Introduction to Fishery</i>	60	<ul style="list-style-type: none"> History of Ichthyology in India. Classification of fishes. Fresh water fishes with reference to Assam. Fish identification: technique and application. Anatomy of fishes. Fish endocrine system: Hormones. Reproductive cycle. Role of hormone in gonadal maturation. Fertilization and developmental system. 	AGR/N 4901
1	<i>Assist in designing Hatchery</i>	20	1) Construction of hatchery with supporting facilities (PC1)	AGR/N 4901
2	<i>Bio security</i>	30	2) Consider potential risk of disease and its and its effect on surrounding. (PC2) 3) Ensure Bio-security measure to protection of disease. (PC3) 4) Follow sanitary dry out procedure before and after each cycle of breeding to prevent the transmission of diseases agents from one cycle to the next. (PC4)	AGR/N 4901

3	Complying to standard operating procedure	50	5) Avoid free movement and movement of vehicle to the restricted area. (PC5)	AGR/N 4901
4	Technical Knowledge	60	1) Hatchery method and techniques for maturing, spawning, hatching method 2) Use of Filter- Sand, Carbon and catridge for water quality management. 3) Temperature and salinity regulation. 4) Bio security measures. 5) Tools and equipment of hatchery 6) Preparations of quarantine pond. (KA1 to KA6)	Include all KAs of the all NOS.
5	Core Skill-	50	7) To reduce the errors and improve the harvesting process. 8) Apply, analyze and evaluate information gathered from observation (SB 7- SB 8)	Include all SAs and SBs of 5 NOS.
•	Marketing:	40	<ul style="list-style-type: none"> Knowledge about fish farm(small scale, large scale, Ltd./Pvt. Ltd) Role of different fish farm on setting up hatchery production hut. 	
•	Training/ workshop.	40		
•	Visit to the fish farm.	50	<ul style="list-style-type: none"> Interaction with the farmers, Relation with the fish farm. 	
•	Presentation /Seminar	50	<ul style="list-style-type: none"> PPT/handwriting presentation on different topic of Hatchery Production Unit. 	
•	On job training	50	<ul style="list-style-type: none"> Knowledge of farming and its processes. 	

•	<i>Revision /according to demand of student</i>	10		
•	<i>Assessment</i>	50		

Unit code- AGR/N 4902

2nd SEMESTER

UNIT TITLE-PRE-SPAWNING PROCESS

This unit is about selecting healthy brood stock, quarantine and adjusting the brood stock to required hatchery condition.

This semester will include-

Health brood stock,

Adhering to quarantine restrictions and procedures.

Adjust brood stock to required conditions.

This course encompasses “5” out of “5” National Occupational standards (NOS) of “Hatchery Production Workers”.

Qualification Pack issued by ASCI. Duration of programme: 590 hrs.

S. No	Topic /Module	Duration (In hrs)	Key Learning Outcomes	Corresponding NOS Code
•	Introduction	60	<ul style="list-style-type: none"> • Principle of fresh water fish culture: General concept, cultivatable fishery • Composite fish culture. • Hatchery and their importance: • Types of hatchery-traditional, Chinese, glass jar, Modern Hatchery • Pond –site selection: 	AGR/N-4902

			<p>Design and construction, design of fish keeping method.</p> <ul style="list-style-type: none"> • Running water re circulation system of aquaculture • Application of feed • Management of hatchery of fish. • Water, temperature, PH regulation. • Soil nutrient and manure. • Calculation of fecundity. • Histological studies of ovary and testes. • Study of fish eggs and embryonic developmental stage. • Identification of eggs, spawn, fry and fingerlings of different species. • Brood stock maintenance and selection of breeders for injection. 	
1	Ensuring healthy brood stock:	60	<ol style="list-style-type: none"> 1. Use Healthy brood stock that are not carriers of serious pathogen. 2. Decide on use of whether brood- stock or domesticated brood-stock. 3. Ensure the appropriate weight of male and female. 4. Information on origin of brood stock and their past performance.(PC1-PC4) 	AGR/N-4902
2	Quarantine restriction and procedure	80	<ol style="list-style-type: none"> 5) Hold the brood stock in isolation, on the arrival until their disease status is ascertained. 6) Ensure isolation from all rearing and production area to avoid any possible cross contamination. 7) Closed observation to insure any virus infection. 	AGR/N-4902

