

Distribution of credits for B.Sc. Fishery Science (optional)

Under Faculty of Science

B. Sc. Syllabus structure

Semester Pattern effective from June 2016

Subject: Fishery Science

Semester	Paper No.	Name of the Course	Instruction Hrs/	Total period	Internal Evaluati	Marks of Semester	Total Mark	Credits
I	CCFS-I (Section A)	Taxonomy & General Topics P-I	03	45	10	40	50	2
	CCFS-I (Section B)	Types Study - Wallago attu P-II	03	45	10	40	50	2
II	CCFS-II (Section A)	Aquaculture P-III	03	45	10	40	50	2
	CCFS-II (Section B)	Fish-seed Production Technology P-IV	03	45	10	40	50	2
	CCFSP-I I & II (Section A & B)]	Practical's based on Section A & Section B of CCFS I & CCFS II (P-V)	04	20 Practical	20	80	100	4

Total credits semester I and II: 12

III	CCFS- III (Section A)	Ecology & Fish Pathology P-VI	03	45	10	40	50	2
	CCFS- III (Section B)	Fish Biology P-VII	03	45	10	40	50	2
	CCFSP- II [CCFS III & IV (Section A)]	Practical's based on P-VI & P-VIII (P-X)	04		10	40	50	2
	CCFSP- II [CCFS III & IV (Section B)]	SEC I (1 Skill/ optional)			15×3 = 45	-	-	(02)*
IV	CCFS -IV (Section A)	Anatomy, Physiology & Microbiology P-VIII	03	45	10	40	50	2
	CCFS- IV (Section B)	Fish Technology P-IX	03	45	10	40	50	2
	CCFSP- III [CCFS- III & IV	Practical's based on P-VII & P-IX (P-XI)	04	10 practical	10	40	50	2
	CCFSP- III [CCFS- III & IV (Section B)]	SEC II (1 Skill / optional)			15×3 = 45	-	-	(02)*
Total credits semester III and IV								12(04)*

Semester	Course No.	Name of the Course	Instruction Hrs/ week	Total period	Internal Evaluation	Marks of Semester	Total Marks	Credits
V	DECFS- I (Section A)	Mari culture & Indian Fisheries P-XII	03	45	10	40	50	2
	DECFS- I [(Section B) Elective]	Aquaculture Technique & Fish Nutrition P-XIII	03	45	10	40	50	2
	DECCFSP- I [DECFS I & II (Section A)]	Practical's based on P-XIII & P-XV(P-XVI)	04	10 Practical	10	40	50	2
	DECFS- II [DECFS- I & IV (Section B)]	SEC III (1 Skill/ optional)			15×3 = 45	-	-	(02)*
VI	DECFS- II (Section A)	Aquarium Keeping & Fish Genetics P-XIV	03	45	10	40	50	2
	DECFS- II [(Section B) Elective]	Fish Economics, Marketing, Co-operative & Extension P-XV	03	45	10	40	50	2
	DECFS- II [DECFS- I & II (Section B)]	Practical's based on P-XIII & P-XIV (P-XVII)	04	10 Practical	10	40	50	2
	DECFS- II (Section B)	SEC IV (Project)			50	-	50	(2)*
Total credits semester V and VI								12(04)*

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. First year (I - SEMESTER)
Semester Pattern effective from June 2016
FISHERY SCIENCE
CCFS I (Section –A)
Paper - I

TAXONOMY AND GENERAL TOPICS

Credits: 02 (MARKS: 50)

PERIODS: 45

UNIT I

11

- 1) Introduction, definition, scope and importance of fishery science.
- 2) Classification of fishes (Berg, 1940) up to class level.
- 3) External characters of teleost and Elasmobranchii.
- 4) Difference between teleost and Elasmobranchii fishes.
- 5) Body forms in fishes.
- 6) Different types of fins and their functions.

