

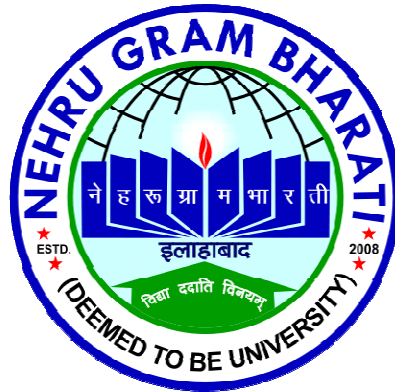
Regulations and Syllabus

For

**POST GRADUATE DIPLOMA
IN
“AQUACULTURE TECHNOLOGY AND
MANAGEMENT
”**

”

(PGDATM)



Offered by

**DEPARTMENT OF ZOOLOGY
NEHRU GRAM BHARTI
(DEEMED TO BE UNIVERVISITY),
KOTWA-JAMUNIPUR-DUBAWAL
ALLAHABAD-221505
From 2017 – 2018**

Regulations and Syllabus

(Effective from Academic Year 2017-18 onwards)

POST GRADUATE DIPLOMA IN AQUACULTURE TECHNOLOGY AND MANAGEMENT (PGDATM)

Apart from regular courses, the Department of Zoology offers a **Post Graduate Diploma in Aquaculture Technology and Management (PGDATM)** through regular mode. Our endeavour is to provide the best quality education in both conventional and applied diploma courses.

Objective

This course has been designed to develop trained manpower for research institutions, Universities, Fishery industries and agriculture in the area of aquaculture technology and management.

The Course

Highlights of the course are described below:

Name of the course

Post Graduate Diploma in Aquaculture Technology and Management (PGDATM)

Nature: Regular Mode

Medium of instruction and examination English

Eligibility for admission

Candidates for admission to the **(PGDATM)** course shall have passed Bachelor of Science degree (B.Sc.). The employee of Government, private sector and NGO (s) are also eligible through proper channel.

Duration of the course

The duration of the **(PGDATM)** course shall be for a period of one year (2 semesters). The total number of contact classes shall be 360 hours. Examinations will be conducted after end of each semester.

Course of study

The Course of study shall contain the subjects as defined in section in further section.

Number of seats: 15

Fee Structure Rs. 5,000/- per semester (Extra Rs. 10,000/- per semester for sponsored candidates)

Job Opportunities:

Central Institute of Freshwater Aquaculture (CIFA), Bhubneshwar, Central Institute of Brackish water Aquaculture CIBA, Chennai, Fish industry sector, hatchery management, Universities and self employment.

Commencement of the course

July/August of every year

Mode of admission As per the norms prescribed by N.G.B. Vishwavidyalay from time to time

Period of completion Not more than 02 years

Duration of the Programme (Minimum: 1 year; Maximum: 2 years)

To fulfill the requirements for the award of P.G. Diploma in Aquaculture Technology and Management (PGDATM), a student may clear all the papers in one year. If a student fails in one or more paper(s), he/she will have to re-appear for supplementary examination, which will be conducted alongwith the terms-end examination of the subsequent batch. Students will have to clear all papers in a maximum period of two years after admission. After expiry of two years, they will have to seek fresh admission.

The Curriculum

Highlights of the curriculum of PG Diploma in Aquaculture Technology and Management (PGDATM) are as follows:

Examination

The participants will be undergoing a continuous assessment throughout his/her period of study. The evaluation will consist of internal examinations and external examinations for each paper based on the specific requirements of the respective paper.

(A) Evaluation systems and question papers

There will be three methods of evaluation

- a. Internal Assessment conducted by the Department.
- b. The External examination conducted by the university at the end of semester for each paper concerned.
- c. Project evaluation consisting of Viva-voce which conducted by the Department.

a) Internal Assessment

Internal Assessments will be conducted for all the papers have 40 marks out of 100 marks.

Tests conducted in the Institute	(Sessional Exam)	- 20 marks
Class Attendance		- 15 marks
Assignments		- 05 marks

b) External Examination

The External examination shall be conducted by the University score 60 marks out of 100 Marks. The pattern of question papers will be as follows:

Section A: Objective type with multiple choices (20 questions 4 from each unit)	- 20%
Section B: Short answer question of either or type (10 questions 2 from each unit)	- 40%
Section C: Essay type question of either or type (5 questions 1 from each unit)	- 40%

c) Project evaluation

Each project work will have an Internal and Continuous Assessment - 40%

Term end evaluation will contain two components:

Viva-voce examination - 30%

Dissertation evaluation - 30%

Total - 100%

Attendance 75% attendance is compulsory in practical (lab courses) for appearing in the examination.

