

॥ सा विद्या या विमुक्तये ॥



स्वामी रामानंद तीर्थ मराठवाडा विद्यापीठ, नांदेड

“ज्ञानतीर्थ” परिसर, विष्णुपुरी, नांदेड - ४३१६०६ (महाराष्ट्र)

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

“Dnyanteerth”, Vishnupuri, Nanded - 431606 Maharashtra State (INDIA)

Established on 17th September 1994 – Recognized by the UGC U/s 2(f) and 12(B), NAAC Re-accredited with 'A' Grade



ACADEMIC (1-BOARD OF STUDIES) SECTION

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संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे CBCS Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९-२० पासून लागू करण्याबाबत.

प रि प त्र क

या परिपत्रकान्वये सर्व संबंधितांना कळविण्यात येते की, दिनांक ०८ जून २०१९ रोजी संपन्न झालेल्या ४४व्या मा. विद्या परिषद बैठकीतील ऐनवेळचा विषय क्र.११/४४-२०१९ च्या ठरावानुसार प्रस्तुत विद्यापीठाच्या संलग्नित महाविद्यालयांतील विज्ञान व तंत्रज्ञान विद्याशाखेतील पदवी स्तरावरील प्रथम वर्षाचे खालील विषयांचे C.B.C.S. (Choice Based Credit System) Pattern नुसारचे अभ्यासक्रम शैक्षणिक वर्ष २०१९-२० पासून लागू करण्यात येत आहेत.

- | | |
|---|---------------------------------------|
| 1. Agricultural Microbiology | 18. Dyes and Drugs |
| 2. Agrochemicals & Fertilizers | 19. Electronics |
| 3. Analytical Chemistry | 20. Environmental Science |
| 4. B.C.A. | 21. Fishery Science |
| 5. B.Voc. (Food Processing, Preservation and Storage) | 22. Food Science |
| 6. B.Voc. (Web Printing Technology) | 23. Geology |
| 7. Biochemistry | 24. Horticulture |
| 8. Bioinformatics | 25. Industrial Chemistry |
| 9. Biophysics | 26. Information Technology (Optional) |
| 10. Biotechnology (Vocational) | 27. Mathematics |
| 11. Biotechnonology | 28. Microbiology |
| 12. Botany | 29. Network Technology |
| 13. Chemistry | 30. Physics |
| 14. Computer Application (Optional) | 31. Software Engineering |
| 15. Computer Science (Optional) | 32. Statistics |
| 16. Computer Science | 33. Zoology |
| 17. Dairy Science | |

सदरील परिपत्रक व अभ्यासक्रम प्रस्तुत विद्यापीठाच्या www.srtmun.ac.in या संकेतस्थळावर उपलब्ध आहेत. तरी सदरील बाब ही सर्व संबंधितांच्या निदर्शनास आणून द्यावी.

‘ज्ञानतीर्थ’ परिसर,
विष्णुपुरी, नांदेड - ४३१ ६०६.
जा.क्र.: शैक्षणिक-०१/परिपत्रक/पदवी-सीबीसीएस अभ्यासक्रम/
२०१९-२०/२९२

दिनांक : ०३.०७.२०१९.

प्रत माहिती व पुढील कार्यवाहीस्तव :

- १) मा. कुलसचिव यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- २) मा. संचालक, परीक्षा व मूल्यमापन मंडळ यांचे कार्यालय, प्रस्तुत विद्यापीठ.
- ३) प्राचार्य, सर्व संबंधित संलग्नित महाविद्यालये, प्रस्तुत विद्यापीठ.
- ४) साहाय्यक कुलसचिव, पदव्युत्तर विभाग, प्रस्तुत विद्यापीठ.
- ५) उपकुलसचिव, पात्रता विभाग, प्रस्तुत विद्यापीठ.
- ६) सिस्टम एक्सपर्ट, शैक्षणिक विभाग, प्रस्तुत विद्यापीठ.

