

**Rajarshi Shahu Mahavidyalaya,
(Autonomous)
Latur.**

S Y L L A B U S

B.Sc. Second Year

Subject :Fishery Science

**Semester Pattern
W.e.f. June 2014**

**RAJARSHI SHAHU
MAHAVIDYALAYA,
(AUTONOMOUS)
LATUR.**

Course Structure

B.Sc. S.Y.

(Semester III)

W.e.f. June 2014

❖ **Paper V: AQUACULTURE**
Course Code: U-FIS-371

❖ **Paper VI: FISH BIOLOGY AND HARVEST TECHNOLOGY**
Course Code: U-FIS-372

❖ **LAB COURSE III**
Course Code: U-FIS-373

❖ **LAB COURSE IV**
Course Code: U-FIS-374

RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS) LATUR.

Course Structure

B.Sc. S.Y. (Semester III)

W.e.f. June 2014

Subject: FISHERY SCIENCE

Paper V: AQUACULTURE

Course Code: U-FIS-371

Marks – 50

Hours 45

Credits – 2

Objectives

- Enable students to understand Aquaculture involves cultivating freshwater and saltwater populations under controlled conditions, and can be contrasted with commercial fishing.
- Enable students to understand Successful aquaculture takes into consideration the biology of the aquatic species such as feeding, water flow and temperature needs, and disease prevention and design like water source and water quality study, pond and tank containment systems, water filtration and aeration.
- Enable students to understand Common products of aquaculture are catfish, tilapia, trout, crawfish, oysters, shrimp, and salmon, and tropical fish for aquariums.
- Enable students to understand Aquaculture basics and history of aquaculture.
- Enable students to understand wide range of aspects such as Systems of aquaculture, aquaculture in different types of water bodies, Pond management, study of Monoculture, polyculture and integrated culture systems, Water and soil quality in relation to fish production and estimation of productivity.

Course outcome:

- It emphasizes the importance of site selection for aqua farm.
- It gives an idea about important points to be remember before prepare aqua farm project.
- It describe about the important points to be considered to select a suitable site for aqua farm. Different stages of site selection, how these factors influences in reducing cost of construction, trouble free culture, easy maintenance for ponds and other related structures.
- How the accessibility of the site condition, physical feature of the land and water source influences in reducing the cost of construction.
- Site condition, topography and other factors influences in preparing layout of fish farm, planning and designing of the ponds.
- It also briefly describe about classification of ponds based on various factors like construction and source of water and their merits and demerits.

Unit –I

I. Importance, objective and scope of aquaculture

II. Introduction to types of aquaculture:

a) Culture based on type of water – Freshwater aquaculture, brackish water aquaculture and Mari culture.

b) Culture based on economic or commercial consideration – Extensive, Intensive and Semi-intensive culture.

c)

Culture based on types of designs of culture – pond culture, pen culture, cage culture, raceway culture, fish culture in paddy fields.

d) Culture based on species - Monoculture and Polyculture, monosex culture (Tilapia)

e) Culture based on climatic condition – Cold water fish culture and warm water fish culture.

Unit –II Intensive Fish farming

A) Selection of site- a) Topography b) Soil type c) Water supply

B) Construction of fish farm –

a) Layout, design and construction of different types of ponds-

i) Hatching pits ii) Nursery pond iii) Rearing Pond iv) Stocking pond

b) Physical, Chemical and Biological factors affecting fish culture.

c) Objectives of fish culture.

d) Qualities of cultivable species of fishes.

e) Types of cultivable fishes, qualities of major carps.

f) Breeding habits of cultivable fishes with special reference to Indian Major Carps.

Unit –III

Management of fish pond in fish culture

- 1) Pre stocking management-
 - a) Drying the pond,
 - b) Eradication of aquatic weeds
 - c) Eradication of predatory fishes , weed fishes, aquatic insects.
 - d) Liming the pond,
 - e) Pond fertilization
- 2) Stocking of fish seed.
- 3) Supplementary feeding.
- 4) Harvesting the fish.

