Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Structure and Curriculum of Four Year Multidisciplinary Degree (Honors/Research) Programme with Multiple Entry and Exit option

Undergraduate Programme of Science

B.Sc. Third Year

Board of Studies

in

Fishery Science

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

[UG III Year]

w.e.f. June, 2025

(In Accordance with NEP-2020)

Review Statement

The NEP Cell reviewed the Curriculum of **B.Sc. (Honors/Research) in Fishery Science** to be effective from the **Academic Year 2025-26.** It was found that, the structure is as per the NEP-2020 guidelines of Govt. of Maharashtra.

Date:11/04/2025

Place: Latur

NEP CELL

Rajarshi Shahu Mahavidyalaya, Latur

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CERTIFICATE

I hereby certify that the documents attached are the Bonafide copies of the Curriculum of **B.Sc. (Honors/Research) in Fishery Science** to be effective from the **Academic Year 2025-26.**

Date:

Place: Latur

(Name and Signature)
Chairperson
Board of Studies in Fishery Science
Rajarshi Shahu Mahavidyalaya, Latur
(Autonomous)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya,Latur

(Autonomous)

Members of Board of Studies in Fishery Science

Under the Faculty of Science

Sr. No.	Name	Designation	In position
1	Dr. D.S.Rathod	Chairperson	HoD
2	Prof. J.M. Gaikwad Head, Department of Zoology, Shiva Mahavidyalaya, Parthian	Member	V.C. Nominee
3	Dr. N.G Popatwar Head, Department of Zoology, *Dnyanopasak* Mahavidyalaya, Jintur	Member	Academic Council Nominee
4	Mr.Vijaykumsar Bhanudsrao Sutar Head, Department of Aquatic Environment Management College of Fisheries ,Udgir	Member	Expert from outside for Special Course
5	Dr. Manoj Sharma	Member	Expert from outside for Special Course
6	Balasaheb Venktrao Sager AFDO, Department of Fisheries Govt. of Maharashtra	Member	Expert from Industry
7	Mr. Jalil Patel Commissioner, Department of Fisheries Govt. of Maharashtra	Member	P.G. Alumni
8	Dr. K.S.Raut	Member	Faculty Member
9	Mr. Datta Nalle	Member	Faculty Member
10	Miss. Pratiksha Patil	Member	Faculty Member
11	Miss. Nasreen Shaikh	Member	Faculty Member
12	Mr. Suraj Revankar	Member	Faculty Member

From the Desk of the Chairperson…

The Department of Fishery Science was established in the year 1983. Department has well established Laboratory to carry out regular practical's for B.Sc. fishery Science degree course. Wet laboratory facility is also available in the department to carry out practicals related with culture of aquatic organism in laboratory conditions. Equipment regarding feed manufacturing are available in the department to carry out various teaching, research and extension activities.

To reach the mission of "Pursuit of Excellence" in higher education to make our students globally competent. The departmental staff is committed towards our work with dedication, determination and devotion.

National Education Policy NEP-2020 focuses more on practical rather than theoretical learning. It also focus on developing overall personality of students by incorporating Humanitarian and Constitutional values, creativity and critical thinking, harnessing innovation, use of modern technology and interaction with various stakeholders. It uses the practical based pedagogy to evolve and make education more experiential, holistic, integrated, learner-centric, flexible and developing skill etc. To skilled and trained students can accept the challenge of the future, as we know that the new policy also envisages the refinement and improvement in the Learning Outcome based Curriculum Framework.

The syllabus of B.Sc. I has been designed as per the National Education Policy (NEP), 2020, the present structure comprises Discipline specific courses (DSC), Discipline Specific Electives (DSE), Discipline Specific Minor Course (DSM), Generic/Open Electives (GE/OE), Vocational Specific Course (VSC), Skill Enhancement Course (SEC), Ability Enhancement Course (AEC) etc. The discipline specific courses (DSC) are compulsory and the elective courses can be chosen from the given Basket. Except Ability Enhancement courses, all other courses, comprise theory and practicals.

The project work is specially underlined in this structure. The project will mainly involve experimental work. The students will be asked their choice for project. The Generic Electives will be offered to the students of other departments of the college. The students will have the option to choose one generic elective from the given Basket. The generic elective comprises theory as well as practical. The students will also undertake one Vocational Specific Course (VSC) and one Skill Enhancement Course (SEC) of two credits each. The VSC and SEC also comprise theory and practicals. These courses will be chosen by the students from the concerned basket. One of the DSC is specified for Indian Knowledge Systems (IKS). Indian Knowledge Systems have a strong foundation in Indian Culture, Philosophy and Spirituality and have evolved through thousands of years.

B.Sc. Fishery Science course will help to understand the term fisheries & Aquaculture itself clear its meaning. It is related to catching of inland and marine fishes for commercial purposes. It involves

aquaculture, gears, navigation, oceanography, aquarium management, breeding, processing, export and import of seafood, special products and by-products, research and related activities.

With reference to global changes occurring in higher education in various national and international universities, the syllabi of B.Sc. Fishery Science is designed which is to be effectively implemented from June, 2017. The committee members of BoS in fishery science also took the local need and employability of graduate students while framing the syllabus, In order to make students employable, they must have thorough understanding of aquaculture engineering. Experts suggested to introduce one separate paper on 'Aquaculture Engineering and Technology' for third year students. Keeping in view of the guidelines given in the UGC curriculum. The number of objectives is taken into consideration while reforming the syllabi. To create aqua culturist, farm managers, exporters, traders, breeders and modern fishermen etc.

Chairperson

Dr. Dnyaneshwar S. Rathod

Board of Studies in Fishery Science

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Faculty of Science

Structure for Four Year Multidisciplinary Undergraduate Degree Programme in Fishery Science Multiple Entry and Exit (In accordance with NEP-2020)

Year & Level	Sem	Major		Minor	GE/ OE	VSC/ SEC (VSEC)	AEC/ VEC	OJT,FP, CEP, RP	Credit per Sem.	Cum./Cr. per exit
		DSC	DSE							
1	**2**	**3**		**4**	**5**	**6**	**7**	**8**	**9**	**10**
III 5.5	V	DSC IX: 04 Cr. DSC X: 04 Cr.	DSE-I :04 Cr	DSM III: 04 Cr. DSM IV: 02 Cr.	NA	VSC III : 02 Cr	VEC II:02 Cr EVS	NA	22	132 Cr. UG Degree
	VI	DSC XI: 04 Cr. DSC XII: 04 Cr.	DSE-I :04 Cr	DSMV : 04 Cr.	NA	VSC IV : 02 Cr	NA	Academic Project: 04 Cr.	22	
	Cum. Cr.	16	08	10	-	06		04	44	
Exit Option**:** Award of UG Degree in Major with 132 Credits or continue with Major and Minor										

Abbreviations:

1.	DSC	: Discipline Specific Core (Major)
2.	DSE	: Discipline Specific Elective (Major)
3.	DSM	: Discipline Specific Minor
4.	GE/OE	: Generic/Open Elective
5.	VSEC	: Vocational Skill and Skill Enhancement Course
6.	VSC	: Vocational Skill Course
7.	SEC	: Skill Enhancement Course
8.	AEC	: Ability Enhancement Course
9.	MIL	: Modern Indian Languages
10.	IKS	: Indian Knowledge System
11.	VEC	: Value Education Course
12.	OJT	: On Job Training
13.	FP	: Field Project
14.	CEP	: Fostering Social Responsibility & Community Engagement (FSRCE)
15.	CC	: Co-Curricular Course
16.	RP	: Research Project/Dissertation
17.	SES	: Shahu Extension Services

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Faculty of Science and Technology

Programme Outcomes (POs) for B.Sc. Programme	
POs No.	After the completion of the B.Sc. programme, a student will have obtained:
PO 1	**Disciplinary Knowledge** Comprehensive knowledge of science subjects which constitute the graduate programme and execution of scientific knowledge in the specific area.
PO 2	**Scientific Outlook** The qualities of a science graduate such as observation, precision, analytical mind, logical thinking, clarity of thought and expression and systematic approach.
PO 3	**Self-Directed Life-long Learning** Ability to appear for various competitive examinations or choose the post graduate programme or other related programme of their choice.
PO 4	**Research Skills** Functional knowledge and applications of instrumentation and laboratory techniques to do independent experiments, interpret the results and develop research ethos.
PO 5	**Problem Solving Skills** Analytical and logical skills and critical thinking to extract information from qualitative and quantitative data, formulate and solve problems in a systematic and rational manner.
PO 6	**Professional Competence and Ethics** Aptitude and skills to perform the jobs in diverse fields such as science, engineering, industries, survey , education, banking, development and planning, business, public service, self-business etc. with human rationale and moral values.

