INFORMATION OF DEPARTMENT OF FISHERIES BIOLOGY, COLLEGE OF FISHERIES, RATNAGIRI FOR THE UNIVERSITY WEBSITE

1. Department of Fisheries Biology

Department of Fisheries Biology is the *Mother department* of Fisheries since it touches almost all the aspects of fisheries science more or less. In keeping with the time, however, the department has updated itself with new subjects and streams to cater for the demands in the fishery sector. The change of emphasis is in the direction of starting Post graduate courses in *Fish Biotechnology* and *Fisheries Resources Management*.

Staff:

The department has a total teaching staff of eight members under the designations of :

a) Professor & Head (1), b) Associate Professor (2), c) Assistant Professor (5). The Professor & Head, the Associate Professors and the Assistant Professors have obtained their doctorate degrees. The staff members have already upgraded themselves in the emerging fields of *Fisheries Resources Management* and *Fish Biotechnology* by undergoing various trainings, seminars and workshops.

STAFF STRUCTURE OF DEPARTMENT OF FISHERIES BIOLOGY

Name of the Faculty	**Dr. (Mrs.) Swapnaja A. Mohite**
Post held	Professor (CAS) & Head
Date of birth	03.05.1963
Qualification	M.Sc. (Fisheries Management), Ph.D. (Aquaculture), M.Ed.
Area of specialization	Fisheries resources management; Fisheries biotechnology
Experience (Year)	28 Years
Research Projects guided Ph.D. M.F.Sc./M.Tech B.Tech.	3 1 8
Present area of research	Taxonomy of finfishes and shellfishes, Sponges and associated organisms, Karyotyping of shellfishes, Truss morphometry
Contact details Land line No. Mobile	 02352-232241 9545030642

	Fax Email	02352 – 232987 Sa_mohite@yahoo.co.in
	**Name of the Faculty**	**Dr. Ravindra Pawar**
	Post held	Professor (CAS)
	Date of birth	19.03.1970
	Qualification	M.Sc. (Fisheries Management) Ph.D. (Marine Biology)
	Area of specialization	Fisheries resources management; Fisheries biotechnology
	Experience (Year)	23 years
	Research Projects guided Ph.D. M.F.Sc./M.Tech B.Tech.	4 1 13
	Present area of research	Marine discards and bycatch; Evolution of sexual size dimorphism in fishes, Stock assessment and population dynamics
	Contact details Land line No. Mobile Fax Email	 02352 – 232241 827563 5577 02352 – 232987 ravindra.fisheries@gmail.com
	**Name of the Faculty**	**B.P.Bhosale**
	Post held	Assistant Professor
	Date of birth	1.6.1965
	Qualification	M.Sc. (FPTM)
	Area of specialization	Fisheries Resource Management
	Experience (Year)	27 years
	Research Projects guided Ph.D. M.F.Sc./M.Tech B.Tech.	4 - 6
	Present area of research	Biological studies of commercially important species, Indigenous Knowledge in Fisheries,
	Contact details Land line No. Mobile Fax Email	 02352 - 232241 94222965850 02352 – 232987 bhosalebp@yahoo.co.in

	**Name of the Faculty**	**Dr. V.H.Nirmale**
	Post held	Assistant Professor
	Date of birth	11.10.1974
	Qualification	M. Sc. (FRM), Ph.D. (FRM)
	Area of specialization	Fisheries Resource Management
	Experience (Year)	15 years
	Research Projects guided Ph.D. M.F.Sc./M.Tech B.Tech.	4 - 5
	Present area of research	Biological studies of commercially important species, Indigenous Knowledge in Fisheries, Truss morphometry, Ethnotaxonomy
	Contact details Land line No. Mobile Fax Email	 02352 – 232241 (Ext. 212) 9405685268 02352 – 232987 Viveknirmale416@gmail.com

Education:

The department is conducting all the UG courses assigned to it as per the new syllabus laid down by ICAR. Students are taken for field collections, visits and tours etc. as per the demand of the courses.