स्वाक्षरित / -

उपकुलसचिव

शैक्षणिक (१-अभ्यासमंडळ) विभाग

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED

**SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM(CBCS)
COURSE STRUCTURE (NEW SCHEME)
B. SC. FIRST YEAR (I - SEMESTER)**

SUBJECT: FISHERY SCIENCE

FROM JUNE 2019

SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY, NANDED
SEMESTER PATTERN CURRICULUM UNDER
CHOICE BASED CREDIT SYSTEM (CBCS)

Faculty of science
Under Graduate (UG) Programmes
Subject Fishery Science
(w.e.f. June 2019)

Class B.Sc. First Year

Semester/ Annual	Course Name.		Paper No.& Title Of paper	Total Periods/ Periods Perweek	Marks for		Credits/ Marks
					Internal (CA)	External (ESE)	
Semester I	CCFS-I	Section A	Ichthyotaxonomy& ecological adaptation I	45 (03/week)	10	40	Cre. 02 Mar.50
		Section B	Type study - Wallago attu II	45 (03/week)	10	40	Cre. 02 Mar.50
Semester II	CCFS- II	Section A	Fresh water fish culture technology III	45 (03/week)	10	40	Cre. 02 Mar.50
		Section B	Fish seed production &hatcheries management IV	45 (03/week)	10	40	Cre. 02 Mar.50
Annual pattern	CCFSP I Section A + Section B		Practical Paper V Based on CCFS I& II	24	20	80	Cre.04 Mar.100
Total credits of semester I&II					60	240	12

CCFS: Core course fishery science, CCFSP Core course fishery science practical.

CA: Continuous assessment, ESE: End of semester examination.

Marks of CA10: 5 Marks for test/assignment&5marks for attendance.

Marks of CA20: 10 Marks for test&10 marks for attendance.

Class B.Sc. Second Year

Semester/ Annual	Course Name.		Paper No.& Title Of paper	Total Periods/ Periods Per week	Marks for		Credits/ Marks
					Internal (CA)	External (ECS)	
Semester III	CCFS- III	Section A	Fish diseases management VI	45 03/week	10	40	Cre. 02 Mar.50
		Section B	Fish developmental Biology VII	45 03/week	10	40	Cre. 02 Mar.50
Annual pattern	SECFS I		Manufacturing of fish byproduct(A) Or Soil & water analysis techniques(B)	25 2+1	25	25	Cre. 02 Mar.50
Semester IV	CCFS- IV	Section A	Fish preservation & fish by production technology VIII	45 03/week	10	40	Cre. 02 Mar.50
		Section B	Fishing craft & gear technology IX	45 03/week	10	40	Cre. 02 Mar.50
Annual pattern	SECFS II		Preservation and Processing Technology(A) OR Manufacturing of fishing nets	25 2+1	25	25	Cre. 02 Mar.50
Annual pattern	CCFSP II		Practical Paper X Based on CCFS VI&VIII	20	10	40	Cre.02 Mar.50
Annual pattern	CCFSP III		Practical Paper XI Based on CCFS VII&IX	20	10	40	Cre.02 Mar.50
Total credits of semester III&IV					110	290	Cre.16 Mar.400

B.Sc III Year

Semester/ Annual	Course Name.		Paper No.& Title Of paper	Total Periods/ Periods Perweek	Marks for		Credits / Marks
					Internal (CA)	External (ECS)	
Semester V	CCFS -V	Section A	Indian Marine Fisheries (A) XII	45 03/week	10	40	Cre. 02 Mar.50
		Section B	Aquaculture Techniques and fish Nutrition(B I) XIII OR Soil & water management in aquaculture(B II) XIII	45 03/week	10	40	Cre. 02 Mar.50
Annual pattern	SECFS III		Fabrication of aquarium (A) (Theory + pract.) OR Breeding technique of ornamental fishes(B)	25 2+1	25	25	Cre. 02 Mar.50
Semester VI	CCFS -VI	Section A	Ornamental fish production and Management(A)XIV	45 03/week	10	40	Cre. 02 Mar.50
		Section B	Fisheries Economics co-operative & marketing management (B I) XV OR Nutrition and feed technology(B II) XV	45 03/week	10	40	Cre. 02 Mar.50
Annual pattern	SECFS IV		Fabrication of aquarium (A) (Theory + pract.) OR Breeding technique of ornamental fishes(B)	25 2+1	25	25	Cre. 02 Mar.50
Annual pattern	CCFSP IV		Practical XVI A based on theory papers XII+XIV	20	10	40	Cre.02 Mar.50
Annual pattern	CCFSP V		Practical XVII based on theory papers(B I) OR Practical XVII based on theory papers(B II)	20	10	40	Cre.02 Mar.50
Total credits of semester V&VI					110	290	16 400