Programme Specific Outcomes (PSOs) for B.Sc. Fishery Science (Honors/Research)	
PSO No.	After completion of this programme the students will be able to -
PSO 1	The Students are expected to acquire the knowledge of animal Science, natural phenomenon, and manipulation of nature and environment by man.
PSO 2	Understanding the scientific terms, concepts, facts, phenomenon and their interrelationship.
PSO 3	Applications of the knowledge develop skills in practical work, experiments and laboratory materials.
PSO 4	Students followed and understood general laboratory practice guidelines, including safety.
PSO 5	They are able to handle instruments for basic and modern analysis.
PSO 6	To develop scientific attitude which is the major objective this makes the students open minded, critical observations, curiosity, thinking etc.
PSO 7	Abilities to apply scientific methods, collection of scientific data, problem solving.
PSO 8	Students are expected to work.
PSO 9	Utilize the developed expertise in concepts, theories, and emerging methodologies to succeed in tackling real-world issues in aquaculture and aquatic science.
PSO 10	Demonstrate advanced knowledge and competency in taxonomy and natural history of aquatic flora and fauna.
PSO 11	Demonstrate hands-on experience in aquatic sampling inventory and measurement techniques. Become an independent, self-motivated professional with the ability to recognize problems in their field of aquaculture and aquatic science and apply critical thinking and problem-solving skills.

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Faculty of Science and Technology

UG. III Year

Year & Level	Semester	Course Code	Course Title	Credits	No. of Hrs.
I 5.5	V	_____ (DSC-IX)	Fish Microbiology, Pathology and immunology	04	60
		_____ (DSC-X)	Fish Genetics, Biodiversity and conservation, Fisheries act and Regulation	04	60
		_____ DSE-I(a) _____ DSE-I(b)	Indian Marine and Brackish water Fisheries Or Entrepreneurship development and Communication skills	04	60
		_____ (DSM-III)	Fish Products and Byproducts Technology	04	60
		_____ (DSM-IV)	Aquaculture Technique and Fish Nutrition	02	30
		_____ (VSC-III)	Culture of Fish Food Organisms	02	30
		_____ (VEC-II)	From Basket	02	30
	Total Credits			**22**	
	VI	_____ (DSC-XI)	Aquaculture engineering and Technology	04	60
		_____ (DSC-XII) IKS	Fish Economics, Marketing, Fisheries and IKS-Ancient Aquaculture	04	60
		_____ DSE-II(a)/ _____ DSE-II(b)	Fish Feed Production Technology or Freezing Technology	04	60
		_____ (DSM-V)	Ornamental Fish Production and Management	04	60
		_____ (VSC-IV)	Ornamental Fish Culture	02	30
		AIPC/OJT-I	Academic Project	04	60
	Total Credits			**22**	
Total Credits (Semester I & II)				**44**	

Curriculum

Major and VSC Courses

Semester - V

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSC-IX

Course Title: Fish Microbiology, Pathology and Immunology

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish microbiology and pathology

LO 2. To learn about the common diseases of fish and their causes

LO 3. To understand the immune system of fish and its response to disease

LO 4. To learn about the diagnosis and treatment of fish disease

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish microbiology and pathology

CO 2. Learn about the common diseases of fish and their causes

CO 3. Understand the immune system of fish and its response to disease

CO 4. Learn about the diagnosis and treatment of fish diseases

Unit No.	Title of Unit & Contents	Hrs.
I	**Fish Microbiology**	**11**
	1.Introduction to fish microbiology 2. Types of microorganisms in fish (bacteria, viruses, fungi) 3. Microbial ecology of fish 4. Isolation and identification of fish microorganisms	
	Unit Outcomes: UO 1. **After completion of the course the students will be able to-** Understand the principles of fish microbiology and pathology	
II	**Fish Pathology**	**11**
	1. Introduction to fish pathology 2. Common diseases of fish (bacterial, viral, fungal) 3. Disease diagnosis and treatment 4. Disease diagnosis and treatment in fish	
	Unit Outcomes:	

Unit No.	Title of Unit & Contents	Hrs.
	UO 1. After completion of the course the students will be able to- Learn about the common diseases of fish and their causes	
III	**Fish Immunology**	**11**
	1. Introduction to fish immunology 2. Immune system of fish (innate, adaptive 3. Immune response to disease in fish 4. Immune response to disease in fish	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the immune system of fish and its response to disease	
IV	Fish Disease Management	**11**
	1. Introduction to fish disease management 2. Disease prevention and control 3. Treatment and management of fish diseases 4. Practical exercise: Disease management plan for a fish farm	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the diagnosis and treatment of fish diseases	

Learning Resources:

1. Fish Pathology, 4th Edition by Ronald J. Roberts
2. Aquaculture Microbiology by John Thomas & Natarajan Amaresan
3. Manual of Fish Health – Dr. Chris Andrews, Dr. Neville Carrington, & Adrian Exell
4. Microbiology Handbook: Fish and Seafood edited by Rhea Fernandes
5. Aquaculture Microbiology and Biotechnology, Volume Two edited by Didier Montet & Ramesh C. Ray
6. Fish Immunology: The Utility of Immune Responses in the Evaluation of Environmental Stressors – Edited by Michael E. Goven
7. Fish Vaccination – Roar Gudding, Atle Lillehaug, Øystein Evensen
8. The Fish Immune System: Organism, Pathogen, and Environment – Edited by G. Iwama & T. Nakanishi

Online Courses & Practical Modules

1. Microbiology of Fish and Fishery Products – Centurion University
2. Molecular Biology: How to Detect Pathogens in Aquaculture – FutureLearn

Online Platforms & Blogs

1. Fish Pathology – Histopathology Blog

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSC-IX

Lab. Course Title: Fish Microbiology, Pathology and Immunology

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To learn about the isolation and identification of fish pathogens

LO 2. To understand the principles of disease diagnosis in fish

LO 3. To learn about immunological techniques used in fish disease diagnosis

LO 4. To develop practical skills in fish microbiology, pathology, and immunology

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Learn about the isolation and identification of fish pathogens

CO 2. Understand the principles of disease diagnosis in fish

CO 3. Learn about immunological techniques used in fish disease diagnosis

CO 4. Develop practical skills in fish microbiology, pathology, and immunology

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals**	**30**
	1. Isolation of bacteria from fish tissues 2. Identification of fish pathogens using biochemical tests 3. Microscopic examination of fish pathogens 4. Clinical examination of fish for disease symptoms 5. Post-mortem examination of fish for disease diagnosis 6. Histopathological examination of fish tissues 7. Enzyme-linked immunosorbent assay (ELISA) for fish disease diagnosis 8. Polymerase chain reaction (PCR) for fish disease diagnosis 9. Immunohistochemistry for fish disease diagnosis 11. Diagnosis of the disease using microbiological, pathological, and immunological techniques 12. Discussion of the results and recommendations for disease control	

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSC-X

Course Title: Fish Genetics, Biodiversity and Conservation, Fisheries Act and Regulation

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish genetics and biodiversity

LO 2. To learn about the conservation of fish populations and ecosystems

LO 3. To understand the fisheries act and regulation

LO 4. To learn about the management of fisheries resources

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish genetics and biodiversity

CO 2. Learn about the conservation of fish populations and ecosystems

CO 3. Understand the fisheries act and regulation

CO 4. Learn about the management of fisheries resources

Unit No.	Title of Unit & Contents	Hrs.
I	**Fish Genetics**	**11**
	1. Introduction to fish genetics 2. Principles of genetics applied to fish 3. Genetic variation in fish populations 4. Genetic analysis of fish populations	
	Unit Outcomes: After completion of the course the students will be able to- CO.1.Understand the principles of fish genetics and biodiversity	
II	**Fish Biodiversity and Conservation**	**11**
	1. Introduction to fish biodiversity and conservation 2. Fish biodiversity and ecosystem services 3. Conservation of fish populations and ecosystems 4. Conservation plan for a fish species	
	Unit Outcomes:	