Unit-IV

1. Composite Fish Farming

- a) Principle of composite fish farming.
- b) Objective of composite fish farming.
- c) Composite fish farming in India.
- d) Stocking density.

2. Integrated Fish Farming

- a) Duck cum fish farming.
- b) Poultry cum fish farming
- c) Pig cum fish farming.
- d) Cattle cum fish farming
- e) Paddy cum fish farming

Books and References Recommended for Paper-V

1. Hilmar Kristjonnson (Ed.) Vol 1 (1962), Vol 2 (1964) Vol. 3 (1971) Modern Fishing Gears of the World 3. Fishing News Books Ltd. England.
2. Jhingran and Srivastava (1983) Fisheries Development in India.
Concept Publishing Co. New Delhi, 606p
2. Jan-Olof- Traung (Ed.) Vol 1 (1955), Vol 2 (1966) Vol. 3 (1967).Fishing Boats of the World. Fishing News Books Ltd. England.
3. Subbarao, Mechanization of marine fisherman.
4. Srivastava, Impact of mechanization on small fishermen.
5. Text book of Fish Biology and Fisheries - By S. S. Khanna and H. R.
6. Singh(2003 Ed.), Narendra Publishing House, Delhi – 110006
7. Encyclopedia of Fishes and Fisheries of India – By A. K. Pandey and G. S. Sandhu, Vol I to IV, Amol Publications, New Delhi.
8. A text book of Fishery Science and Indian Fisheries – By C.B.L.Srivastava
(Kitab Mahal)
9. An Introduction to Fishes – S. S. Khanna, Central Book Depot, Allahabad.

RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS) LATUR.

Course Structure

B.Sc. S.Y. (Semester III)

W.e.f. June 2014

Subject: FISHERY SCIENCE

LAB COURSE III

Course Code: U-FIS-373

Marks – 50

Hours 30

Credits – 1

Objectives

- Enable students to understand Aquaculture Successful aquaculture takes into consideration the biology of the aquatic species such as feeding, water flow and temperature needs, and disease prevention and design like water source and water quality study, pond and tank containment systems, water filtration and aeration.
- Enable students to understand Identification, Classification, and description of special feature of Fresh Water Fishes ,Indigenous and exotic carps, brackish water fishes
- Enable students to understand Classification, and description of Phytoplankton and zooplankton

Course outcome:

- It emphasizes the importance of site selection for aqua farm Lay out design and construction of different types of ponds.
- It describe about the important points to be considered to select a suitable site for aqua farm. Different stages of site selection, how these factors influences in reducing cost of construction, trouble free culture, easy maintenance for ponds and other related structures..
- Site condition, topography and other factors influences in preparing layout of fish farm, planning and designing of the ponds.
- The students will understand to Estimate of carbon dioxide in water sample .
- The students will understand to Estimate chloride in water sample
- The students will understand to operate water analysis kit.
- The students will understand to different fish diseases and treatments in actual field.

- 1 - Identification, Classification, and description of special features of Fresh Water Fishes**
- 2. Identification, Classification, and description of special features brackish Water Fishes**
- 3. Identification, Classification, and description of special feature of Indigenous and exotic carps**
- 4. Identification, Classification, and description of special feature of Phytoplankton**
- 5. Identification, Classification, and description of special feature of Zooplanktone.**
- 6. Lay out design and construction of different types of ponds.**
- 7. Study of aquatic weeds and plants.**
- 8. Estimation of dissolved oxygen in water sample**
- 9. Estimation of carbon dioxide in water sample**
- 10. Estimation of chloride in water sample**
- 11. Estimation of pH, salinity, Nitrate etc by water analysis kit.**
- 12. Identification of fishing crafts and gears**
- 13. Study of fish diseases**
- 14. Visit to fish breeding farm**

RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS) LATUR.