B. Sc. Syllabus structure
Semester Pattern effective from June 2019
Subject: Fishery Science

Semester	Paper No.	Name of the course
I	I	Icthyotaxonomy & ecological adaptation
	II	Type study of Wallago attu
II	III	Fresh water fish culture technology
	IV	Fish seed production & hatcheries management
	V	Practical Based on paper I&II
III	VI	Fish diseases management
	VII	Fish developmental Biology
	SEC I	Manufacturing of fish byproduct (A) Or Soil & water analysis techniques
IV	VIII	Fish preservation & fish by production technology
	IX	Fishing craft & gear technology
	SEC II	Preservation and Processing Technology (A) OR Manufacturing of fishing nets
	X	Practical based on VI&VIII
	XI	Practical based on Paper VII & IX
V	XII	Indian Marine Fisheries (A)
	XIII	Aquaculture Techniques and fish Nutrition(B I) OR Soil & water management in aquaculture(B II)
	SEC III	Fish feed production technology(A) (Theory+pract) OR Culture of fish food organisms(B) (Theory+pract)
VI	XIV	Ornamental fish production and Management(A)
	XV	Fisheries Economics, co-operative and marketing management(B I) OR Nutrition and feed technology(B II)

	SEC IV A OR B	Fabrication of aquarium (A) (Theory+pract) OR Breeding technique of ornamental fishes(B)
	XVI(A)	Practical based on theory papersXII+XIV
	XVII (BI&II)	Practical based on theory papers XIII+XV(B I) OR Practical based on theory papers XIII+XV (B II)

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 2019

FISHERY SCIENCE

CCFS I (Section-A) (P-I)

Paper-I: Ichthyotaxonomy & Ecological Adaptation

Credit 02

Marks 50

period 45

UNIT I (11 Period)

Ichthyotaxonomy

- 1) Scope and importance of fishery science.
- 2) Classification of fishes (Berg, 1940) up to class level
- 3) General characters of class Elasmobranchii
- 4) General characters of class Holocephali
- 5) General characters of class Dipnoi
- 6) General characters of class Teleostomi
- 7) Difference between Elasmobranch and Teleost fishes

UNIT II (12 Period)

- 1) Body forms in fishes.
- 2) Different types of fins and their functions.
- 3) Fish identification techniques.
 - i. Study of morphometric characters in fishes.
 - ii. Study of meristic characters in fishes
 - iii. Study of descriptive characters in fishes
- 4) Locomotion in fishes: Types of locomotion, special mode of locomotion, locomotion due to the movement of appendages.
- 5) Structure and functions of skin in fishes.
- 6) Study of different types of scales.

UNIT III (11 Period)

Ecological adaptation in fishes

- 1) Migration in fishes – general account of migration, types of migration, advantages of migration, factors influencing migration.
- 2) Colouration in fishes – Source of colour, colour changes in fishes, regulation of colour changes, significance of colour changes.
- 3) Light producing organs in fishes – occurrence, nature of light producing, location, structure of light producing organs, significance of luminescence in fishes.
- 4) Electric organs in fishes – Occurrence, location of electric organs, general structure of electric organ, electric organ in torpedo, *Electrophorus electricus*, functions of electric organ.
- 5) Sound producing organs in fishes
- 6) Poison glands in fishes – Introduction, difference between poisonous and venomous fishes, division of poisonous fishes

UNIT IV (11 Period)

- 1) Air bladder, location of air bladder, different types of air bladder, their structure and functions.
- 2) Weberian ossicle in fishes – structure and functions.
- 3) Lateral line canal – Structure of lateral line canal
- 4) Structure and functions of neuromast organs.

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 2019

FISHERY SCIENCE

CCFS I (Section-B) (P-II)

Paper-II: Type study: *Wallago attu* Fresh Water Shark

Credit 02

Marks 50

period 45

UNIT I

(12 Period)

- 1) Introduction and classification
- 2) External characters
- 3) Skin – structure and functions.
- 4) Endoskeleton
 - i. Axial skeleton – typical trunk vertebra, caudal vertebra, ribs
 - ii. Appendicular skeleton – pectoral girdle and fin, pelvic girdle and fin.
- 5) Air bladder – structure and functions.
- 6) Weberian ossicles – structure and functions.

UNIT II

(11 Period)

- 1) Coelom and alimentary canal.
- 2) Associated glands of digestive system.
 - i. Liver
 - ii. Pancreas
 - iii. Gall bladder
- 3) Physiology of digestion
- 4) Respiratory system
 - i. Structure of gills
 - ii. Physiology of respiration

UNIT III

(11 Period)

- 1) Blood circulatory system
 - i. Structure & working of heart
 - ii. Arterial system
 - iii. Venous system
 - iv. Composition of blood
- 2) Nervous system
 - i. Structure of brain
 - ii. Cranial nerves
 - iii. Spinal nerves

UNIT IV

(11 Period)

- 1) Excretory system
- 2) Male reproductive system
- 3) Female reproductive system
- 4) Spawning habits and structure of eggs.
- 5) Photoreceptor organs (eye)

- 6) Internal ear (membranous labyrinth) – Structure and functions.
- 7) Olfactory organs – Structure and functions.