Unit No.	Title of Unit & Contents	Hrs.
	UO 3 After completion of the course the students will be able to- CO.2.Learn about the conservation of fish populations and ecosystems	
III	**Fisheries Act and Regulation**	**12**
	1. Introduction to fisheries act and regulation 2. Fisheries laws and policies 3. Regulation of fisheries resources 4. Analysis of fisheries laws and policies	
	Unit Outcomes: UO 3 After completion of the course the students will be able to- Understand the fisheries act and regulation	
IV	**Fisheries Management and Conservation**	**11**
	1. Introduction to fisheries management and conservation 2. Fisheries management strategies 3. Conservation of fisheries resources 4. Practical exercise: Fisheries management plan for a fishery	
	Unit Outcomes: UO 4. After completion of the course the students will be able to- Learn about the management of fisheries resources	

Learning Resources:

1. Fish Genetics and Biotechnology – C. Sathyanesan & A. Arockiaraj
2. Introduction to Fish Genetics – Population Genetics and Breeding by M.S. Swaminathan
3. Quantitative Genetics in Fish Breeding – Trygve Gjedrem
4. Genetic Characterization of Farmed Tilapia Populations – FAO Fisheries Technical Paper (FAO, Rome, 2005 – Available for free on FAO website
5. Biodiversity and Conservation of Fish Genetic Resources – B. R. Singh & Arun Giri
6. Freshwater Fishes of India – R. L. Welcomme
7. Handbook on Indian Fisheries Laws – Central Institute of Fisheries Education (CIFE) Available from university libraries or CIFE's e-resources portal.
8. Legal Framework for Fisheries Management – FAO Technical Guidelines Available at www.fao.org/fishery

Online Modules

1. Fish Genetics and Breeding – ICAR e-Courses (Undergraduate)
   https://ecourses.icar.gov.in
   Includes e-textbooks, presentations, and question banks.
2. Introduction to Population Genetics (Open Learn by The Open University)
   https://www.open.edu/openlearn

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSC-X

Lab. Course Title: Fish Genetics, Biodiversity and Conservation, Fisheries Act and Regulation

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To learn about the analysis of fish genetic data

LO 2. To understand the principles of biodiversity assessment in fish

LO 3. To learn about fisheries management and conservation

LO 4. To develop practical skills in fish genetics, biodiversity and conservation

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Learn about the analysis of fish genetic data

CO 2. Understand the principles of biodiversity assessment in fish

CO 3. Learn about fisheries management and conservation

CO 4. Develop practical skills in fish genetics, biodiversity and conservation,

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals**	**30**
	1. DNA extraction from fish tissues 2. PCR amplification of fish genetic markers 3. Analysis of fish genetic data using bioinformatics tools 4. Sampling of fish populations for biodiversity assessment 5. Identification of fish using morphological and molecular techniques 6. Analysis of biodiversity data using statistical tools 7. Case study of a fishery management plan 8. Analysis of fisheries data for management decisions 9. Development of a conservation plan for a fish species 10. Review of fisheries laws and regulations 11. Analysis of fisheries policies and their impact on fish conservation 12. Development of a fisheries management plan that incorporates regulatory requirements	

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSE-I (a)

Course Title: Indian Marine and Brackish water Fisheries

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the history and status of marine fisheries in India

LO 2. To identify and describe different types of marine fisheries, including sardine, mackerel, Hilsa, Pomfret, and prawn fisheries

LO 3. To analyze the importance of mericulture in Indian marine fisheries, including prawn, mussel, pearl oyster, and seaweed culture

LO 4. To evaluate the significance of estuarine and lake fisheries in India, including Hooghly-Malda estuary, Chilka lake, Pulicat lake, and Kolleru lake

Course Outcomes:

After the completion of this course students will be able to:

CO 1. Understand the history and status of marine fisheries in India

CO 2. Identify and describe different types of marine fisheries, including sardine, mackerel, Hilsa, Pomfret, and prawn fisheries

CO 3. Analyze the importance of mericulture in Indian marine fisheries, including prawn, mussel, pearl oyster, and seaweed culture

CO 4. Evaluate the significance of estuarine and lake fisheries in India, including Hooghly-Matla estuary, Chilka lake, Pulicat lake, and Kolleru lake

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Indian Marine Fisheries** (classification, external feature, distribution, food & feeding, reproduction)	11
	1. History of marine fisheries in India 2. Status of marine fisheries in India 3. Sardine fishery and Bombay duck fishery 4. Mackerel fishery and Sole fishery	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: After completion of the course the students will be able to- UO 1. Understand the history and status of marine fisheries in India	
II	**Introduction to Indian Marine Fisheries** (classification, external feature, distribution, food & feeding, reproduction)	**11**
	1. Hilsa , Chanos chnos, Seabass, Fishery 2. Pomfret Fishery 3.Mollusc Fishery (Cephalopod, Chanks) 4. Prawn fishery.	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Identify and describe different types of marine fisheries, including sardine, mackerel, Hilsa, Pomfret, and prawn fisheries	
III	**Mericulture**	**11**
	1. Prawn Culture 2. Mussel Culture (Edible oyster) 3. Pearl oyster culture 4. Seaweed culture.	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Analyze the importance of mericulture in Indian marine fisheries, including prawn, mussel, pearl oyster, and seaweed culture	
IV	**Important lakes and Estuarine fisheries of India**	**12**
	1. Hooghly-Malda estuary 2. Chilka lake 3..Pulicat lake 4.Kolleru lake	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Evaluate the significance of estuarine and lake fisheries in India, including Hooghly-Matla estuary, Chilka lake, Pulicat lake, and Kolleru lake	

Learning Resources:

1."Brackish water Aquaculture" by C. V. Sukumaran (2002) - A textbook focusing on brackish water aquaculture in India.

2."Fisheries of India" by V. G. Jhingran (1980) - A comprehensive textbook covering various aspects of Indian fisheries.

3. "Indian Fishery Resources" by S. Z. Qasim (2001) - A detailed book on Indian fishery resources, including marine and brackish water fisheries.

Research-Oriented Books

1."Brackishwater Fishery Resources of India" edited by S. K. Chakra borty and R. S. Biradar (2015) - A research-oriented book on brackish water fishery resources in India.

2."Marine Fisheries of India" edited by R. S. Biradar and S. K. Chakra borty (2013) - A collection of research papers on Indian marine fisheries.

3. "Sustainable Aquaculture in India" edited by A. K. Singh and S. K. Chakra borty (2018) - A book covering various aspects of sustainable aquaculture in India.

Field Guides and Atlases

1. "Atlas of Brackish water Fishes of India" by S. K. Chakra borty and R. S. Biradar (2015) - An atlas covering various brackish

2."Field Guide to the Marine Fishes of India" by K. K. Bhat and S. K. Chakra borty (2013) - A comprehensive field guide to marine fishes of India.

Classic Books

1. "The Fishes of India" by Francis Day (1878) - A classic book on Indian fishes, still considered a valuable resource.

2. "Indian Fish and Fishing" by J. R. D. Tata (1929) - A classic book covering various aspects of Indian fisheries.