			<p>8) Perform waste disposal and effluent treatment.</p> <p>9) Store adequate containers in quarantine room for effective routine movement of fish.</p> <p>10) Ensure independent supply of water and air in the quarantine with separate treatment and disinfection system.</p> <p>11) Collect waste water in to another tank for chlorination and dechlorination before release to environment.</p> <p>12) Disposal of infected animals.</p> <p>13) Mark separately the implements use in the quarantine area.</p> <p>14) Ensure brood stocks is not release from quarantine area until their health status is clearly known. (PC5 to PC14)</p>	
3	Adjusting Brood –stock :The Required Condition	50	<p>(15) Adjust brood stock to the environmental conditions of the maturation facility.</p> <p>(16) Ensure difference in temperature between quarantine area and maturation facility is gradually reduced.</p> <p>(17) Clean disinfectant the incoming water through chlorination and filtration before distributed to the working area</p>	AGR/N-4902
4	Technical Knowledge	50	<p>(1) Wild and domesticated brood stock.</p> <p>(2) Use of chlorination, chemicals, disinfectants cleaning the tank and</p>	Include all KAs of the all NOS

			<p>equipments regularly after and before starting a new production cycle.</p> <p>(3) Adjust the brood stock to the surrounding condition and type of feed.</p> <p>(4) Standard operating procedure.</p> <p>(5) Nutrient requirement.</p> <p>(6) Dry out facilities for managing hatching facility.</p> <p>(KA1-KA6)</p>	
5	Core Skills/Generic Skill	30	<p>(1) Reading magazine to know latest skill to know the latest development of Hatchery.</p> <p>(2) Communication between neighboring workers and fish farmer.</p> <p>(SA1-SA2)</p>	Include all SAs and SBs of 5 NOS.
•	Professional Skill	50	<p>(1) To decide the healthy brood stock, planing on Prespawning Process.</p> <p>(2) Need to know relationship with the farmers, customers and other neighboring workers and work well with coordination.</p> <p>(3) To identify problem that may arise and necessary step to solve them.</p> <p>(4) Monitor to reduce respective errors and improve the harvesting presses.</p> <p>(5) Apply, Analyze and evaluate the information gathered from observation and experience.</p> <p>(6) Decision making, plan and organize certainty problem solving analytical thinking, critical thinking.</p>	

	Marketing	30	<ul style="list-style-type: none"> • Knowledge about fish farm(small scale, large scale,Ltd./Pvt.Ltd) • Role of different fish farm on setting up hatchery production hut. 	
•	Training /workshop	20		
•	Visit to the fish farm	20	<ul style="list-style-type: none"> • Interaction with the farmers. • Relation with fishery department. 	
•	Presentation /Seminar	30	<ul style="list-style-type: none"> • Ppt/handwriting presentation on different topic of Hatchery Production Unit. 	
•	On job training	50	<ul style="list-style-type: none"> • Knowledge of farming and its processes 	
•	Revision /according to demand of students.	10		
•	Assessment	50		

3rd Semester

NOS code AGR/N4903

Unit title-PRODUCE LARVAE

This unit is about producing the larval by maturing spawning and hatching ensuring good brood stock nutrition and disinfecting brood stock.

This unit include-

1. Mature and breed the mature fresh water fish.
2. Perform spawning ,carrying out hatching.
3. Screen the brood stock
4. Disinfection the brood stock
5. Treat spawn

This course encompasses “5” out of “5” National Occupational standards (NOS) of “Hatchery Production Workers”.

Qualification Pack issued by ASCI. Duration of programme: 600 hrs.

S. No	Topic /Module	Duration (In hrs)	Key Learning Outcomes	Corresponding code
	Introduction of larva production and breeding.	50	<ul style="list-style-type: none"> • Breeding habits of different cultivable crops species. • Raising and rearing of brooders and cat fishes. • Food and feeding schedule of carp of brood stock. • Factors responsible for gonadal development of carps, cat fish. • Hygienic conditions, environmental factors for good breeding. • Induced breeding and its principle and methods.- Major Carp, Exotic fish • Bund breeding, hapa breeding. • Hypophysation. - Synthetic Hormone Used induced Breeding. • Mechanism of endocrine action on carp spawning used of different agents for induction of breeding LINPE method and multiple breeding 	AGR/N-4903