UNIT II

12

- 1) Fish identification techniques.
 - a. Study of morphometric characters in fishes.
 - b. Study of meristic characters in fishes
- 2) Locomotion in fishes: Types of locomotion, special mode of locomotion, locomotion due to the movement of appendages.
- 3) Migration in fishes – general account of migration, types of migration, advantages of migration, factors influencing migration.
- 4) Structure and functions of skin in fishes.
- 5) Study of different types of scales.

UNIT III

11

- 1) Colouration in fishes – Source of colour, colour changes in fishes, regulation of colour changes, significance of colour changes.
- 2) Air bladder, location of air bladder, different types of air bladder, their structure and functions.
- 3) Weberian ossicle in fishes – structure and functions.
- 4) Parental care in fishes

UNIT IV

11

- 1) Light producing organs in fishes – occurrence, nature of light producing organs, location, structure of light producing organs, significance of

luminescence in fishes.

2) Electric organs in fishes – Occurrence, location of electric organs, general structure of electric organ, electric organ in torpedo, electrophorus electricus, functions of electric organ.

3) Sound producing organs in fishes.

4) Poison glands in fishes – Introduction, difference between poisonous and venomous fishes, division of poisonous fishes.

5) Lateral line canal – Structure of lateral line canal

6) Structure and functions of neuromast organs.

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)

B. Sc. First year (I - SEMESTER)

Semester Pattern effective from June 2016

FISHERY SCIENCE

CCFS I (Section –B)

Paper - II

PAPER II : TYPE STUDY WALLAGO ATTU (FRESH WAER SHARK)

Credits: 02 (MARKS: 50)

PERIODS: 45

UNIT I

12

- 1) Introduction and classification
 - a. Distinguishing characters of cypriniformes.
 - b. Distinguishing characters of family cyprinide.
 - c. General characters of the family siluridae.
- 2) External characters of wallago attu
- 3) Skin – structure and functions.
- 4) Endoskeleton
 - a. Axial skeleton – typical trunk vertebra, caudal vertebra, ribs
 - b. Appendicular skeleton – pectoral girdle and fin, pelvic girdle and fin.
- 5) Air bladder of wallago attu – structure and functions.
- 6) Weberian ossicles – structure and functions.

UNIT – II

11

- 1) Coelom and alimentary canal.
- 2) Associated glands of digestive system.
 - a. Liver
 - b. Pancreas
 - c. Gall baldder
- 3) Physiology of digestion
- 4) Respiratory organs
 - a. Structure of gills
 - b. Physiology of respiration

UNIT III

11

- 1) Cardiovascular system

- a. Structure of heart
 - b. Arterial system – Ventral aorta and afferent branchial arteries, dorsal aorta and its branches.
 - c. Venous system
 - i. Anterior cardinal system
 - ii. Posterior cardinal system
 - iii. Hepatic portal system
 - d. Composition of blood
- 2) Nervous system
- a. Structure of brain
 - b. Cranial nervous system
 - c. Spinal nerves

UNIT IV

11

- 1) Lateral line canals – Structure and functions.
- 2) Pit organs – Structure and functions.
- 3) Internal ear (membranous labyrinth) – Structure and functions.
- 4) Olfactory organs – Structure and functions.
- 5) Photoreceptor organs (eye)
- 6) Male urinogenital system of *wallogo attu*
- 7) Female urinogenital system of *wallogo attu*
- 8) Spawning habits and structure of eggs.

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. First year (II - SEMESTER)
Semester Pattern effective from June 2016
FISHERY SCIENCE
CCFS II (Section –A)
Paper - III

AQUACULTURE

Credits: 02 (MARKS: 50)

PERIODS: 45

UNIT I

11

- 1) Importance, objective and scope of aquaculture.
- 2) Comparison between agriculture, aquaculture and capture fishery.
- 3) Introduction to types of aquaculture.
 - a. Culture bases on types of water:
Fresh water aquaculture, brackish water aquaculture, mariculture.
 - b. Culture based on economic or commercial consideration:
Extensive culture, intensive culture & semi-intensive culture
 - c. Culture based on the types of designs of culture:
Pond culture, culture in manmade reservoirs, fish culture in paddy fields, culture in bheries, culture in tanks, raceway culture, cage culture and pen culture.
 - d. Culture based on number:
Monoculture and poly culture
 - e. Culture based on climatic condition:
Cold water fish culture and warm water fish culture