Course Structure

B.Sc. S.Y. (Semester III)

W.e.f. June 2014

Subject: FISHERY SCIENCE

Paper VI: FISH BIOLOGY AND HARVEST TECHNOLOGY

Course Code: U-FIS-372

Marks – 50

Hours 45

Credits – 2

Objectives

- Enable students to understand in identification, external and internal morphology, tagging, reproduction, and aging of fishes.
- Enable students to understand Maturity and Spawning in fishes.
- Enable students to understand Methods of fishing and fishing gear
- Enable students to understand different Fishing Crafts

Course outcome:

At the end of this course, students should be able to

- Students enable to understand Sexual maturity stages and breeding seasons of Indian major carps and exotic carps
- Students enable to understand of gamete maturation and release of eggs and sperms
- Students enable to understand Methods of fishing and fishing gear along with the operation of fishing gear
- Have a greater understanding of external and internal morphology
- Have greater insight into how growth is regulated in fishes.

UNIT I

Growth Studies:

- a) Length – weight relationship
- b) Ponderal Index

c) Age and Growth Studies in Fishes:

- i) Methods of age and growth determination – Tagging, Marking, Scale method, otolith, radio carbon uptake method, RNA – DNA ratio method,

Length frequency method.

ii) Factors affecting growth rate in fishes.

iii) Significance of age and growth studies.

UNIT II

Maturity and Spawning in fishes:

a) Sexual dimorphism in fishes.

b) Seasonal changes in testes (Morphological and Histological)

c) Seasonal changes in ovary (Morphological and Histological)

d) Study of oogenesis and spermatogenesis in fishes.

e) Determination of spawning periodicity by ova diameter method.

f) Study of Gonado somatic index.

g) Fecundity in fishes – Methods of estimation of fecundity:

i) Volumetric ii) Gravimetric iii) Von Bayers Method

UNIT III

Methods of fishing and fishing gear

i) Introduction

ii) Fishing without gear

iii) Wounding gear

iv) Line fishing

v) Fishing baited springs, fish screens, fish traps.

vi) Traditional and Modern fishing gears :

dip net, cast net, triangular net purse net, drag net gill net, bag net, rampani net, trawls, tuna line fishing.

vii) Fishing gear material,

viii) Fabrication of nets.

viii) Preservation of gears

ix) Recent development in fishing gears of India.

UNIT IV: Fishing Crafts:

- i) Indigenous fishing crafts-
 - a) Sea fishing crafts- i) Catameron ii) Masula boat iii) Dug out canoes
iv) Out trigger canoes v) Plank built canoes
 - b) Built up boats
 - c) Mechanization of Indian fishing crafts.
 - d) Selection of boat construction material.
 - e) Electronics in fishing industry – i) Echo sounder ii) Sonar iii) Electro fishing

Books and References Recommended for Paper-VI

1. Jan-Olof- Traung (Ed.) Vol 1 (1955), Vol 2 (1966) Vol. 3 (1967).Fishing Boats of the World. Fishing News Books Ltd. England.
2. Subbarao, Mechanization of marine fisherman. Srivastava, Impact of mechanization on small fishermen
3. Hilmar Kristjonsonn (Ed.) Vol 1 (1962), Vol 2 (1964) Vol. 3 (1971) Modern Fishing Gears of the World 3. Fishing News Books Ltd. England.
4. Text book of Fish Biology and Fisheries - By S. S. Khanna and H. R. Singh(2003 Ed.), Narendra Publishing House, Delhi – 110006
5. FISHES BY Mary chandy

RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)LATUR.