The department has already started M.F.Sc. courses, initially in Fisheries Biology stream and then in the disciplines of *Fisheries Resources Management* and *Fish Biotechnology.* All the staff members of the department are recognized as Post Graduate teachers to guide the P.G. students in these disciplines. After the up gradation of these two disciplines, the strength of the students has been increased to six. So far, 35 students of M.F.Sc. (FRM) and 19 students of M.F.Sc.(FBT) were awarded degree from the department of Fisheries Biology. Since 2012-13, the department has started Ph.D. (Fisheries Resources Management) with intake capacity of one student. So far 3 student were awarded Ph.D. degree from this department.

2. ACADEMIC PROGRAMMES:

2.1.U.G. Syllabus of Department of Fisheries Biology

Semester	Course Code & Credits	Topics	
		SEMESTER-I	**11+11 = 22**
I	**FRM 111 3 (1 + 2)**	**Taxonomy of Finfish**	
	Theory		
	1	Principles of taxonomy. Nomenclature, types.	5
	2-3	Introduction to modern taxonomic tools: karyotaxonomy, DNA barcoding, protein analysis and DNA polymorphism.	5
	4	Classification and interrelationships.	5
	5-6	Criteria for generic and specific identification.	5
	7-8	Morphological, morphometric and meristic characteristics of taxonomic significance.	10
	9-10	Major taxa of inland fishes up to family level.	20
	11-12	Major taxa of marine fishes up to family level.	20
	13 – 16	Commercially important freshwater and marine fishes of India and their morphological characteristics.	30
	Practical		
	1-10	Collection and identification of commercially important inland and marine fishes.	
	11 – 15	Study of their external morphology and diagnostic features.	
	16- 19	Modern taxonomic tools - Protein analysis and electrophoretic studies.	
	20 – 22	Karyotaxonomy - chromosome preparation and identification.	
	23 – 25	DNA barcoding, DNA polymorphism.	
	26 – 32	Visit to fish landing centres to study commercially important fishes and catch composition.	
	Suggested Readings :		
	1. Bal D.V. & Rao K.V. 1990. Marine Fishes of India. 1st Revised Ed. Tata McGraw Hill. 2. Jhingran V.G. Commercial sea fishes of India, 3. Mayer E. 1977, Principle of Systematic Zoology, Tata McGraw Hill. 4. Khanna S.S. 1993, An Introduction to Fishes. Central Book Depot. 5. P.B.Moyle and J.J. Cech, Fishes: An Introduction to Ichthyology. 6. K.F.Laglar, J.E.Bardacg, R.R.Miller, Ichthyology, **7.** K.C.Jayram, Freshwater fishes of the Indian Region		
I	**FRM 112 2 (1 + 1)**	**Taxonomy of Shellfish**	
	Theory		

	1-4	Study of external morphology and meristic characteristics of crustacean.	15
	5-8	Study of external morphology and meristic characteristics of mollusca.	15
	9-12	Classification of crustacea up to the level of species with examples of commercially important species.	35
	13-16	Classification of mollusca up to the level of species with examples of commercially important species.	35
	Practical		
	1-2	Study of external morphology.	
	3-13	Collection, preservation and identification of commercially important prawns, shrimps, crabs, lobsters, bivalves, gastropods, cephalopods from natural habitats.	
	14-16	Field visits for collection and study of commercially important shellfishes.	
	Suggested Readings :		
	1. Kurian CV & Sebastian VO. 1986. Prawns and Prawn Fisheries of India. Hindustan Publ. Corp. 2. Saxena A..2005 Text book of Crustacea. 3. Discovery Publishing House, New Delhi. 4. Castro P & Huber ME. 1997. Marine Biology. 2nd Ed. Mc-Graw Hill. 5. Linder G. 1977 Sea shells of the world. Blandford PressLtd.Dorset. **6.** Ede DA. 1978. An Introduction to Developmental Biology. Blackie.		
		SEMESTER-II	**13+8 = 21**
II	**FRM 123 3 (2 + 1)**	**Anatomy and Biology of Finfish**	
	Theory		
	1-5	Study of external and internal anatomy of important groups of finfish.	5
	6-7	Study of oral region and associated structures.	5
	8-10	Digestive system and associated digestive glands.	10
	11-15	Food and feeding habits of commercially important fishes.	5
	16-18	Qualitative and quantitative methods of analysis of gut contents.	5
	19-24	Circulatory system, respiratory system, nervous system, urino-genital system, endocrine system, skeletal systems and sensory organs.	20
	25 - 27	Reproductive biology – maturity stages, gonado-somatic index, ponderal index, fecundity, sex ratio and spawning.	10
	28-29	Eggs and larval stages and developmental biology.	10
	30	Age and growth determination by direct and indirect methods.	10
	31	Fish migration - type and significance.	10
	32	Tagging and marking.	10
	Practical		
	1-5	Study of internal organs – digestive, respiratory, circulatory, urino-	