UNIT II

12

- Intensive fish farming
- A) Selection of site -
- 1) Topography 2) soil type 3) water supply
- B) Construction of fish farm
- a) Layout, design and construction of different types of pond
 - 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 culturable 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

11

Fish Pond 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
- f. Stocking of fish seed
- g. Supplementary feeding
- h. Harvesting the fish

UNIT IV

1) Composite fish farming

11

- a. Principle of composite fish farming
- b. Objectives of composite fish culture
- c. Composite fish culture 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

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. First year (II - SEMESTER)
Semester Pattern effective from June 2016
FISHERY SCIENCE
CCFS II (Section –B)
Paper - IV

PAPER IV: FISH SEED PRODUCTION TECHNOLOGY

Credits: 02 (MARKS: 50)

PERIODS: 45

UNIT I

12

1) Breeding techniques

A) Bundh breeding

Types of bundhs – i) wet bundhs ii) dry bundhs iii) modern bundhs

B) Artificial fertilization by stripping

C) Induced breeding by hypophysation

i) Definition

ii) Hormones responsible for induced breeding

iii) Dissection and removal of gland

iv) Preservation and storage of pituitary gland

v) Preparation of gland suspension for injection and dosage.

vi) Collection, rearing and selection of brooders

vii) Synthetic hormones used in induced breeding.

UNIT II

11

1) Fish seed trade and transport

a. Classification of fish seed and identification techniques

b. Different units of fish seed counting

c. Fish seed trade in India

d. Fish seed transportation system

i. Open transportation system

- ii. Close transportation system
- e. Causes of mortality in transportation
- f. Use of chemicals in live-fish transportation
- g. Anesthetic drugs use in transport
- h. Antiseptic and antibiotics used in transportation
- i. Technique of fish seed release.

UNIT III

12

Hatcheries and management (Principle, structure and management)

- i) Haching happa
- ii) Glass jar hatchery
- iii) Bin hatchery
- iv) CIFE D 80 model (Dwivedi – 80)
- v) CIFE D 81 model (Dwivedi 81)
- vi) Chinese hatchery

UNIT IV

10

- a) Reverine spawn resources investigation technique
- b). Selection of spawn collection site
- c) Gears used for collection of spawn and their diversities
- d) Methods of collection of spawn

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

B. Sc. First year (I & II SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER V: PRACTICAL SYLLABUS

Practical Paper: CCFS P-I (P-V)

(Annual practical Based on [CCMB I & II (Section A & B)])

PAPER V: PRACTICAL SYLLABUS

(Practical syllabus requires **four periods per batch per week for 2 consecutive days** B.Sc. First year practical includes studies of growth of microorganisms and life activities of Microorganisms. These studies need two consecutive days for completion of practical.)

Credits: 04 (Marks: 100)

- 1) Identify, classify and describe following fishes :
 - i. Indian major carps
 - a) *catla catla* b) *cirrhina mrigala* c) *labeo rohita*
 - ii. Exotic carps
 - a) *cyprinus carpio* b) *ctinopharyngodon idella*
 - c) *hypothalmyethys molitrix*
 - iii. Adaptation in fishes
 - a) *Tropedo* b) *trygon* c) *tilapia* d) *pterois*
- 2) Permanent mounting of fish scales and submission of prepared slides
 - a) Placoid b) cycloid c) ctenoid
- 3) Fish identification techniques (any locally available fish)
 - a) Study of any five morphometric characters
 - b) Study of any five meristic characters
- 4) Dissection of *wallago attu* / any locally available teleost.
Dissection – digestive system, urinogenital system (male & female),
Ventral aorta and afferant branchial arteries, brain, weberian ossicle, air bladder
- 5) Preparation of pituitary gland extract and injection techniques, dosage of synthetic hormones to fishes for induced breeding.
- 6) Identification of spawn, fry and fingerlings of Indian major carps.
- 7) Skeleton study
 - a) Trunk vertebra b) caudal vertebra c) pectoral girdle d) pelvic girdle
- 8) Identify and describe predatory fishes (any three).
- 9) Identify and describe predatory insects (any three).
- 10) Identification of aquatic weeds(any three)
- 11) Identification of artificial fish feed(any three)
- 12) Preparation of layout plan of fish farm and their submission.
- 13) Visit to fish farm/ hatchery / fish market and submission of report.