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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 2019
FISHERY SCIENCE
CCFS II (Section-A) (P-III)

Paper-III: Fresh water fish culture technology

Credit 02

Marks 50

period 45

UNIT I

(11 Period)

- 1) Importance, objective and scope of aquaculture.
- 2) Introduction to types of aquaculture.
 - i. Culture based on economic or commercial consideration: Extensive culture, intensive culture & semi-intensive culture
 - ii. 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.
 - iii. Culture based on number of species: Monoculture and poly culture
 - iv. Culture based on climatic condition: Cold water fish culture, warm water fish culture

UNIT II

(12 Period)

Intensive fish farming

- 1) Selection of site -
 - i. Topography
 - ii. Soil type
 - iii. Water supply
- 2) 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.
- 3) Objectives of fish culture
- 4) Qualities of culturable species of fishes
- 5) Types of cultivable fishes
- 6) Culture qualities & breeding habits of Indian major carps

UNIT III

(11 Period)

Fish Pond Management

1. **Pre-stocking Management:** Drying, ploughing, liming, manuring, watering, Eradication of aquatic weeds; Eradication of predatory fishes, weed fishes, aquatic insects, predatory animals
2. **Stocking Management:** Seed selection, acclimatization, stocking
3. **Post-stocking Management:** Feeding and Feed management, Water quality management, disease management, harvesting

UNIT IV

(11 Period)

1) Composite fish farming

- i. Principle of composite fish farming
- ii. Objectives of composite fish culture
- iii. Composite fish culture in India
- iv. Stocking density

2) Integrated fish farming

- i. Principle of Integrated fish farming
- ii. Paddy cum fish farming

- iii. Poultry cum fish farming
- iv. Cattle cum fish farming

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 2019

FISHERY SCIENCE

CCFS II (Section-B) (P-IV)

Paper- IV: Fish Seed Production & Hatcheries Management

Credit 02

Marks 50

period 45

UNIT I

(11 Period)

- 1) Natural Seed collection
 - i. Spawn resources investigation technique
 - ii. Selection of spawn collection site
 - iii. Gears used for collection of spawn
 - iv. Methods of collection of spawn
- 2) Bundh breeding
 - Types of bundhs –
 - i) Wet bundhs ii) Dry bundhs iii) Modern bundhs

UNIT II

(11 Period)

- 1) Artificial fertilization by stripping
 - i) Dry Method ii) Wet Method
- 2) Induced breeding by hypophysation
 - i. Introduction
 - ii. Identification & selection of brooders
 - iii. Dissection and removal of pituitary gland
 - iv. Preservation and storage of pituitary gland
 - v. Preparation of gland suspension for injection and dosage
- 3) Hormones responsible for induced breeding
- 4) Synthetic hormones used in induced breeding

UNIT III

(12 Period)

Hatcheries and management (Principle, structure and management)

- 1) Hatching happa
- 2) Glass jar hatchery
- 3) Bin hatchery
- 4) CIFE D 80 model (Dwivedi – 80)
- 5) Chinese circular hatchery

UNIT IV

(11 Period)

- 1) **Fish seed transportation**
 - i. Open transportation system
 - ii. Close transportation system
 - iii. Causes of mortality in transportation
 - iv. Use of chemicals in live-fish transportation
 - v. Anesthetic drugs use in transport
 - vi. Antiseptic and antibiotics used in transportation
 - vii. Technique of fish seed release.
- 2) **Fish seed trade**
 - i. Classification of fish seed
 - ii. Identification techniques

iii. Different units of fish seed counting

iv. Fish seed trade in India

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. First year (I & II SEMESTER)
Annual Patter Effective from June 2019
FISHERY SCIENCE
Practical Paper: CCFSP I (P-V)
(Annual practical Based on CCFS I & II (Section A & B))
Paper-V: Practical Syllabus