	1	Maturing and breeding the mature fish	50	<ol style="list-style-type: none"> 1. Maintain the maturation room with low light. 2. Maintain minimum noise, movement and other disturbance. 3. Ensure separation of feed preparation area from the area of maturation. 4. Drain and clean the mature tank periodically. 5. Ensure the equipment s to capture the mature female are clean. 	AGR/N-4903
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2	Performing spawning	50	<p>6. Perform washing and disinfection without disturbing brood stock</p> <p>7. Reduce the risk of disease transfer between the females during collective spawning by ensuring individual spawning to happen.</p> <p>8. Ensure best quality of water for spawning and hatching tank.</p> <p>9. Appropriate temperature should manage in the both tanks as maturation tank.</p> <p>10. Capture the gravid female</p> <p>11 .Place the female in a container and transfer to the spawning room if the spermatopore in present.</p> <p>12. Monitor spawning rate and length of the time for female maturation.</p> <p>13. Determine good egg production and fertilization by counting egg.</p> <p>14. Transfer the egg to the hatching tanks fallowing collection.</p>	AGR/N-4903
3	Carrying out hatching	40	<p>15.Ensure hatching in takes place in the isolated clean tank.</p> <p>16. Maintain water quality with appropriate temperature as spawning</p> <p>17. Maintain proper aeration to keep the egg in moving in suspension</p> <p>18. Ensure nauplii appears approximately appear in eight hours.</p>	AGR/N-4903

			<p>19. Stop aeration at this point in order to harvest the spawn.</p> <p>20. Place a cover over the tank and allow the healthy nauplii to aggregate in the hole cut in the centre of the cover plate.</p> <p>21. Wash and disinfect the spawn after collection.</p> <p>22. Discard the weaker spawn and unhatched eggs remaining in hatching tank.</p> <p>(PC 15-PC22)</p>	
4	Screening brood stock Health	20	<p>24. Select sample for general Health analysis to ensure it free of plathgen.</p> <p>25. Screen the selected brood for maturation.</p>	AGR/N-4903
5	Disinfection bloodstock	20	<p>26. Immerse the female the spawning tank in iodine after removing them and before returning them back to the mating. (PC26)</p>	AGR/N-4903
6	Treating Spawn	40	<p>27. Wash the sing a light which attract them to the harvested spawn by treating them with a bath immersion to prevent fungal</p>	AGR/N-4903

			<p>contamination.</p> <p>28. Harvest water to the spawn using alight which attracts them to the water surface.</p> <p>29. Hold the harvested spawn under optimal conditions until they are stocked.</p> <p>30. Wash the material and equipments used to prevent the contamination of harvested spawn .</p> <p>(PC27-PC30)</p>	
7	Good stock nutrition	40	<p>31. Ensure good diet feeding for brood-stock in the production.</p> <p>32. Balance diet with rich in vitamins, minerals, minerals, pigment, Fatty acids, which are essential for eggs production.</p> <p>(PC31-PC32)</p>	AGR/N-4903
8	Technical Knowledge	40	<p>1. Health analysis, disinfecting spawn, treating the spawn, feed and nutrition, temperature requirement.</p> <p>2. Use of chemicals, disinfectants and solutions used during hatching process.</p> <p>3. Procedure of wising and handling of brood stock, health and screening process, Use of high power light microscope, water proof flash light.</p> <p>4. To know the use of tool and equipment needed for hatchery.</p> <p>5. Standard operating procedure for hatchery.</p> <p>• (KA1 to KA4)</p>	Include all KAs of the all NOS
9	Core skill/ Generic Skill	40	<p>Reading magazine and recording with oral communication:</p>	Include all SAs and SBs of 5 NOS.
			<p><u>Reading magazine</u></p> <p>1. To understand about latest technology for larval production.</p> <p>2. Up to date system and record</p>	

			keeping on the harvest. Read and follow update records. (SA1-SA2)	
			<u>Oral Communication</u> 1) Maintain effective relationship with neighboring worker. (SA3)	
• Skill	30	1. To make decision on production process and analysis(SB1) 2. Plan on the larval production. 3. Use high power light microscope, waterproof light 4. Communication skill with neighboring farmer. 5. Planning, organizing and decision making 6. Problem solving 7. Analytical thinking-monitor, maintain the larva production. 8. Reduce the respective error improve harvesting process. (All SB)		
• Marketing	20	<ul style="list-style-type: none"> • Economic structure of aquaculture: Resources and practical • Techniques/tool for optimization Farm planning and budgeting. • Farm business analysis Methods of assets valuation and computing depreciation. • Concept of cost, return and efficiency of aquaculture. • Functions and problems of aquaculture marketing. • Marketing structures and co-operative marketing. • Basic computer knowledge 		
• Visit to the fish farm	20	• Interaction with the farmers		

•	Presentation /Seminar	30	PPT/handwriting presentation on different topic of Hatchery Production Unit.	
•	On job training	50	Knowledge of farming and its processes.	
•	Revision /according to demand of student	10		
•	Assessment	50		

4th Semester**UNIT TITEL:** PERFORM POST-SPAWNING

The unit is about performing post-spawning process by maintain and managing the spawn produced.

Scope-

1. Rear the larvae
2. Maintain larval nutrition and feed
3. General larval Condition
4. Select post larval stocking
5. Transport and sell the post larvae.