		genital system, nervous systems.	
	6	Skeletal systems.	
	7	Endocrine system.	
	8-10	Study of food and feeding habits. Analysis of gut contents.	
	11-12	Estimation of age and growth by direct and indirect methods.	
	13-14	Classification of maturity stages. Estimation of fecundity.	
	15	Study of developmental stages.	
	16	Tagging and marking.	
	Suggested readings :		
	1. Khanna, S. S., & Singh, H. R. (2011). A text book of fish biology and fisheries. Narendra Publishing House. 2. Wilhelm Harder: 1976 Anatomy of fishes. Schweizerbart science publishers. 3. Evans, D. H., Claiborne, J. B. and Currie S. The Physiology of Fishes, Fourth Edition CRC Marine Biology Series. 4. Rajiv Tyagi and Arvind N. Shukla, Anatomy of fishes. 5. J.S.Datta Munshi and G.H.Hughes, Air breathing fishes of India, their structure, function and life history.		
II	**FRM 124 2 (1 + 1)**	**Anatomy and Biology of Shellfish**	
	Theory		
	1	Study of external and internal organization of commercially important crustaceans.	5
	2	Study of external and internal organization of commercially important molluscs.	15
	3-4	Digestive system, Food and feeding habits,	10
	5-8	Respiratory, circulatory, nervous and reproductive systems.	20
	9-10	Growth and moulting.	10
	11-12	Length – weight relationship.	10
	13-14	Age and growth determination by direct and indirect methods.	10
	15-16	Reproductive biology, larval stages.	10
	Practical		
	1	Study of internal organs of commercially important crustaceans.	
	2	Study of internal organs of commercially important molluscs.	
	3-7	Study of Digestive, respiratory, circulatory, nervous and reproductive systems.	
	8-10	Study of food and feeding habits - analysis of gut contents.	
	11-14	Age and growth, length - weight relationship and condition.	
	15-16	Reproductive biology: maturity stages, spawning periodicity, fecundity and larval stages.	
	Suggested readings:-		
	1. Adiyodi KG & Adiyodi RG. 2000. Reproductive Biology of Invertebrates: Vol. X. Part B.		