Credit 04

Mark 100

- 1) Fish identification techniques (any locally available fish)
 - i. Study of any five morphometric characters
 - ii. Study of any five meristic characters
- 2) Identify, classify and describe following fishes :
 - a) Indian major carps
 - i) *Catla catla* ii) *Labeo rohita* iii) *Cirrhinus mrigala*
 - b) Exotic carps
 - i) *Hypothalmyethys molitrix* ii) *Ctinopharyngodon idella* iii) *Cyprinus carpio*
 - c) Adaptation in fishes
 - i) *Tropedo* ii) *Trygon* iii) *Tilapia* iv) *Pterois* v) *Exocoetus*
 - 3) Identify and describe predatory fishes (any three).
 - 4) Identify and describe predatory insects (any three).
 - 5) Identification of aquatic weeds (any three)
 - 6) Identification of fish feed (any three)
 - 7) Permanent mounting of fish scales (Submission)
 - i) Placoid ii) Cycloid iii) Ctenoid
 - 8) Identification of spawn, fry and fingerlings of Indian major carps.
 - 9) Preparation of pituitary gland extract, injection techniques & dosage.
 - 10) Skeleton study
 - i) Trunk vertebra ii) Caudal vertebra iii) Pectoral girdle iv) Pelvic girdle
 - 11) Dissection of *wallago attu* / any locally available teleost.
 - i. Digestive system,
 - ii. Urinogenital system
 - iii. Heart and Ventral aorta, afferent branchial vessels,
 - iv. Brain,
 - v. Air bladder
 - vi. Weberian ossicle
 - 12) Preparation of layout plan of fish farm and their submission.

13) Visit to fish farm/ hatchery / fish market and submission of report.

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SWAMI RAMANAND TEERTH MARATHWADA UNIVERSITY NANDED
Choice Based Credit System (CBCS) Course Structure (New Scheme)
B. Sc. First year (I & II SEMESTER)
Annual Patter Effective from June 2019
FISHERY SCIENCE
Practical Paper: CCFSP I (P-V)
(Annual practical Based on CCFS I & II (Section A & B))
Paper-V: Practical Syllabus
Paper V: Practical Examination paper pattern

DATE: / /
CENTRE

MAX MARK 80
TIME 4 hrs

-
- Q. 1) Dissect fish so as to expose ----- system of local available fish 20
(Wallago/ local available any fish, major dissection)
- Q.2) Dissect fish so as to expose/ dissect out its brain/ air bladder/ weberian ossicle 10
(Local available any fish minor dissection)
- OR
- Preparation of pituitary gland extract
- Q.3) Identify, classify and describe the following one specimen from each 15
a) Major carp
b) Exotic carp
c) Modification in fish
- Q. 4) Identify, classify and describe the following one specimen from each 15
a) Predatory fish
b) Predatory insect
c) Fish scale
- Q.5. a) Define and measure any five morphometric characters from the given fish 10
b) Define and count any five meristic characters from the given fish 10

Board of Studies in Fishery Science

- | | |
|--|-----------------------|
| 01 Dr. Gaikwad Jayprakash Manikrao
Associate Professor & Head, Department of Fishery Science
Shri. Shivaji College, Parbhani, Dist. Parbhani. | Chairman |
| 02 Dr. Ahirrao Sunil Deoram
Associate Professor, Department of Fishery Science
Shri Shivaji College, Parbhani, Dist. Parbhani. | Member |
| 03 Dr. Papatwar N.G
Associate Professor & Head, Department of Fishery Science
DSM Arts, Commerce & Science College, Jintur Dist. Parbhani. | Member |
| 04 Dr. Kadam Sunil Uttamrao
Associate Professor & Head, Department of Fishery Science
DSM College, Parbhani, Dist. Parbhani | Member |
| 05 Mrs. Ratna Vyankat Kirtane
Assistant Professor, Department of Fishery Science
Dayanand Science College, Latur | Member |
| 06 Dr. Hiwre Chandrashekhar J.
Professor & Head , Department of Zoology
Dr. Babasaheb Ambedkar Marathwada University, Aurangabad | Member |
| 07 Dr. Ingole Baban
Professor of CSIR & Chief Scientist
National Institute of Oceanography (NIO), GOA | Member |
| 08 Dr. Sarwade Jeevan Pandurang
Associate Professor & Head, Department of Zoology,
Art, Science & Commerce College, Indapur, Dist. Pune | Member |
| 09 Dr. Sawate Sopan Sambhaji
Assistant Manager, Growel Feeds Pvt. Ltd. Syno 57,
Chevuru Village, Mudinepalli Mandal, Dist. Krishna, AP | Member |
| 10 Shri Patil Dhananjay Wamanrao
Assistant professor & Head, Department of Fishery Science
Toshniwal Arts Commerce & Science College, Sengaon Dist: Hingoli | Invited Member |
| 11 Shri Markad Sandip Surendra
Assistant professor, Department of Fishery Science
Toshniwal Arts Commerce & Science College, Sengaon Dist: Hingoli | Invited Member |