Course Structure

Semester-wise course structure is given below:

Paper Code	Title of the Paper	Core/ Elective	External marks	Internal marks	No. of Credits
SEMESTER I					
PGDATM 101	Freshwater and Cold water fishery	Core	60	40	5
PGDATM 102	Aquaculture Technology and Management	Core	60	40	5
Practical	Microbial analysis & Culture techniques	Core	30	20	4
SEMESTER II					
PGDATM 103	Fishery education, Extension and Economics of Aquaculture	Core	60	40	5
	Field work (Pond Preparation & culture)				3
PGDATM 104	Project work (Report Seminar+ Viva –voce)		150		18
	TOTAL		Total 500		40

Details of the syllabus

The course of PGDATM is divided into papers. In 1st semester 2 papers and in 2nd semester 1 paper and field work. The field work is divided in to project work, project seminar and project viva – voce. In the practicals microbial analysis and culture techniques will be conducted.

PG. DIPLOMA IN AQUACULTURE TECHNOLOGY AND MANAGEMENT

PAPER-1- Freshwater and Cold water fishery

Unit – 1

- 1.1 Riverine fisheries-river system in India: their ecology and fisheries (Ganga & Yamuna)
- 1.2 Cold water fisheries: Hill streams their ecology & fisheries (Alknanda, Bhagirathi)
- 1.3 Ponds and lake fisheries- Pond in Meza; Deoria Taal (Nainitaal)

Unit -2

- 2.1 Riverine fisheries of commercial importance
- 2.2 Cold water fisheries: Mahasheer; Carps; Trouts
- 2.3 Shell fish & fisheries: Molluscs; Crabs; Prawns; Crustaceans; Cray fish

Unit -3

- 3.1 Classification and topography of hill stream environments & salient features of different zones.
- 3.2 Classification and topography of Gangetic plains & salient features of different zones.
- 3.3 Physical environmental factors (temperature, light, pressure, currents, tides and waves) & Chemical environmental factors (oxygen, carbon dioxide and carbonates, pH, nitrogen cycle)

Unit - 4

- 4.1 Basics of aquaculture: Scope and definition, history of aquaculture, origin and growth, General principles underlying the practices of cold streams and freshwater aquaculture.
- 4.2 Types of culture systems: Traditional, extensive, semi-extensive, and intensive culture of fish and their management and economics
- 4.3 Procurement of Stocking material from natural environment, Bund breeding and Induced breeding - Transportation of fish seed and brood fish (Methods of transporting fish seed – Fingerlings and breeders – Control of mortality and measures for reducing mortality during transportation).

Unit - 5:

- 5.1 Fish Catch Statistics: A general survey of Inland and Marine fish catches of India and the world (Available Fishing Potential, Estimation of Inland fish catches, Estimation of marine fish landings).
- 5.2 Craft and Gear used in Inland and Marine Fisheries: Traditional and Mechanized Boats and Nets used in catching fish.
- 5.3 Fish Population dynamics: Fish populations and factors affecting the population structures Estimation of fish yield and control of over-fishing
Water ways in Gangetic riverine system.....

PRACTICALS

Analysis of water: Turbidity, pH, Dissolved oxygen, Alkalinity etc.

Primary productivity, Estimation by Light and Dark Bottle method

Spotters : Cultivable species of finfish and shellfish based on the theory

Identification of fresh water and marine fish

Observing different boats, nets and other instruments used in fishery

Biological analysis of fish samples for gut contents, maturity stages and fecundity

Fieldwork: Visit to fish landing and processing centres

Reference Books:

1. Friedrich, H.: Marine Biology
2. Raymont, J.E.C.: Plankton and productivity in the Oceans, Volume 1.
3. Balakrishna Nair. N. and D.M. Thampy: A text book of Marine ecology
4. Broecker, W.S.: Chemical Oceanography
5. Sverdrup, H.V., M.W., Johnson and R.H. Fleming.: The Oceans - Their physics, chemistry and general biology. Prentice-Hall Inc. 1942.

PAPER II- AQUACULTURE TECHNOLOGY AND MANAGEMENT

Unit -1

- 1.1 Design, construction and management practices of Finfish hatcheries
- 1.2 Design, construction and management practices of prawn & shrimp Hatcheries

Unit – 2

- 2.1 Fertilizers: Introduction, properties of chemical fertilizers, role of inorganic, organic and bio-fertilizers in aquaculture practices.
- 2.2 Liming: Introduction, properties of liming materials, effects of liming on pond ecosystem, exchange of acidity and lime requirements, application of liming materials of ponds, acid sulfate soils

Unit – 3

- 3.1 Feeding methods: Introduction, different methods of feeding, frequency of feeding, fate of nutrients in feed, water quality and feeding rates
- 3.2 Harvesting methods-drainable ponds Cage, Handling-Transport-Preservation methods, - Pickling-Smoking - Freezing and Canning.
- 3.3 Processing & Preservation of fish products and byproducts- Fish meal, Fish Oils, Fish Sauce, Fish Glue, Sanitation in Processing-Treatment & Disposal of Fish Wastes –Solid and Liquid

Unit - 4

- 4.1 Introduction: Diseases: Definition, Disease problems in aquaculture, Infectious and non-infectious diseases.
- 4.2 Environmental induced diseases of fish. Thermal stress, O₂ deficiency, stress due to pH variations; Gas bubble disease
- 4.3 Nutrition deficiency diseases: Avitaminosis, Mineral deficiency, Starvation.