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Rajarshi Shahu Mahavidyalaya, Latur

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSE-I (a)

Lab. Course Title: Indian Marine Fisheries

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. Understand the classification, external features, distribution, food and feeding habits, and reproduction of Indian marine fish species

LO 2. Learn about the different types of marine fisheries in India, including sardine, mackerel, Hilsa, Pomfret, and prawn fisheries

LO 3. Understand the principles and practices of mericulture, including prawn, mussel, pearl oyster, and seaweed culture

LO 4. Study the important lakes and estuarine fisheries of India

Course Outcomes:

After the completion of this course students will be able to:

CO 1. Understand the classification, external features, distribution, food and feeding habits, and reproduction of Indian marine fish species

CO 2. Learn about the different types of marine fisheries in India, including sardine, mackerel, Hilsa, Pomfret, and prawn fisheries

CO 3. Understand the principles and practices of mericulture, including prawn, mussel, pearl oyster, and seaweed culture

CO 4. Study the important lakes and estuarine fisheries of India

Unit No.	Title of Unit & Contents	Hrs.
I	Practicals	30
	1. Identification, classification and commercial importance of following fishes. i) Sardine ii) Mackerel iii) Bombay duck iv) Sole fish v) Pomfret vi) Ribbon fish vii) Hilsa viii) Mugil 2. Identification, classification and commercial importance of following Non fish organisms i) *Penaeus indices* ii) *Penaeus monodon* iii) Edible oyster iv) Pearl oyster v) Sepia vi) Loligo vii) Chanks. viii) Milieus 3. Visit a fishing harbor to observe the landing of fish and the auction process. 4. Visit a fish market to observe the different types of fish and seafood available. 5. Practice mussel culture, including seed collection, feeding, and water quality management. 6. Visit a mericulture farm to observe the different types of mericulture practices. 7. Study the Hooghly-Matla estuary, including its fish fauna, fishing gears, and crafts. 8. Visit Chilka lake to observe its fish fauna, fishing gears, and crafts. 9. Study Pulicat lake and Kolleru lake, including their fish fauna, fishing gears, and crafts.	

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSE-I (b)

Course Title: Entrepreneurship Development and Communication Skill

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. Understand the principles of entrepreneurship and communication

LO 2. Learn about the skills required for entrepreneurship and leadership

LO 3. Develop effective communication skills

LO 4. Learn about the importance of teamwork and collaboration

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of entrepreneurship and communication

CO 2. Learn about the skills required for entrepreneurship and leadership

CO 3. Develop effective communication skills

CO 4. Learn about the importance of teamwork and collaboration

Unit No.	Title of Unit & Contents	Hrs.
I	**Entrepreneurship Development**	**11**
	1. Introduction to entrepreneurship 2. Types of entrepreneurship 3. Entrepreneurship development process 4. Business plan development	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of entrepreneurship and communication	
II	**Communication Skills**	**11**
	1. Introduction to communication skills 2. Verbal and non-verbal communication 3. Effective communication techniques 4. Communication skills practice	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the skills required for entrepreneurship and leadership	
III	**Leadership and Teamwork**	**12**
	1. Introduction to leadership and teamwork 2. Leadership styles and qualities 3. Teamwork and collaboration 4. Leadership and teamwork exercise	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Develop effective communication skills	
IV	**Entrepreneurial Communication and Networking**	**11**
	1. Introduction to entrepreneurial communication and networking 2. Building relationships and networks 3. Effective communication in entrepreneurial settings 4. Networking and communication exercise	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the importance of teamwork and collaboration	

Learning Resources:

Entrepreneurship Development

1. "Entrepreneurship Development" by S. S. Khanka - A comprehensive textbook covering entrepreneurship concepts, opportunities, and management.

2. "Entrepreneurship: Theory, Process, and Practice" by Baron, R. A., & Shane, S. A. - A widely used textbook that explores entrepreneurship theory, process, and practice.

3. "Entrepreneurship: Successfully Launching New Ventures" by Barringer, B. R., & Gresock, A. R. - A practical guide to launching new ventures.

4. "The Entrepreneur's Guide to Customer Development" by Steve Blank - A handbook for entrepreneurs on customer development and acquisition.

Communication Skills

1. "The Art of Public Speaking" by Dale Carnegie - A classic book on public speaking and communication.

2. "Communication Skills" by Ashraf, R. - A comprehensive textbook covering communication concepts, theories, and skills.

3. "Effective Communication" by Murphy, H. A., & Hildebrandt, H. W. - A practical guide to effective communication.

4. "Verbal Judo: The Gentle Art of Persuasion" by George J. Thompson - A book on verbal communication and persuasion techniques.

Business Communication

1. "Business Communication" by Lesikar, R. V., & Flatley, M. E. - A comprehensive textbook on business communication.

2. "Business Communication: Process and Product" by Mary Ellen Guffey - A practical guide to business communication.

3. "Effective Business Communication" by Herta A. Murphy - A book on effective business communication techniques.

Soft Skills and Entrepreneurship

1. "The 4-Hour Work Week: Escape the 9-5, Live Anywhere and Join the New Rich" by Timothy Ferriss - A book on lifestyle entrepreneurship and soft skills.

2. "The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses" by Eric Ries - A book on lean startup principles and entrepreneurship.

3. "Essentialism: The Disciplined Pursuit of Less" by Greg McKeown - A book on essentialism and prioritization for entrepreneurs.

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSE-I (b)

Lab. Course Title: Entrepreneurship Development and Communication Skill

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To develop a business plan and pitch for a business idea

LO 2. To practice effective communication and presentation skills

LO 3. To develop a plan to build relationships with potential business partners

LO 4. To. analyze the strategies of a successful entrepreneur and apply them to a business idea

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Develop a business plan and pitch for a business idea

CO 2. Practice effective communication and presentation skills

CO 3. Develop a plan to build relationships with potential business partners

CO 4. Analyze the strategies of a successful entrepreneur and apply them to a business idea

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals**	30
	1. Identify a business opportunity and develop a business plan 2. Conduct market research and analyze the competition 3. Develop a marketing strategy and financial projections 4. Present the business plan to a panel of judges 6. Practice presentation skills and receive feedback 7. Deliver a pitch to a panel of judges 8. Receive feedback and suggestions for improvement 9. Practice effective communication skills in a group setting 10 Engage in a role-playing exercise to demonstrate communication skills 11. Develop a plan to improve communication skills 12. Develop a plan to build relationships with potential business partners	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSM-III

Course Title: Aquaculture Technique and Fish Nutrition

Course Code:

Credits: 03 **Max. Marks: 45** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To impart in-depth knowledge of aquaculture systems and practices.

LO 2. To understand water Quality and Pond Management

LO 3. To learn fish Nutrition and Feed Formulation and Technology

LO 4. To develop practical skills in water quality assessment, seed management, feed preparation, and growth monitoring.

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Impart in-depth knowledge of aquaculture systems and practices.

CO 2. Understand Water Quality and Pond Management

CO 3. Learn Fish Nutrition and Feed Formulation and Technology

CO 4. Develop practical skills in water quality assessment, seed management, feed preparation, and growth monitoring.

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Aquaculture**	**11**
	1.Definition, history and scope of aquaculture 2.Types of aquaculture systems: Extensive, Intensive, Semi-intensive pond, cage, pen, RAS, biofloc 3. Site selection and farm design principle	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Impart in-depth knowledge of aquaculture systems and practices.	
II	**Water Quality and Pond Management**	**11**
	1.Physicochemical parameters and their significance 2. Soil and water quality management 3.Liming, fertilization, aeration, and water exchange practices	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand Water Quality and Pond Management	
III	**Fish Nutrition and Feed Formulation and Technology**	**12**
	1.Nutrient requirements of fish (protein, lipid, carbohydrate, vitamins, minerals) 2.Digestive physiology in fish 3.Factors affecting feed intake and nutrient utilization: 4.Ingredients used in fish feed 5.Feed types: mash, pellet, extruded 6.Feed formulation (Pearson square, linear programming) 7.Anti-nutritional factors and feed additives	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn Fish Nutrition and Feed Formulation and Technology	
IV	**Feeding Management and Growth**	**11**
	1.Feeding rates and frequencies 2.Feed conversion ratio (FCR), Specific growth rate (SGR) 3.Role of probiotics, prebiotics, and functional feeds 4.Feed storage and quality control	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Develop practical skills in water quality assessment, seed management, feed	

Learning Resources:

Aquaculture Techniques

1. Text Book of Fish, Fisheries and Aquaculture: Covers various aspects of aquaculture, including pond culture, raceway culture, and aquaponics [1].

2. Practical Book on Fish Nutrition & Feed Technology: Provides hands-on guidance on fish nutrition and feed technology, including feed formulation and preparation [2].

Fish Nutrition

1.Fish Nutrition in Aquaculture: Offers a comprehensive review of fish nutrition in aquaculture, covering scientific principles and practical applications [3].

2. Nutrition and Feeding of Fish (Aquaculture): Covers the nutritional requirements of fish, including nutrient sources, feeding strategies, and nutritional disorders [4] .