	2. John Wiley & Sons. Progress in Developmental Endocrinology. 3. Saxena AB. 1996. Life of Crustaceans. Recent Advance in Entomology, Series -10. Anmol Publ. 4. Barrington EJW. 1981. Invertebrate Structure and Function. 2nd Ed. The English Language Book Society & Nelson. 5. The biology of crustacean, Vol I to IX. **6.** C.M. Yonge & T.E.Thompson, Living marine mollusks.		
		SEMESTER-III	**14+9 = 23**
III	**FRM 215 3 (2 + 1)**	**Inland Fisheries**	
	Theory		
	1-5	Freshwater fishery regions of the world and Maharashtra and their major fish species composition.	5
	7-9	Global inland fish production data.	5
	10-12	Capture fishery resources of India.	10
	13-15	Potential of inland water bodies with reference to respective state.	10
	16 -19	Estimation of Inland fish production and problems in the estimation of inland fish catch data.	10
	20-21	Fishing crafts and gears of Maharashtra.	10
	22-24	Major riverine and estuarine systems of India.	10
	25-26	Major brackish water lakes and their fisheries.	5
	27-29	Fisheries of major reservoirs / natural lakes of India.	15
	30-31	Flood-plain capture fishery- present status of their exploitation and future prospects.	10
	32	Cold water fisheries of India.	10
	Practical		
	1-5	Analysis of species composition of commercial catches at landing and assembling centres.	
	6-7	Sampling and familiarization of commercially important groups.	
	8-11	Observations and experimental operations of selected fishing crafts and gears in inland / estuarine waters.	
	12-13	Maintenance of records on catch data.	
	14-16	Visit to Dept. of fisheries, lakes and reservoirs, net making yards.	
	Suggested readings:-		
	1. Ayyapan,2010, Handbook of Fisheries and Aquaculture, ICAR 2. H R Singh & W S Lakra, Cold water Aquaculture and Fisheries, pp 1-36 Ed. 3. Jhingran VG & Pathak V. 1987, FAO Tech paper on freshwater fisheries, Eco. & Manag. of Bheels in Asam- A case study. 4. Jhingran VG 1991. Fish & Fisheries of India 3rd Edi. Hindustan Publishing House. 5. Jhingran,V.G & Sehagal, K.L, 1978, Cold water Fisheries of India. 6. Checklist of the Native freshwater fishes of India K Rema Devi, ZSI		

	7. Jayaram, The Freshwater fishes of India. A Handbook Vol. I& II 8. Sugunan VV 1997. Reservoir Fisheries of India, **9.** Blaber JM 1997. Fish & Fisheries of Tropical Estuaries, Chapman & Hall		
III	**FRM 216 3 (2 + 1)**	**Physiology of Finfish and Shellfish**	
	Theory		
	1-2	Water as a biological medium.	5
	3-5	Gas exchange; Circulation (finfish & shellfish).	15
	6-8	Excretion; Osmoregulation (finfish & shellfish).	
	9-12	Reproductive physiology (finfish & shellfish).	10
	13-14	Muscle physiology (finfish & shellfish).	5
	15-16	Sense organs (finfish & shellfish).	5
	17-18	Energy and nutrient status of food (finfish & shellfish).	10
	19-20	Nitrogen balance (finfish & shellfish).	5
	21-22	Standard and active metabolism (finfish & shellfish).	5
	23-24	Energy utilization (finfish & shellfish).	5
	25-28	Effect of environmental factors on physiology of fin and shellfishes.	5
	29-30	Stress related physiological changes (finfish & shellfish).	5
	31-32	Structure and functions of important endocrine glands (finfish & shellfish).	10
	Practical		
	1-4	Estimation of oxygen consumption (finfish & shellfish).	
	5-7	Osmoregulation (finfish & shellfish).	
	8-9	Ammonia excretion and carbon-dioxide output (finfish & shellfish).	
	11-12	Influence of temperature and salinity on metabolism (finfish & shellfish).	
	13-14	Haematology of fin and shellfishes (finfish & shellfish).	
	15-16	Histological techniques (finfish & shellfish).	
	Suggested readings:-		
	1. Evans, D. H., Claiborne, J. B. and Currie S. (2013) The Physiology of Fishes, Fourth Edition CRC Marine Biology Series. 2. Brown, M. E. (Ed.). (2013). The Physiology of Fishes: Behavior. Academic Press. 3. Khanna, S. S., & Singh, H. R. (2011). A text book of fish biology and fisheries. Narendra Publishing House.		
		SEMESTER-IV	**13+10 = 23**
IV	**FRM 227 1 (1 + 0)**	**Aquatic Mammals, Reptiles and Amphibians**	
	Theory		
	1-3	Selected aquatic mammal, reptile, amphibian and birds species of India relevant to fisheries.	20
	4 -7	Taxonomic status, identification characters, distribution, abundance, habitat, exploitation,	20
	8-9	Threats and conservation.	20