Course Structure

B.Sc. S.Y. (Third Semester)

W.e.f. June 2014

Subject: FISHERY SCIENCE

LAB COURSE IV

Course Code: U-FIS-374

Marks – 50

Hours 30

Credits – 2

Objectives

1. Enable students to understand in identification of sexual dimorphism in fishes. they can differentiate male and female
2. Enable students to understand Maturity and Spawning in fishes so that they can breed fishes according to season.
3. Enable students to understand Methods of histological slides preparation.
4. Enable students to understand Length weight relationship study in locally available fishes.

Course outcome:

At the end of this course, students should be able to

- Students enable to understand sexual dimorphism
- Students enable to understand Sexual maturity stages and breeding seasons of Indian major carps and exotic carps.
- Students enable to understand of gamete maturation and release of eggs and sperms
- Students enable to understand Methods of fishing and fishing gear along with the operation of fishing gear
- Have a greater understanding of Preparation of permanent histological slides.
- Students enable to understand structure and building of Crafts – Catamaran, Masula boat, Dugout canoes.
- Students enable to understand Determination of fish age by scale method

1. Identification and sexual dimorphism in fishes (any 5)

2. Study of maturity stages in teleosts (any locally available fishes) –
Morphological and histological studies.

3. Preparation of permanent histological slides of Testis and Ovary of any locally available fish.

4. Assessment of fecundity of any two locally available fish.\

5. Assessment of spawning season by ova diameter measurement in any locally available fish.

6. Length weight relationship study in locally available fishes. (any 5)

7. Determination of fish age by scale method.

8. Study of Fishing Gears- Wounding gears, fish traps, Line fishing, Nets- Cast net, Drag net, Gill net.

9. Study of Crafts – Catamaran, Masula boat, Dugout canoes

**RAJARSHI SHAHU MAHAVIDYALAYA,
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Course Structure

B.Sc. S.Y.

(Semester IV)

- ❖ **Paper VII: Culture & Breeding of Ornamental Fishes and Aquarium Keeping**
Course Code: U-FIS-471
- ❖ **Paper VIII: Fish Nutrition and Feed Technology**
Course Code: U-FIS-472
- ❖ **LAB COURSE V**
Course Code: U-FIS-473
- ❖ **LAB COURSE VI**
Course Code: U-FIS-474

**RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)
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Course Structure

B.Sc. S.Y. (Semester IV)

W.e.f. June 2014

Subject: FISHERY SCIENCE

Paper VII: Culture & Breeding of Ornamental Fishes and Aquarium Keeping

Course Code: U-FIS-471

U-FIS-471

Marks – 50

Hours 45

Credits – 2

Objectives

- Enable students to understand Aquarium Setting
- To give students knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation.
- To teach techniques of construction of glass aquarium and its maintenance
- Enable students to understand Hybridization of ornamental fishes

Course outcome:

- Student enables to set aquarium
- Student enables to manage the home as well as commercial aquariums
- Students will learn to handle different aquarium equipments
- Students will learn Decorations of aquarium
- Students will learn Breeding of Aquarium Fishes

UNIT -I

1 Aquarium Setting

- a) Introduction and history of aquarium
- b) How to set up an aquarium
- c) Choosing a spot for your aquarium
- d) Choosing an aquarium
- e) Acrylic or Glass Aquarium
- f) Putting the aquarium in place

Choosing equipment

Lighting

Heating

Filtration

- Mechanical filtration
- Chemical filtration
- Biological filtration
- Other types of filtration
- Air Pumps

Decorations

- Plants
- Setting up the aquarium
- Water chemistry
- Conditioning water
- Cycling
- Adding Fish
- Stress in aquarium
- Water problems and their solutions
- Tropical fish aquarium problems
- Vacation care for your fish
- Safety

2 – Aquarium Plants

- Choosing plants for your aquarium
- Factors that affect plant growth
- Water
- Lighting
- Substrate
- Nutrients
- Suitable plants for beginners
- Caring for plants
- Propagating plants.