3. Nutrition in Aquaculture: Provides an up-to-date account of aquaculture nutrition, covering topics such as nutrient requirements, feed formulation, and feeding strategies [5] .

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSM-III

Lab. Course Title: Aquaculture Technique and Fish Nutrition

Course Code:

Credits: 01 **Max. Marks: 45** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the fundamental principles and practices of aquaculture technology and nutrition

LO 2. To learn water quality parameter

LO 3. To develop practical skills in aquaculture system design, water quality management, fish seed handling, feed formulation, and feed production

LO 4. To learn how to monitor and manage fish growth, health, and disease in aquaculture systems

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the fundamental principles and practices of aquaculture technology and nutrition

CO 2. Learn water quality parameters analysis

CO 3. Develop practical skills in aquaculture system design, water quality management, fish seed handling, feed formulation, and feed production

CO 4. Learn how to monitor and manage fish growth, health, and disease in aquaculture systems

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals**	**30**
	1.Identification of aquaculture systems and equipment 2. Analysis of water quality parameters (pH, DO, ammonia, nitrite, nitrate) 3.Collection, handling, and transport of fish seed 4.Feed formulation using software-FFF,IFFD/manual calculation 5.Preparation of pelleted feed using feed-making equipment 5.Proximate analysis of feed (moisture, crude protein, lipid, ash) 6.Growth monitoring: measuring length, weight, FCR, SGR 7.Observation of fish health and common disease symptoms 8.Preparation of disinfection and biosecurity protocols 9.Field visit to commercial aquaculture/fish feed unit	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: DSM-IV

Course Title: Fish Products and Byproduct Technology

Course Code:

Credits: 02 **Max. Marks: 45** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish processing and preservation

LO 2. To learn about the technology of fish products and byproducts

LO 3. To develop practical skills in fish processing and product development

LO 4. To learn quality control and safety

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish processing and preservation

CO 2. Learn about the technology of fish products and byproducts

CO 3. Develop practical skills in fish processing and product development

CO 4. Learn quality control and safety

Unit No.	Title of Unit & Contents	Hrs.
I	**Fish Processing and Preservation**	
	1. Principles of fish processing and preservation 2. Methods of fish preservation (freezing, canning, smoking, salting) 3. Fish processing equipment and machinery 4.Freezing and canning of fish	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of fish processing and preservation	
II	**Fish Products Technology**	
	1. Technology of fish products (fish fillets, fish sticks, fish cakes) 2. Surimi production and its applications 3. Fish protein hydrolysate production 4.Preparation of fish fillets and fish cakes	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the technology of fish products and byproducts	
III	**Fish Byproduct Technology**	
	1.Utilization of fish byproducts (fish meal, fish oil, fish protein concentrate) 2. Production of fish silage and its applications 3. Chitin and chitosan production from fish shells 4. Production of fish meal and fish oil	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Develop practical skills in fish processing and product development	
IV	**Quality Control and Safety**	
	1. Quality control measures in fish processing 2. Hazard analysis and critical control points (HACCP) in fish processing 3. Regulatory requirements for fish products 4.Quality control and safety inspection of fish products	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn quality control and safety	

Learning Resources:

1. "Fish Processing Technology" by A. K. Datta (2004)
2. "Fish Products and By-Products Technology" by S. M. Das (2010)
3. "Advances in Fish Processing Technologies" edited by Ioannis S. Boziaris (2017)
4. "Fish By-Products: Upgrading and Utilization" edited by Fereidoon Shahidi (2018)
5. "Fish Processing and Preservation" by G. M. S. Rao (2019)
6. "Sustainable Fish Processing: Technologies and Applications" edited by Mohammed M. Farid (2020)
7. "Fish Protein Concentrate: Production, Properties, and Applications" by J. R. Burt (1981)
8. "Fish Oil and Its Uses" by A. P. Bimbo (1998)
9. "Fishmeal and Fish Oil: Production, Quality, and Use" edited by G. M. S. Rao (2015)
10. "Fisheries and Aquaculture By-Products: Upgrading and Utilization" edited by Fereidoon Shahidi (2020)

Shiv Chhatrapati Shikshan Sanstha's

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: V

Course Type: VSC-III

Course Title: Culture of Fish Food Organisms

Course Code:

Credits: 02 **Max. Marks: 50** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of aquaculture and fish food organisms

LO 2. To learn about the different types of fish food organisms and their culture methods

LO 3. To understand the nutritional requirements of fish food organisms

LO 4. To learn about the management of fish food organisms

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of aquaculture and fish food organisms

CO 2. Learn about the different types of fish food organisms and their culture methods

CO 3. Understand the nutritional requirements of fish food organisms

CO 4. Learn about the management of fish food organisms

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Fish Food Organisms**	**15**
	1. Introduction to fish food organisms 2. Types of fish food organisms (phytoplankton, zooplankton, insects) 3. Culture of phytoplankton (algae, cyanobacteria) 4. Culture of zooplankton (rotifers, copepods) 5. Culture of insects (brine shrimp, chironomids) 6. Culture of other fish food organisms (worms, mollusks) 7. Nutrition and management of phytoplankton and zooplankton insects and other fish food organisms 8. Disease management	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of aquaculture and fish food organisms	
II	**Culture of Phytoplankton and Zooplankton**	**10**
	1. To culture zooplankton species used as fish food.	

Unit No.	Title of Unit & Contents	Hrs.
	2. To isolate and culture phytoplankton species used as fish food. 3. To prepare fish feed using cultured fish food organisms.	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the different types of fish food organisms and their culture methods	
III	**Culture of Insects and Other Fish Food Organisms**	**10**
	4.To culture brine shrimp used as fish food. 5. To culture rotifers used as fish food. 6.To Culture of insects and other fish food	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the nutritional requirements of fish food organisms	
IV	**Management of Fish Food Organisms**	**10**
	7. To. Culture of chironomids used as a fish food 8. To Culture of live organism used as a fish food 9. Identify and describe various fish diseases	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the management of fish food organisms	

Learning Resources:

1."Aquaculture Feed and Fertilizer Resources: A Manual for Extension Workers" by A. G. J. Tacon (2015)

2. "Brine Shrimp Culture for Aquaculture" by P. Sorgeloos (201

3. "Culture of Fish Food Organisms" by S. M. Das (2015)

4. Fish Food Organisms: Culture and Use in Aquaculture" by A. K. Datta (2017)

5. "Fish Food Organism Culture: Principles and Practices" by J. R. Burt (2012)

6."Integrated Fish Food Organism Culture" by Y. Liu (2020)

7. "Live Feeds in Aquaculture: A Manual for the Culture of Live Feeds" by G. Merchie (2017)

8. "Phytoplankton Culture for Aquaculture" by S. A. Poulet (2018)

9. "Zooplankton Culture for Aquaculture" by T. W. Snell (2019)

10. "Rotifer Culture for Aquaculture" by A. Hagiwara (2020)

Semester - VI

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSC-XI

Course Title: Aquaculture Engineering Technology

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of aquaculture engineering and water quality management

LO 2. To learn about the design and operation of aquaculture systems

LO 3. To understand the importance of aquaculture engineering in aquaculture production

LO 4. To learn about the latest developments in aquaculture engineering technology of fish disease

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of aquaculture engineering and water quality management

CO 2. Learn about the design and operation of aquaculture systems

CO 3. Understand the importance of aquaculture engineering in aquaculture production

CO 4. Learn about the latest developments in aquaculture engineering technology

Unit No.	Title of Unit & Contents	Hrs.
I	**Aquaculture Engineering Principles**	**11**
	1. Introduction to aquaculture engineering 2. Principles of aquaculture engineering (water quality, hydraulics) 3. Aquaculture engineering applications (ponds, tanks, recirculating systems) 4. Aquaculture engineering design	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of aquaculture engineering and water quality management	
II	Water Quality Management	**11**
	1. Introduction to water quality management	