LIST OF REFERENCE BOOK

- 1) General and applied ichthyology – S.K. Gupta, P.G. Gupta, S. Chand Publishing company, New Delhi.
- 2) An introduction to fishes – S.S. Khanna, Central Book Depo, Allahabad.
- 3) A text book of fish, fisheries and technology – K. P. Biswas, Narendra publishing house, New Delhi.
- 4) A manual of aquaculture – Santhanam, Narendra publishing house, New Delhi.
- 5) Fish and fisheries – Pandey, Shukla, rastogi publication, Merrut.
- 6) Inland fisheries (ecology and management) – R.L. welcome. Discovery publishing house, New. Dehli.
- 7) Aquaculture and aquarium keeping – S.P. Chavan, M.S. Kadam, Niture S.D. Educational publishers and distributors, Aurangabad (M.S.).
- 8) A text book of fishery science and Indian fisheries – C.B.L. Shrivastava. Kitab mahal Allahabad.
- 9) A manual of fishery science – A.D. Mohekar, K.R. Reddy, M.G. Babre. Manjusha publication, Naldurg (M.S.)
- 10) Applied fishery science – vol. I, II S.M. Shafi. Atlantic publishers and distributors, New Delhi
- 11) An introduction to Indian fisheries – Mrs. Uma Sharma, S.P. Grover. Bisensingh, Mahendrapalsing, Connot place, Deharadunn.
- 12) An introduction to fishes – H.S.L. Bhamrah and K. Juneja. Anmol publication, New Delhi
- 13) Fish and fisheries of India – V.G. Jhingran. Hindustan publishing corpo. New Delhi
- 14) Wallago attu (Fresh water shark of India) – B.M. Sinha. Hindustan publishing corp. New Delhi.
- 15) Fish culture in India – Alikunhi
- 16) Aquaculture – Bardarch Ryther, M.C. Larney

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY,
NANDED

B. Sc. First year (I & II SEMESTER)

SUBJECT – FISHERY SCIENCE

PAPER V: PRACTICAL SYLLABUS

Practical Paper: CCFS P-I (P-V)

(Annual practical Based on [CCMB I & II (Section A & B)])

PAPER V: PRACTICAL SYLLABUS

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Credits: 04 (Marks: 100)

Paper V: Practical Examination paper pattern

DATE:

MAX MARKS: 100

CENTRE:

TIME: 3hrs.

BATCH NO. :

- Q.1. Dissect..... to expose.....
(wallago/locally available fish, major dissection) 20
- Q.2. Dissect To expose / dissect out
(wallago/locally available fish , minor dissection) 10
- OR
- Preparation of pituitary gland extract
- Q.3. Identify, classify and describe the following one specimen from each 20
- a) Major carp
 - b) Exotic carp
 - c) Modification in fish
 - d) Fish seed
- Q.4. Identify, classify and describe the following : (One specimen from each) 20
- a) Predatory fish
 - b) Predatory insect
 - c) Bone
 - d) Scale
- Q.5. a. Define and measure morphometric characters from the given teleost. 10
- 1) 2) 3) 4) 5)
- b. Count any five meristic characters from the given teleost. 10
- Q.6. Record book, submission of permanent slide excursion report 10