Chapter 3 - Aquarium Fishes

Choosing Fishes for aquarium

Taxonomy

Size, shape, colour adaptability

UNIT -II

4 - Aquarium Maintenance

Daily routine

Checking the fish

Checking the water
Checking the Filter
Feeding the fish
Weekly Routine
Monthly Routine
The “Old Aquarium” Syndrome
Filtration

5 - Food and its Types

Feeding Fish
Flavor and taste
Sound
Smell
Color and Buoyancy of food
Understanding feeding and digestion in fish
Protein
Fatty acids
Fat-soluble carotenoid
Carbohydrates
Vitamins and minerals
Live foods
Cultivation of some common live food
Feeding Fry
Feeding Habits

UNIT -III

6 – Breeding of Aquarium Fishes

Spawning Methods
Egg Scatterers
Egg Depositors
Mouth Brooders
Nest Builders
Livebearers

7. Equipment management while breeding fish

Choosing the parents
Conditioning the parents
Tips for effective breeding
Raising Fry
Failure in Reproduction

8 – Diseases

Buying healthy fish
Prevent diseases
Quarantine Aquarium
Columnaris
Gill Disease

Ick
Dropsy
Fin-rot
Fungal Infections
Hole in the Head
Pop-Eye
Cloudy Eye
Fish Lice
Nematode Worms
Water Quality Induced Diseases
Treating Fish

UNIT -IV

9-Hybridization of ornamental fishes

Hybrid gold fish variety comet, celestial, telescope eye, lion head, fan tail.

10-Genetic manipulation and transgenic ornamental fishes

Types of transgenic fish

Methods of making transgenic fish.

Genes of interest

Merits and demerits of transgenic fish

Books and References Recommended for Paper-VII

1. Hawlins, A.D. (Ed). Aquarium Systems. Academic Press.
2. Hunnam, P. Ward Lock, Living Aquarium.
3. Ratjak, K. and Zukal, R., Aquarium Fishes and Plants.
4. Spotte and John Wiley, S., Seawater Aquariums.
5. Straughan, R.P.L. and Thomas Yoseloff. Salt water Aquarium in the Home.
6. Dick Mills, 1987. Illustrated Guide to Aquarium Fishes. Published by Galley and Price, an imprint of W.H. Smith and Sons Limited, England.
7. Stephen Spotte. Marine Aquarium Keeping. A Wiley-Interscience Publication.
8. Dick Mills and Gwynne Vevere. Tropical Aquarium Fishes. Published by Salamander Books Limited. London.
9. Carcacson, R.H. A field guide to the Coral Reef Fishes of the Indian and West Pacific Oceans.
10. Vincent B. Hargreaves. The Tropical Marine Aquarium. Mc-Graw-Hill Book Company. New York.
11. Guy N. Smith. Profitable Fish Keeping.
12. Maurice Melzak. Marine Aquarium Manual. B.T. Balsford Ltd., London.
13. Ornamental aquarium fishes of India- 1999- K.L.Tekrival and A.A. Rao.- TFH United Kingdom.
14. Marine Ornamental species (collection, culture and conservation) – J.C.Cato and C.L.Brown. – Blackwell Science

**RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)
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Course Structure

B.Sc. S.Y. (Semester IV)

W.e.f. June 2014

Subject: FISHERY SCIENCE

Paper VIII: Fish Nutrition and Feed Technology

Course Code: U-FIS-472

Marks – 50

Hours 45

Credits – 2

Objectives

1. The course deals with different aspects of fish nutrition and feed technology. The fish requires different types of nutrients for its growth, health and maintenance. The various nutrients required by fish and shellfish include proteins, lipids, carbohydrates, vitamins and minerals. Crustacean nutritional requirements, feed formulation and feeding strategy.
2. Basic concept of feed formulation and different feed processing techniques The course also deals with the fish feed formulation and manufacturing of various forms of feeds and their description and use have been presented. Different feed additives like binders, antioxidants
3. The importance of carbohydrate in aqua feed and the relationship of dietary Carbohydrate for protein sparing.