	10-14	Biology of aquatic animals: Cetaceans (whales. dolphins, porpoises and narwal), Sirenia (manates and dugongs), Carnivora (seals, sea lions walruses, polar bear and otter), Sea turtles, tortoise, crocodiles, sea/ fresh water snakes and amphibians.	20
	15-16	IUCN criteria – Red list, Wild Life (Protection) Act.	20
	Suggested readings:-		
	1. R. R. Reeves, B. S. Stewart, P. J. Clapham, J. A. Powell and P. Folkens, Guide to marine mammals of the world. 2. Annalisa Berta, James L. Sumich, Kit M. Kovacs, Pieter Arend Folkens and Peter J. Adam,Marine Mammals Evolutionary Biology. 3. H. Shirihai, Whales, Dolphins and Seals: A Field Guide to the Marine Mammals of the World. 4. Anthony Martin, The illustrated encyclopedia of Whales and Dolphins. 5. Dale W. Rice, Marine Mammals of the World. 6. J.C. Daniel The Book of Indian Reptiles and Amphibians.		
		SEMESTER-V	**14+9 = 23**
V	**FRM 318 3 (2 + 1)**	**Marine Fisheries**	
	Theory		
	1-4	Classification and definition of fishery zones and fishery resources of world.	13
	6-10	Overview of marine fisheries resources of the world and India, Maharashtra	14
	9-11	Methodology for estimation of marine fish landings in India	10
	12 -20	Major exploited marine fisheries of India, their developmental history and present status.	25
	21-24	Important pelagic - demersal fish, shellfish and seaweed resources of India.	13
	25-27	Traditional, motorized and mechanized fisheries according to major gears.	10
	28-30	Potential marine fishery resources of the India's EEZ.	9
	31-32	GIS and Remote sensing in marine capture fishery.	6
	Practical		
	1-4	Visit to fish landing centers	25
	5-7	Observation and analysis of catches by major crafts and gears.	19
	8-9	Methodology for estimation of marine fish landings in India	13
	10-12	Field collection of fishes, crustaceans, molluscs and seaweeds and record keeping of relevant data.	19
	13-14	Participation in fishing cruises.	12
	15-16	GIS and remote sensing in marine capture fishery.	13
	Suggested readings:-		
	1. Talwar P.K. and Kacker R.K. 2013 Commercial Sea fishes of India. Zoological		

	Survey of India- Kolkata. 997 pp. 2. Fischer, W and Bianchi G (eds) 1984. FAO species Identification sheets for fishery purposes. Western Indian Ocean (Fishing Area 51). Prepared and printed with the support of the Danish International Development Agency (DANIDA). Rome, Food and Agricultural Organization of the United Nations, vols. 1-6 page		
V	**AHM 316 2 (1 + 1)**	**Fish Immunology**	
	Theory		
	1	Introduction, brief history to immunology.	5
	2	Types of immunity: Innate and adaptive immunity, cell mediated and humoral immunity, cells and organs of the immune system.	5
	3	Antigens – structure and types. epitopes, haptenes. Antibody – fine structure, classes with structure and functions.	5
	4	Antigenic determinants on immunoglobulins.	5
	5	MHC complex – types, structure, and functions.	5
	6	Antigen-antibody interactions- principle, antigen recognition by B-cells and T cells**.**	5
	7	Antigen-antibody reaction - Precipitin reactions, agglutination reactions.	5
	8	Microorganisms associated with fishes in health and disease.	5
	9	Defences mechanism in finfish and shellfish- specific and non-specific immune system.	10
	10	Pathogenicity and virulence.	5
	11	Sources of infection, transmission of disease producing organisms, portals of infection.	5
	11	Immunity to bacteria, fungi and parasites.	5
	12	Role of stress and host defence mechanism in disease development.	5
	13	Vaccines - types of vaccines – whole cell vaccine, purified macromolecules, recombinant –vector, DNA vaccines and multivalent subunit vaccines, modes of vaccine administration.	5
	14	Serological methods in disease diagnosis.	10
	15	Immunostimulants –types, mechanism of action, modes of administration.	10
	16	Immunoassays, immunodiffusion, ELISA, immunofluorescence, neutralization, radioimmunoassay, serotyping.	5
	Practical		
	1-3	Collection, separation and identification of fish leucocytes.	
	4-8	Separation of blood plasma and serum. Differential counting - RBC and WBC by Haemocytometer.	
	9-10	Study of different types of leukocytes and isolation of macrophages.	
	11-14	Precipitin reactions - Agglutination test, immunogel diffusion, double immuno diffusion, radial immuno diffusion assay, ELISA.	