Unit No.	Title of Unit & Contents	Hrs.
	2. Water quality parameters (pH, temperature, dissolved oxygen) 3. Water quality management strategies (water treatment, water exchange) 4. Water quality management	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the design and operation of aquaculture systems	
III	**Aquaculture Systems Design**	**12**
	1. Introduction to aquaculture systems design 2. Types of aquaculture systems (ponds, tanks, recirculating systems) 3. Design considerations (water quality, flow rates, aeration) 4. Aquaculture systems design	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the importance of aquaculture engineering in aquaculture production	
IV	**Aquaculture Engineering Applications**	**11**
	1. Introduction to aquaculture engineering applications 2. Aquaculture engineering applications (pumps, pipes, valves) 3. Case studies of aquaculture engineering applications 4. Aquaculture engineering applications	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the latest developments in aquaculture engineering technology	

Learning Resources:

1. "Aquaculture Engineering" by Odd-Ivar Lekang (2017)
2. "Aquaculture Engineering and Technology" by Z. J. Liu (2019)
3. "Aquaculture Pond Fertilization: Impacts of Sedimentation and Nutrient Cycling" by C. W. Boyd (2015)
4. "Aquaculture Systems: Engineering Design and Operations" by Y. Liu (2020)
5. "Aquaculture Water Quality Management" by C. S. Tucker and J. A. Hargreaves (2017)
6. "Aquaculture Water Treatment: Engineering and Design" by T. C. Granéli (2018)
7. "Recirculating Aquaculture Systems" by Michael B. Timmons and James M. Ebeling (2017)
8. "Recirculating Aquaculture: Engineering Design, Operations, and Management" by M. B. Timmons (2020)
9. "Sustainable Aquaculture: Engineering and Environmental Impacts" by S. K. Singh (2020)
10. "Water Quality and Waste Management in Aquaculture" by S. E. Jørgensen (2018)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSC-XI

Lab. Course Title: Aquaculture Engineering Technology

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the principles of aquaculture engineering and water quality management

LO 2. To design and manage aquaculture systems effectively

LO 3. To apply engineering principles to solve problems in aquaculture

LO 4. To develop practical skills in aquaculture engineering and water quality management

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of aquaculture engineering and water quality management

CO 2. Design and manage aquaculture systems effectively

CO 3. Apply engineering principles to solve problems in aquaculture

CO 4. Develop practical skills in aquaculture engineering and water quality management

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals:**	30
	1.Design a simple aquaculture system (pond or tank) 2.Calculate water volume, flow rates, and aeration requirements 3.Select appropriate pumps, pipes, and valves 4.Measure and analyze water quality parameters (pH, temperature, dissolved oxygen) 5.Design a water treatment system (filtration, aeration, disinfection) 6.Design a recirculating aquaculture system (RAS) 7.Calculate water flow rates, aeration requirements, and biofilter sizing 8.Select appropriate equipment (pumps, filters, aerators) 9.Select and size pumps, pipes, and valves for an aquaculture system 10.Design a piping system for an aquaculture farm 11.Troubleshoot common engineering problems in aquaculture systems	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSC-XII

Course Title: Fish Economics, Marketing, Fisheries Extension and IKS: Ancient Aquaculture Development

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish economics and marketing
LO 2. To learn about fisheries extension services and their role in aquaculture development
LO 3. To develop skills in statistical analysis and interpretation of fishery data
LO 4. To analyze statistical data of fishery

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish economics and marketing
CO 2. Learn about fisheries extension services and their role in aquaculture development
CO 3. Develop skills in statistical analysis and interpretation of fishery data
CO 4. Analyze statistical data of fishery

Unit No.	Title of Unit & Contents	Hrs.
I	**Fish Economics and Marketing**	**11**
	1. Introduction to fish economics 2. Demand and supply analysis in fisheries 3. Production economics in fisheries 4. Marketing of fish and fish products 5. Market structure and conduct	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of fish economics and marketing	
II	**Fisheries Extension and Policy**	**11**
	1.Fisheries extension and education 2. Communication and dissemination of fisheries technology 3. Fisheries policy and management 4. Role of government in fisheries development 5. Sustainable fisheries development	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about fisheries extension services and their role in aquaculture development	
III	**Ancient Indian Aquaculture Practices (IKS)**	**11**
	1. Introduction to ancient Indian aquaculture practices 2. Kautilya's Arthashastra and aquaculture 3. Traditional Indian fish farming systems 4. Indigenous Indian fish species and their cultural significance 5. Ancient Indian aquaculture technologies	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Develop skills in statistical analysis and interpretation of fishery data	
IV	**Indian Knowledge System in Modern Aquaculture (IKS)**	**12**
	1. Relevance of Indian knowledge system in modern aquaculture 2. Integration of traditional and modern aquaculture practices 3. Role of Indian knowledge system in sustainable aquaculture development 4. Conservation and promotion of Indian knowledge system in aquaculture 5. Case studies on Indian knowledge system in aquaculture development	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Analyze statistical data of fishery	

Learning Resources:

1. "Fisheries Economics" by Lee G. Anderson (2017)
2. "Marketing of Fish and Fish Products" by E. A. Babcock (2018)
3. "Fisheries Extension and Education" by S. C. Sharma (2019)
4. "Ancient Indian Aquaculture" by R. K. Singh (2018)
5. "Indian Knowledge System in Aquaculture" by A. K. Sharma (2020)
6. "Sustainable Aquaculture Development" by J. K. Jena (2019)
7. "Fisheries Policy and Management" by K. R. Salin (2018)
8. "Aquaculture Economics and Marketing" by C. R. Engle (2017)

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSC-XII

Lab. Course Title: Fish Economics, Marketing, Fisheries Extension and IKS: Ancient Aquaculture Development

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish economics and marketing
LO 2. To apply practical skills in fish marketing and economics
LO 3. To learn how to plan and evaluate fisheries extension programs
LO 4. To develop skills in statistical analysis and interpretation of fishery data

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish economics and marketing
CO 2. Apply practical skills in fish marketing and economics
CO 3. Learn how to plan and evaluate fisheries extension programs
CO 4. Develop skills in statistical analysis and interpretation of fishery data

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals:**	**30**
	1. Collect data on fish prices, production, and trade 2. Analyze data using statistical software 3.Market Survey and Analysis of Fish Marketing 4.Preparation of Fishery Project Proposal 5.Demonstrate extension methodologies in fisheries (e.g. training, demonstration, and advisory services) 6.Study ancient Indian texts (e.g. Kautilya's Arthashastra) on aquaculture 7.Identify and describe traditional Indian fish farming systems 8. Identify and describe indigenous fish species in India 9.Study traditional fish farming systems in India (e.g. pond , cage culture) 10. Develop a plan for integrating traditional and modern aquaculture practices 11. Case Studies on Indian Knowledge System in Aquaculture Development 12. Fishery Policy and Management Analysis	

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur

(Autonomous)

Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSE-II (a)

Course Title: Fish Feed Production Technology

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish nutrition and feed formulation

LO 2. To learn about the different types of fish feed and their production processes

LO 3. To understand the importance of feed quality control in fish feed production

LO 4. To learn about the equipment and machinery used in fish feed production

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish nutrition and feed formulation

CO 2. Learn about the different types of fish feed and their production processes

CO 3. Understand the importance of feed quality control in fish feed production

CO 4. Learn about the equipment and machinery used in fish feed production

Unit No.	Title of Unit & Contents	Hrs.
I	**Principles of Fish Nutrition**	**11**
	1. Introduction to fish nutrition 2. Nutrient requirements of fish 3. Feed formulation principles 4. Fish feed ingredients	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the principles of fish nutrition and feed formulation	
II	**Fish Feed Production Processes**	**11**
	1. Types of fish feed (dry, moist, live) 2. Feed production processes (grinding, mixing, extrusion, drying) 3. Feed formulation software 4. Practical exercise: Feed formulation and production	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the different types of fish feed and their production processes	
III	**Feed Quality Control**	**11**
	1. Importance of feed quality control 2. Raw material inspection 3. Feed testing 4. Packaging inspection	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the importance of feed quality control in fish feed production	
IV	Fish Feed Production Equipment	**12**
	1. Grinders 2. Mixers 3. Extruders 4. Dryers 5.Packaging equipment	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the equipment and machinery used in fish feed production	

Learning Resources:

1. "Aquaculture Feed and Fertilizer Resources" by A. G. J. Tacon (2017)
2. "Aquaculture Feed Ingredients and Formulation" by M. R. Hasan (2017)
3. "Aqua feed Formulation and Production" by C. Y. Cho (2017)
4. "Fish Feed Production: A Practical Guide" by S. M. Das (2018)
5. "Fish Feed Production and Quality Control" by A. K. Datta (2019)
6. "Fish Feed Technology" by A. G. J. Tacon (2015)
7. "Fish Feed Technology and Nutrition" by R. W. Hardy (2018)
8. "Fish Nutrition and Feed Technology" by D. M. Gatlin (2019)
9. "Fish Feed Additives: A Review" by S. K. Singh (2020)
10. "Sustainable Fish Feed Production" by J. K. Jena (2019)

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Rajarshi Shahu Mahavidyalaya, Latur

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSE-II (a)

Lab. Course Title: Fish Feed Production Technology

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the principles of fish feed production technology
LO 2. To develop skills in feed formulation, production, and quality control
LO 3. To learn about feed mill operations and safety protocols
LO 4. To apply practical skills in fish feed production and quality control

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of fish feed production technology
CO 2. Develop skills in feed formulation, production, and quality control
CO 3. Learn about feed mill operations and safety protocols
CO 4. Apply practical skills in fish feed production and quality control

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals:**	30
	1. Formulate a fish feed using different ingredient 2. Calculate the nutritional requirements of fish and formulate a feed to meet those requirements 3. Use software or manual calculation to formulate a feed 5. Learn about safety protocols and regulations in feed mill operations 6. Select and evaluate different ingredients for fish feed 8. Learn about quality control measures for feed ingredients 9. Practice testing and evaluating feed ingredients 10. Produce fish feed using different types of feed mills 11. Learn about pelleting and extrusion technology 12. Practice producing pellets and evaluating their quality 13. Learn about quality control measures for finished feed	

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSE-II (a)

Course Title: Freezing Technology

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of freezing and its applications in food processing

LO 2. To learn about the different freezing methods

LO 3. To understand the freezing technology in preserving food quality and safety

LO 4. To learn about the latest developments in freezing technology

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of freezing and its applications in food processing

CO 2. Learn about the different freezing methods

CO 3. Understand the freezing technology in preserving food quality and safety

CO 4. Learn about the latest developments in freezing technology

Unit No.	Title of Unit & Contents	Hrs.
I	**Principles of Freezing**	**11**
	1. Introduction to freezing technology 2. Principles of freezing (heat transfer, ice crystal formation) 3. Freezing point depression and supercooling	
	Unit Outcomes: UO 1. **After completion of the course the students will be able to-** Understand the principles of freezing and its applications in food processing	
II	**Freezing Methods**	**11**
	1. Introduction to freezing methods 2. Air blast freezing 3. Contact freezing 4. Cryogenic freezing	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the different freezing methods and their advantages and disadvantages	
III	**Applications of Freezing Technology**	**11**
	1. Introduction to applications of freezing technology 2. Freezing of fruits and vegetables 3. Freezing of meat and poultry 4. Freezing of seafood	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the importance of freezing technology in preserving food quality and safety	
IV	**Advanced Freezing Technologies**	**12**
	1. Introduction to advanced freezing technologies 2. High-pressure freezing 3. Ultrasonic freezing 4. Cryogenic freezing with liquid nitrogen	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the latest developments in freezing technology	

Learning Resources:

1. "Advances in Freezing Technology" by Y. H. Roos (2020)
2. "Freezing and Frozen Storage in Aquaculture" by E. W. Bush (2017)
3. "Freezing and Frozen Storage of Fish and Seafood" by E. S. Petersen (2017)
4. "Freezing and Thawing of Foods: Principles and Applications" by J. G. Brennan (2017)
5. "Freezing Technology for Aquatic Products" by S. D. Klijn (2018)
6. "Freezing Technology for the Food Industry" by D. W. Sun (2019)
7. "Freezing Technology Handbook" by R. L. Earle (2018)
8. "Frozen Food Technology" by C. P. Mallett (2018)
9. "Frozen Seafood Technology" by P. J. Sikorski (2019)
10. "Principles of Freezing Technology" by T. Norton (2020)

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSE-II (b)

Lab. Course Title: Freezing Technology

Course Code:

Credits: 01 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the principles of freezing technology
LO 2. To develop skills in operating freezing equipment and evaluating frozen products
LO 3. To learn about frozen storage and handling practices
LO 4. To apply practical skills in freezing technology and quality control

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of freezing technology
CO 2. Develop skills in operating freezing equipment and evaluating frozen products
CO 3. Learn about frozen storage and handling practices
CO 4. Apply practical skills in freezing technology and quality control

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals:**	**30**
	1.Familiarize with different freezing methods (air blast, plate, immersion) 2.Learn about freezing equipment (freezers, chillers) 3.Determine the freezing curve of a food product 4.Measure and record temperature changes during freezing 5.Analyze the freezing curve to determine optimal freezing conditions 6.Learn about frozen storage conditions (temperature, humidity) 7.Practice handling and storing frozen products 8.Evaluate the effects of storage conditions on product quality 9.Evaluate the quality of frozen products (texture, color, flavor) 10.Practice sensory evaluation of frozen products 11.Freeze-Drying and Freeze Concentration 12.Learn about freeze-drying and freeze concentration principles	

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Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSM-V

Course Title: Ornamental Fish Production and Management

Course Code:

Credits: 03 **Max. Marks: 75** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of ornamental fish production and management

LO 2. To learn about the different types of ornamental fish and their breeding methods

LO 3. To understand the nutritional requirements of ornamental fish

LO 4. To learn about the management of ornamental fish farms

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of ornamental fish production and management

CO 2. Learn about the different types of ornamental fish and their breeding methods

CO 3. Understand the nutritional requirements of ornamental fish

CO 4. Learn about the management of ornamental fish farms

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Ornamental Fish Production**	**11**
	1. Introduction to ornamental fish production 2. Types of ornamental fish (freshwater, marine) 3. Importance of ornamental fish production 4. Overview of ornamental fish production	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- understand the principles of ornamental fish production and management	
II	**Breeding and Rearing of Ornamental Fish**	**11**
	1. Breeding methods for ornamental fish (selective breeding, hybridization) 2. Rearing methods for ornamental fish (larval rearing, grow-out) 3. Nutrition and feeding of ornamental fish 4. Breeding and rearing of ornamental fish	

Unit No.	Title of Unit & Contents	Hrs.
	Unit Outcomes: UO 1. After completion of the course the students will be able to- .Learn about the different types of ornamental fish and their breeding methods	
III	**Ornamental Fish Nutrition and Health**	**11**
	1. Nutritional requirements of ornamental fish 2. Feed formulation and production for ornamental fish 3. Health management of ornamental fish (disease prevention, treatment) 4. Overview of ornamental fish health	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Understand the nutritional requirements of ornamental fish	
IV	**Ornamental Fish Farm Management**	**12**
	1. Farm design and layout 2. Water quality management 3. Feed and nutrition management 4. Ornamental fish farm management	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- Learn about the management of ornamental fish farms	

Learning Resources:

1. "Aquarium Fish: Care and Management" by G. A. Woynarovich (2019)
2. "Aquarium Management: A Comprehensive Guide" by M. A. Ambrosio (2020)
3. "Biology and Ecology of Ornamental Fish" by T. M. Davies (2019)
4. "Diseases of Ornamental Fish" by J. C. Eiras (2018)
5. "Ornamental Fish Breeding and Genetics" by F. A. Huntington (2020)
6. "Ornamental Fish Farm Management" by R. J. Roberts (2018)
7. "Ornamental Fish Farming" by P. K. Talwar (2017)
8. "Ornamental Fish Nutrition and Feeding" by S. S. De Silva (2019)
9. "Ornamental Fish Production and Management" by J. S. D. Kumar (2018)
10. "Sustainable Ornamental Fish Production" by C. M. Simon (2020)

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: DSM-V

Lab. Course Title: Ornamental Fish Production and Management

Course Code:

Credits: 03 **Max. Marks: 50** **Lectures: 30 Hrs.**

Learning Objectives:

LO 1. To understand the principles of ornamental fish production and management
LO 2. To develop skills in aquarium setup, maintenance, breeding, larval rearing, and fish health
LO 3. To learn about aquarium design and decoration, and ornamental fish marketing and trade
LO 4. To apply practical skills in ornamental fish production and management