Unit -5

- 5.1 Economic Feasibility of investment analysis, Cash flow analysis- Socio-economic analysis, risk and insurance–Role of banks and funding agencies.

PRACTICALS

1. Examination of normal and diseased fish - Thorough examination of external surface
2. Autopsy of the diseased fish

3. Host examination – Collection of parasites
4. Slide preparation - fixing - staining and mounting of parasites
5. Histopathology of organs of diseased fish (Sectioning – Staining and Mounting)
6. Slides of fish parasites (Protozoan – Helminth and Copepod)
7. Design and estimates of area and construction of freshwater fish/shrimp farm

Reference Text Books :

1. Pillay, T.V.R. & M.A. Dill. Advances in Aquaculture. Fishing News (Books) Ltd., England, 1979.
2. Stickney, R.R. Principles of Warm water Aquaculture. John Wiley & Sons Inc., 1979.
3. Hefner, B. & Y. Prugim. Commercial Fish Farming. John Wiley & Sons Inc., 1981.
4. Boyd, C.E. Water Quality Management for Pond Fish Culture. Elsevier Scientific Publishing Company, 1982.
5. Jhingran, V.G. Fish and Fisheries of India. Hindustan Publishing Corporation India, 1982
6. Bose, A.N. et. Al. Coastal Aquaculture Engineering. Oxford & IBH Publishing Company Pvt. Ltd., 1991.
7. Cheng, T.C. The Biology of Animal Parasites. Saunders, Philadelphia, 1964.
8. Reichenbach, H.H. Fish Pathology. T.F.H. (Great Britain) Ltd., England, 1965.
9. Conroy, D.A. & R.L. Herman. Textbook of Fish Diseases. Ibid, 1968.
10. Ribelin, W.E. & G. Miguki. The Pathology of Fishes. The Univ. of Wisconsin Press Ltd., Great Russel st., London, 1975.
11. Schaperclaus. Fish Diseases. Vol. I & II.

PAPER III-FISHERY EDUCATION, EXTENSION AND ECONOMICS OF AQUACULTURE

Unit – 1

- 1.1 Understanding extension education, extension research, and extension service;
- 1.2 Scope and importance of fisheries extension and aquaculture extension.

UNIT -2

- 2.1 Fisheries training and education in India: Training Institutes, Universities, Research Organisations, etc.
- 2.1 Institutional funding to fisheries and aquaculture sector

Unit – 3

- 3.1 Socio-economic conditions of fishermen and fish farmers
- 3.2 Fishermen Co-operative Societies

Unit – 4

- 4.1 Role of government agencies – Role of NABARD and other central government agencies in the upliftment of fisher folk.
- 4.2 Role of state government agencies and NGO'S in various fishery activities – Loans and credits, policies
- 4.3 Integrated river linking; concept of management

Unit – 5

- 5.1 Fishery and Economics-Financial and Economic Feasibility of investment analysis, Cash flow analysis- Socio-economic analysis.
- 5.2 Risk and insurance–Role of banks and funding agencies- Fish Marketing and Resource Management. Legal and Environmental issues

PRACTICALS

Visiting marine research Institutes etc.,

Collecting data of the Fishermen in the nearby fishing villages.

Collecting the particulars of Farming practices and its economics.

Case studies of extension approaches practiced by select state departments of fisheries, practice of extension methods / approaches in a marine fishing village and an aquaculture based village; field exposure on extension activities by DoF and other agencies.

Reference Text Books :

1. Bond, et. al. Fish Inspection and Quality Control. Fishing News (Books), England, 1971.
2. Allen, et. al. Eds. Bio-Economics of Aquaculture, Elsevier, 1984.
3. Chaston, I. Business Management in Fisheries and Aquaculture, Fishing News (Books) Ltd., 1984.
4. Govindan, T.K. Fish Processing Technology, Oxford-IBH, 1985.
5. Meade, J.W. Aquaculture Management, Van Nostrand, New York, 1989.
6. Hopher, B. and Y. Pruginin. Commercial Fish Farming. Wiley-Interscience, 1989.
7. Shang, Y.C. Aquaculture Economic Analysis – An Introduction. 1990.
8. Pillay, T.V.R. Aquaculture Principles and Practices. Fishing News (Books) Ltd., London, 1990.