This course encompasses “5” out of “5” National Occupational standards (NOS) of “Hatchery Production Workers”.

Qualification Pack issued by ASCI. Duration of programme: 570 hrs.

S. NO	Topic /module	Duration (In hrs)	Key learning outcomes	Corresponding NOS code
	<ul style="list-style-type: none"> Introduction to post spawning process. 	40	<ul style="list-style-type: none"> Bloodstock management and transportation of brood fish. Causes of mortalities of eggs and spawn. Treatment of eggs. Spawn rearing techniques. Use of anesthetics in fish breeding and transport Cryopreservation of fish gametes. Basic Knowledge statistics 	AGR/N-4904
1	Rearing larval	50	<ol style="list-style-type: none"> Follow restriction on entering the production unit as per procedures to avoid the spread of infection Replace disinfectant solution 	AGR/N-4904

			<p>periodically.</p> <p>3. Rinse the Common used equipment regularly</p> <p>4. replace the disinfectant</p> <p>5. Check larvae post larvae regularly.</p> <p>6. Discard the larvae or spawn into a plastic contained with sodium hypochlorite or other suitable solution,</p>	
2	Maintaining Larval nutrition and feed	20	<p>1.High standard feed preparation ,maintain high standard of hygiene, high quality of feed and store in cool and dry conditions.(PC7 to PC9)</p>	AGR/N-4904
3	Managing larval health	20	<p>10.Avoid excessive density of Fish(Fresh water fish)</p> <p>11.Stock the spawn in each separate unit in hatchery</p> <p>12.Monitor quality, quantity and management of feed.</p> <p>(ALL PC)</p>	AGR/N-4904
4	Assessing general larval condition	50	<p>14.Check larvae visually in the rearing tank</p> <p>15. Assess larval Condition by inspecting them periodically.</p> <p>16. Observe larval stage, health ,activity ,swimming and abundance of feed in water quality in the tank.</p> <p>17. Transfer sample larvae for the laboratory for detail examination. (PC14 to PC17)</p>	AGR/N-4904
5	Selecting Post larvae for stocking	40	<p>18.Determine prevalence of infection.</p> <p>19.Estimate survival rate of the fry as an</p>	AGR/N-4904

			<p>indication of the general state of health, clinical history and lack of problems.</p> <p>20. select samples and carry out for tests when mature.</p> <p>(PC18 to PC20)</p>	
6	Transporting the fry	50	<p>21.Ensure the fry sent for selling generally within a maximum of 10-16 days from production to avoid damage and spoilage.</p> <p>22.Assist to lift and transport fry in large tanks or boxes</p> <p>23.Add few granules of washed, new, activated carbon for long duration transport.</p> <p>24.Seal the bags appropriately</p> <p>25.Use appropriate temperature according to the travel time and distance.</p> <p>26.Bio security measurement at the time of transportation.</p> <p>27.Disinfection the shipping containers and equipments before and after use.</p> <p>(PC 21 TO PC 27)</p>	AGR/N-4904
7	Technical knowledge	50	<ol style="list-style-type: none"> 1. Rearing larval and its health management. 2. Transportation requirements and procedures. 3. Chemicals, disinfectants and solution used during hatchery production process. 4. Bio-security procedures involved in transportation 5. Standard operating produce to be followed for hatchery 	Include all KAs of the all NOS

8	Core skills/Generic skills	30	Read magazines and understand about latest technologies in harvesting. <i>SA1</i>	Include all SAs of 5 NOS.
•	Professional skills	40		Include all SBs of 5 NOS
			<u>Decision making</u> 1.Make decision pertaining to health and nutrient management.(SB1)	
			<u>Plan and organize</u> 2.Plan on post-spawning process. (SB2)	
			<u>Customer centricity</u> 3Maintain relationships with farmers, customers and other neighboring workers as well as and well with coordination. (SB3)	
			<u>Problem solving</u> 4Identify problems that may arise and take necessary actions.(SB4)	

			<u>Analytical thinking</u> 5. Monitor and maintain the post-spawning process. 6. Reduce the repetitive errors and improve the harvesting process and conditions. (SB5 to SB6)	
			<u>Critical thinking</u> 7. Apply, analyze and evaluate the information gathered from observation and experience. (SB7)	
•	Visit to the fish farm	40	Interaction with the farmers	
•	Presentation /Seminar	20	PPT/handwriting presentation on different topic of Hatchery Production Unit.	
•	Project under taken	40		
•	On job training	20	Knowledge of farming and its processes.	
•	Revision /according to demand of student	10		
•	Assesstment of 4 th sem	50		

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