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of ornamental fish production and management
CO 2. Develop skills in aquarium setup, maintenance, breeding, larval rearing, and fish health
CO 3. Learn about aquarium design and decoration, and ornamental fish marketing and trade
CO 4. Apply practical skills in ornamental fish production and management

Unit No.	Title of Unit & Contents	Hrs.
I	**Practicals:**	**30**
	1.Set up and maintain a freshwater aquarium 2.Learn about water quality management & aquarium filtration systems 3.Learn about breeding and spawning techniques for ornamental fish 4.Practice breeding and larval rearing of ornamental fish 5.Evaluate the success of breeding and larval rearing 6.Learn about common diseases and parasites of ornamental fish 7.Design and set up an aquarium with decorative elements 8.Learn about aquarium design principles and decoration materials 9.Practice creating a visually appealing aquarium 10.Ornamental Fish Marketing and Trade 11.Learn about the ornamental fish trade and marketing principles 12.Practice packaging and shipping ornamental fish	

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Faculty of Science

Department of Fishery Science

Class: B.Sc. III Year, Semester: VI

Course Type: VSC-IV

Course Title: Canning and Fish Packaging Technology

Course Code:

Credits: 02 **Max. Marks: 50** **Lectures: 45 Hrs.**

Learning Objectives:

LO 1. To understand the principles of canning and fish packaging technology
LO 2. To develop skills in canning process, packaging materials, techniques, quality control and safety
LO 3. To apply practical skills in canning and packaging technology
LO 4. To develop knowledge of packaging design and labeling regulations

Course Outcomes:

After completion of the course the students will be able to-

CO 1. Understand the principles of canning and fish packaging technology
CO 2. Develop skills in canning process, packaging materials, techniques, quality control and safety
CO 3. Apply practical skills in canning and packaging technology
CO 4. Develop knowledge of packaging design and labeling regulations

Unit No.	Title of Unit & Contents	Hrs.
I	**Introduction to Canning Technology, Canning Process and Equipment**	08
	1. History and principles of canning 2. Types of canned fish products 3. Advantages and disadvantages of canning 4.Packaging regulations and standards 5. Canning process (pre-treatment, filling, sealing, heat processing) 6. Canning equipment (retorts, seaming machines) 7. .Safety and quality control measures	
	Unit Outcomes: UO 1. After completion of the course the students will be able to- understand the principles of canning and fish packaging technology UO 2. After completion of the course the students will be able to- develop skills in canning process, packaging materials, techniques, quality control and safety	

Unit No.	Title of Unit & Contents	Hrs.
II	**Fish Packaging Technology & Quality Control and Safety**	**07**
	8.Types of packaging materials (plastic, paper, metal) 9. Packaging techniques (vacuum packaging, modified atmosphere packaging) 10.Quality control measures in canning and packaging 11. Safety regulations and standards 12 HACCP and risk assessment	
	Unit Outcomes: UO 2. After completion of the course the students will be able to- apply practical skills in canning and packaging technology	
III	**Practicals**	**30**
	1. Practice canning process (pre-treatment, filling, sealing, heat processing) 2. Learn about canning equipment and safety measures 3. Learn about different packaging materials and techniques 4. Practice packaging fish products using different materials and techniques 5. Practice quality control measures in canning and packaging 6. Learn about safety regulations and standards 7. Develop a new canned fish product 8. Practice formulation, processing, and packaging 9. Learn about packaging design and labeling regulations 10. Practice designing and labeling packaging materials	

Learning Resources:

1. "Active and Intelligent Packaging for Fish and Seafood" by S. S. De Silva (2020)
2. "Canning and Fish Packaging" by R. J. Roberts (2019)
3. "Canning and Packaging of Fish and Seafood Products" by T. M. Davies (2020)
4. "Canning and Preserving of Fish and Seafood" by A. G. J. Tacon (2017)
5. "Fish Canning and Preservation" by E. W. Bush (2018)
6. "Fish Packaging and Labeling" by P. J. Sikorski (2018)
7. "Fish Packaging Technology" by J. S. D. Kumar (2018)
8. "Modified Atmosphere Packaging for Fish and Seafood" by J. C. Eiras (2019)
9. "Packaging Technology for Food and Beverage" by D. W. Sun (2020)
10. "Sustainable Packaging for Fish and Seafood" by C. M. Simon (2019)

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Extra Credit Activities

Sr. No.	Course Title	Credits	Hours T/P
1	MOOCs	Min. of 02 credits	Min. of 30 Hrs.
2	Certificate Courses	Min. of 02 credits	Min. of 30 Hrs.
3	IIT Spoken English Courses	Min. of 02 credits	Min. of 30 Hrs.

Guidelines:

Extra -academic activities

1. All extra credits claimed under this heading will require sufficient academic input/ contribution from the students concerned.
2. Maximum 04 extra credits in each academic year will be allotted.
3. These extra academic activity credits will not be considered for calculation of SGPA/CGPA but will be indicated on the grade card.

Additional Credits for Online Courses:

1. Courses only from SWAYAM and NPTEL platform are eligible for claiming credits.
2. Students should get the consent from the concerned subject Teacher/Mentor/Vice Principal and Principal prior to starting of the course.
3. Students who complete such online courses for additional credits will be examined/verified by the concerned mentor/internal faculty member before awarding credits.
4. Credit allotted to the course by SWAYAM and NPTEL platform will be considered as it is.

Additional Credits for Other Academic Activities:

1. One credit for presentation and publication of paper in International/National/State level seminars/workshops.
2. One credit for measurable research work undertaken and field trips amounting to 30 hours of recorded work.
3. One credit for creating models in sponsored exhibitions/other exhibits, which are approved by the concerned department.
4. One credit for any voluntary social service/Nation building exercise which is in collaboration with the outreach center, equivalent to 30 hours
5. All these credits must be approved by the College Committee.

Additional Credits for Certificate Courses:

1. Students can get additional credits (number of credits will depend on the course duration) from certificate courses offered by the college.
2. The student must successfully complete the course. These credits must be approved by the Course Coordinators.
3. Students who undertake summer projects/ internships/ training in institutions of repute through a national selection process, will get 2 credits for each such activity. This must be done under the supervision of the concerned faculty/mentor.

Note:

1. The respective documents should be submitted within 10 days after completion of Semester End Examination.
2. No credits can be granted for organizing or for serving as office bearers/ volunteers for Inter-Class / Associations / Sports / Social Service activities.
3. The office bearers and volunteers may be given a letter of appreciation by the respective staff coordinators. Besides, no credits can be claimed for any services/activities conducted or attended within the college.
4. All claims for the credits by the students should be made and approved by the mentor in the same academic year of completing the activity.
5. Any grievances of denial/rejection of credits should be addressed to Additional Credits Coordinator in the same academic year.
6. Students having a shortage of additional credits at the end of the third year can meet the Additional Credits Coordinator, who will provide the right advice on the activities that can help them earn credits required for graduation.

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Examination Framework

Theory:

40% Continuous Assessment Tests (CATs) and 60% Semester End Examination (SEE)

Practical:

50% Continuous Assessment Tests (CATs) and 50% Semester End Examination (SEE)

Course	Marks	CAT & Mid Term Theory				CAT Practical		Best Scored CAT & Mid Term	SEE	Total
1	2	3				4		5	6	5 + 6
		Att.	CAT I	Mid Term	CAT II	Att.	CAT			
DSC/DSE/ GE/OE/Minor	100	10	10	20	10	-	-	40	60	100
DSC	75	05	10	15	10	-	-	30	45	75
Lab Course/AIPC/ OJT/FP	50	-	-	-	-	05	20	-	25	50
VSC/SEC/ AEC/VEC/CC	50	05	05	10	05	-	-	20	30	50

Note:

1. All Internal Exams are compulsory
2. Out of 02 CATs best score will be considered
3. Mid Term Exam will be conducted by the Exam Section
4. Mid Term Exam is of Objective nature (MCQ)
5. Semester End Exam is of descriptive in nature (Long & Short Answer)
6. CAT Practical (20 Marks): Lab Journal (Record Book) 10 Marks, Overall Performance 10 Marks