Course outcome:

- The course deals with different aspects of fish nutrition and feed technology. The fish requires different types of nutrients for its growth, health and maintenance. The various nutrients required by fish and shellfish include proteins, lipids, carbohydrates, vitamins and minerals.
- The course also deals with the nutritional requirement of cultivable fish and shellfish. The nutritional requirement of fish is dependent on the various factors like type of fish species /size/age/metabolic state etc. and an overview of nutritional requirements by different fish and shellfish species are presented.
- The course also deals with the fish feed formulation and manufacturing of various forms of feeds and their description and use have been presented.
- Different feed additives like binders, antioxidants, enzymes, pigments, growth promoters and feed stimulants have been dealt.
- An account on feed storage, use of preservatives and antioxidants gives an insight into importance of preserving nutrient value of feeds during storage. The details on feed evaluation in terms of food conversion ratio (FCR), feed efficiency ratio (FER), protein efficiency ratio (PER), net protein utilization and biological value are also presented.

Unit I

I) Composition of the Fish

- a) Introduction
- b) Why composition is important
- c) Structure of fish muscle
- d) The principal components of fish muscle
- e) The minor components of fish muscle
- f) Factors affecting the composition of fish
- g) Fish for human consumption

II) Ingredients for Fish Feed Manufacturing

- a) Introduction
- b) Mill by-products
- c) Oil Extractives
- d) Animal by-products
- e) Miscellaneous

Unit II

III) Anti-oxidants in compounded feeds

- a) Introduction
- b) Criteria for selecting feed Anti-oxidants
- c) Commonly used feed Anti-oxidants
- d) Functional effect of Anti-oxidants
- e) Level of anti-oxidant usage in feed
- f) Other effect on Anti-oxidant in feed

IV) Storage problems of Feedstuffs

- a) Introduction
- b) Insects
- c) Micro-organisms
- d) Deteriorative changes in stored feed stuffs

e) Storing feedstuffs

Unit III

V) Stability of micro-ingredients in fish feed

- a) Introduction
- b) Selection of Micro-ingredient sources
- c) Stability of micro-ingredient
- d) Diluents for premixes

VI) Fish Feed Formulation

- a) Introduction
- b) Balancing crude protein level
- c) Steps in feed formulation
- d) Best-buy techniques

Unit IV

VII) Material Flow in Feed Manufacturing

- a) Introduction
- b) Receiving
- c) Processing
- d) Packaging
- e) Storage and distribution

VIII) Feed Milling Processes

- a) Introduction
- b) Grinding
- c) Mixing
- d) Pelletting

Books and References Recommended for Paper-VIII

1. Verreth, J. Fish Larval Nutrition. Chapman and Hall, Publ.
2. Stephen Goddard, 1996. Feed Management in Intensive Aquaculture.
3. Farm-made Aquafeeds. FAO Fisheries Technical Paper 343.
4. Devadasan, K. (Ed.)1994. Nutrients and Bioactive substances in Aquatic Organisms.
5. Kalver John, E. 1972. Fish Nutrition. Academic Press, London.
6. Halver John E. and Tiews Klaus, 1979 Finfish Nutrition and Fish Feed Technology. Heenemann, Berlin.
7. Hephher Balfour 1988. Nutrition of Pond Fishes. Cambridge University Press.
8. Tyler Peter and Calow Peter, 1985. Fish Energetics. Croom Helin, London.
9. Winberg, 1960. Rate of Metabolism and Food Requirements in Fishes. Fisheries Research Board of Canada.
10. Shimeno Sadao, 1982. Studies on Carbohydrate Metabolism in Fish. Amerind Publishing Company, New Delhi.
11. Cowey, C.B. et al. (Eds.) 1985. Nutrition and Feeding in Fishes. Academic Press, London
12. Sena S. De Silva and Trevor Anderson. Fish Nutrition in Aquaculture. Chapman and Hall, Publ.