	15-16	Methods of vaccine preparation and techniques of fish immunization.	
	Suggested readings:-		
	1. Iwama & Nakanishi, (1996). The Fish Immune System: Organisms, Pathogens and Environment, (Eds.) Fish Physiology Vol. 15. Academic Press, California, USA. 2. R.J. Roberts John Wiley and Sons, (2012). Fish Pathology (Fourth Edition) USA 3. Zabriskie, (2009). Essential Clinical Immunology. (Ed.). Cambridge University Press, UK. 4. Zaccone, Meseguer, Garcia-Ayala and Kapoor, (2009) Fish Defenses: Immunology (Vol.1). (Eds.). Science Publishers, USA.		
		SEMESTER-VI	**14+10 = 24**
VI	**FRM 329 3 (2 + 1)**	**Fish Population Dynamics and Stock Assessment**	
	Theory		
	1-2	The concept of population and unit stock.	5
	3-4	Biological structure of fisheries resource in space and time.	5
	5-6	Indicators of dynamics in a fishery resource.	5
	7	Characteristics of unit and mixed stock.	3
	8	Data requirements for stock assessment.	3
	9-10	Segregation of stocks. Principles of stock assessment.	5
	11-12	Population age structure.	5
	13	Theory of life tables.	3
	14-16	Von Bertalanffy growth parameters. Graphical models.	10
	17-18	Monte Cario simulation model and ECOPATH model.	13
	19-22	Estimation of total fishing and natural mortality.	10
	23-25	The concept of yield, yield in number and yield in weight, yield per recruit, yield curve. Yield models. The concept of Maximum Sustainable Yield and Maximum Economic Yield.	4
	26	Biological symptoms of under-fishing and over-fishing. Growth over-fishing and recruitment over-fishing.	4
	27	Eumetric fishing.	4
	28	Open access fisheries. Fisheries regulations.	10
	29-30	CPUE. Trawl selection and gillnet selection.	5
	31-32	Analytical models of fish stocks.	6
	Practical		
	1-2	Study of length – weight relationship.	
	3	Segregation of stock using direct methods.	
	4-6	Study of analytical models: Beverton and Holt model. VBGF, Pauly's integrated methods, graphical models.	
	7-8	Estimation of Z, F and M. estimation of net selectivity coefficient.	
	9-11	Fitting of surplus production model: Schaeffer model, Fox model.	

	12-13	Study of yield isopleth diagrams.	
	14-16	Micro-computer packages ELEFAN, FISAT.	
	Suggested readings:-		
	1. Devaraj M. 1983. Fish population Dynamics. Course manual. Central Institute of Fisheries Education, Mumbai. Bulletin No. 3 (10) 83. 94 pp. 2. King, M. 1995. Fisheries biology, assessment and management. Fishing News Books. Oxford. 341 pp. 3. Pauly, D. 1983. Some simple methods for the assessment of tropical fish stocks. FAO Fish Tech Paper No. 234. 52 pp. 4. Sparre, P. and Venema, S.C. 1992. Introduction to tropical fish stock assessment Part – I Manual. FAO Fish Technical Paper No. 306.1, Rev. 1. Rome, FAO. 376 pp.		

2.2.P.G. Course structure of Discipline Fisheries Resources Management

CODE	COURSE TITLE	CREDITS
FRM 501*	INLAND FISHERIES RESOURCES	2+1
FRM 502*	MARINE FISHERIES RESOURCE MANAGEMENT	2+1
FRM 503*	MARINE ECOSYSTEMS, BIODIVERSITY AND CONSERVATION	2+1
FRM 504*	TROPICAL FISH STOCK ASSESSMENT	2+1
FRM 505	FISHERIES REGULATIONS	2+1
FRM 506	REMOTE SENSING AND GIS FOR FISHERIES MANAGEMENT	1+1
FRM 507#	INTEGRATED COASTAL ZONE MANAGEMENT	2+1
FRM 508	AQUATIC FLORAL RESOURCES	2+1
FRM 509	FEEDING AND REPRODUCTIVE BIOLOGY OF FINFISH AND SHELLFISH	2+1
FRM 510	DEVELOPMENTAL BIOLOGY OF FINFISH AND SHELLFISH	2+1
FRM 511	FISHING AND ALLIED TECHNOLOGIES	2+1
FRM 512	MODERN TECHNIQUES IN ICHTHYOTAXONOMY	2+1
FRM 591	MASTER'S SEMINAR	1+0
FRM 599	MASTER'S RESEARCH	20
FRM 601**	ASSESSMENT OF AQUATIC BIODIVERSITY	2+1
FRM 602**	APPLICATIONS OF FISHERIES MODELS IN STOCK ASSESSMENT	2+1
FRM 603**	CONSERVATION AND MANAGEMENT OF EXPLOITED FISHERIES RESOURCES	2+1
FRM 604	CORAL REEF MANAGEMENT	2+1
FRM 605	DATA COLLECTION AND ESTIMATION OF EXPLOITED FISHERIES RESOURCES	0+2
FRM 606	FISHERIES ENVIRONMENTAL ASSESSMENT	2+1
FRM 607	ISSUES IN CAPTURE FISHERIES	1+1
FRM 691	DOCTORAL SEMINAR I	1+0
FRM 692	DOCTORAL SEMINAR II	1+0
FRM 699	DOCTORAL RESEARCH	45

* Compulsory for Master's programme; ** Compulsory for Doctoral programme
#FRM 507 cross listed with Aquatic Environment Management AEM 503

2.3. P.G. Course Structure of Discipline Fish Biotechnology

CODE	COURSE TITLE	CREDITS
FBT 501*	FUNDAMENTALS OF MOLECULAR BIOLOGY	2+1
FBT 502*	BASIC CONCEPTS OF CELL BIOLOGY	2+1
FBT 503*	GENE STRUCTURE AND REGULATION OF EXPRESSION	2+1
FBT 504*	GENETIC ENGINEERING AND ITS APPLICATION IN FISHERIES	2+1
FBT 505#	MOLECULAR AND IMMUNOGENETICS	1+1
FBT 506#	BIOINFORMATICS	1+1
FBT 507#	CELL AND TISSUE CULTURE	1+1
FBT 508	MARINE BIOTECHNOLOGY	1+1
FBT 509	AQUACULTURE BIOTECHNOLOGY	1+1
FBT 591	MASTER'S SEMINAR	1+0
FBT 599	MASTER'S RESEARCH	20
FBT 601**	ADVANCES IN MOLECULAR AND CELL BIOLOGY	2+1
FBT 602**	GENETIC ENGINEERING OF EUKARYOTES	2+1
FBT 603**	GENETIC ENGINEERING OF BACTERIA AND VIRUSES	2+1
FBT 604	BIOSAFETY AND PATENT LAWS	2+0
FBT 605	FUNCTIONAL GENOMICS AND PROTEOMICS	1+1
FBT 606	PROTEIN CHEMISTRY AND ENGINEERING	1+1
FBT 607	RNAI TECHNOLOGY	1+1
FBT 608	BIOPROCESS TECHNOLOGY	1+1
FBT 691	DOCTORAL SEMINAR I	1+0
FBT 692	DOCTORAL SEMINAR II	1+0
FBT 699	DOCTORAL RESEARCH	45