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Course Structure

B.Sc. S.Y. (Semester IV)

W.e.f. June 2014

Subject: FISHERY SCIENCE

LAB COURSE V= U-FIS-473

Objectives

- Enable students to understand Identify classify and describe an aquarium fishes & hybrid aquarium fishes.
- To give students knowledge about various foods and its Types
- To teach techniques of construction of glass aquarium and its maintenance
- To give students knowledge about various techniques of ornamental fish breeding, rearing and its marketing to make them self sustainable after graduation.
- Enable students to understand Aquarium fish diseases

1. Course outcome:

- Student enables Identify and describe the aquarium accessories with their use and maintains
- Student enables to set aquarium
- Student enables to manage the home as well as commercial aquariums
- Students will learn Maintenance of an aquarium, Decorations of aquarium
- Students will learn Breeding of Aquarium Fishes
- Students will learn Cultivation of some common live food

- Students will be self sustainable after graduation in the field of Aquarium keeping.

1. Identify and describe the aquarium accessories with their use and maintains. (any five).

1. Identify classify and describe an aquarium fishes (any five).
2. Identify and describe hybrid aquarium fishes.
3. Identify and describe food and its Types
4. Identify and describe an aquarium plants (any five).
5. Preparation of an aquarium tank of suitable size
6. Setting of aquarium.
7. Maintenance of an aquarium.
8. Cultivation of some common live food
9. Aquarium fish diseases

1. Columnaris
 2. Gill Disease
 3. Ick
 4. Dropsy
 5. Fin-rot
 6. Fungal Infections
 7. Hole in the Head
 8. Pop-Eye
 9. Cloudy Eye
 10. Fish Lice
 11. Nematode Worms
 12. Water Quality Induced Diseases
- Treating Fish

RAJARSHI SHAHU MAHAVIDYALAYA, (AUTONOMOUS)

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Course Structure

B.Sc. S.Y. (Semester IV)

W.e.f. June 2014

Subject: FISHERY SCIENCE

Lab course

LAB COURSE VI

Course Code: U-FIS-474

Objectives

- The course deals with different aspects of fish nutrition and feed technology.
- Enable students to understand The importance of carbohydrate in aqua feed and the relationship of dietary Carbohydrate for protein sparing.
- Enable students to understand different milling machines their operation handling and use.
- Enable students to understand Packing and storage of feed stuffs
- Enable students to understand Estimation of carbohydrate/ vitamin from feed ingredients and feed.

Course outcome:

- At the end of this course, students should be able to
 - Students enable to understand formulation and manufacturing of various forms of feeds and their description and use have been presented
 - Students enable to understand Different feed additives like binders, antioxidants, enzymes, pigments, growth promoters and feed stimulants have been dealt.
 - Students enable to Formulate fish feed for Herbivorous/Carnivorous fishes.
 - Students enable to analyze proximate compounds of feed stuff.
 - Students enable to identify locally available feed ingredients
 - Students enable to formulate different fish diets.

1. Study of different milling machines (Any 2)
2. Study of locally available feed ingredients (Any 5)
3. Packing and storage of feed stuffs
4. Study of insects & microorganism affecting the feeds storage
5. Formulation of fish feed for Herbivorous/Carnivorous fishes
6. Estimation of crude protein from feed ingredients and feed.(Standard MAFF (1982) method for determining proteins in feedstuffs and feed ingredients.
7. Estimation of lipid from feed ingredients and feed.
8. Estimation of carbohydrate from feed ingredients and feed.
9. Estimation of vitamin from feed ingredients and feed.

10. 3. PROXIMATE ANALYSES

1. MOISTURE
2. CRUDE LIPIDS
3. CRUDE FIBRE
4. ASH
5. NITROGEN-FREE EXTRACT (NFE)

11. Collection and submission of locally available feed ingredients.
12. Submission of prepared fish feed.