* Compulsory for Master's programme; ** Compulsory for Doctoral programme
#FBT 505, FBT 506 and FBT 507 cross listed with Fish Genetics and Breeding FGB 507, FGB 510 and FGB 512 respectively

2.4. LIST OF M.F.SC. (FISHERIES RESOURCES MANAGEMNT) THESIS

2008			
01.	Systematic and Biology of Estuarine Crab *Scylla spp.* Of Ratnagiri Coast, Maharashtra	Funde Anil B.	Dr.S.D. Naik
02	Biology of *Sardinella Longiceps* along Ratnagiri Coast off Maharashtra.	Deshmukh Abhay V.	Dr. S. R. Kovale
2010			
01.	Biology of *Nemipterus Japonicus* along the Ratnagiri Coast off Maharashtra	Suresh Kumar P.S.	Dr.S.AMohite
2011			
01	Morphometrics, Gonad Development and Food and Feeding of the White Fish *Lactarius lactarius* (Bloch & Schneider, 1801)	Akhade Roshan R.	Dr. M.S Sawant.
2012			
01.	Biology of *Megalaspis cordyla* (Linnaeus, 1758) off Ratnagiri Coast, Maharashtra.	JadhavTrupti D.	Dr.S.AMohite
02.	Reproductive Biology of Estuarine Crab, *Scylla tranquebarica* (Fabricius, 1798) along Ratnagiri Coast, Maharashtra.	Sonawane Shivam S.	Dr. S.D.Naik
03	Biological Studies of Indian Mackerel, Rastrelligerkanagurta (Cuvier, 1817) off Ratnagiri Coast, Maharashtra.	Bhendarkar M.P.	Dr. S.D.Naik
04	Morphology and Biology of *Meretrix meretrix* (Linnaeus, 1758) along Ratnagiri Coast, Maharashtra.	Sawant Prajwala P.	Dr. (Mrs.)S.A. Mohite
05	Molecular discrimination of six Mullet species from Ratnagiri coast using random amplified polymorphic DNA (RAPD) markers	Nadkar P. G.	Dr. M. S. Sawant
2013			
01	Biology of *Lepturacanthus savala* (Cuvier, 1829) Off Ratnagiri Coast, Maharashtra	Miss. Pakhmode Pallavi K.	Dr. (Mrs.)S.A. Mohite
02	Biology of Pony Fish, *Leiognathus splendes* (Cuvier,1829) Ratnagiri Coast, Maharashtra	Acharya Kanishka V.	Dr.S.D. Naik
03	Studies on the Biology of Squid *Loligo duvauceli* (D'Orbigny,1835) along the Ratnagiri Coast of Maharashtra	Pawar Nitin S.	Shri. B. P. Bhosale
04	Morphometric and Genetic Analysis of Pink Perch *Nemipterus japonicus* Along the West Coat of India	Hakim Mudasir Maqsood	Dr.M.S. Sawant
05	Molecular identification of Oyster species using random amplified Polymorphic DNA (RAPD) analysis	SalviPooja V.	Dr. M. S. Sawant
06	Morphometric and molecular studies on three Portunid Crabs off Ratnagiri coast	BhosaleMangesh M.	Dr. R.A. Pawar
07	Effect of biotechnological inputs on Crustacean	Gaikwad U. R.	Dr.R. A. Pawar

	health and water condition		
2014			
01	Study of Sextual dimorphism in mantis shrimp	Benjamin Kondowe	Dr.R.A.Pawar
02	Bionomics of Freshwater Crab Resources of Ratnagiri with reference to *Barytelphusa cunicularis(*Wesrwood,1836)	Beg Nayum A.	Dr.S.D.Naik
03	Studies on the Biology of Pony Fish *Leiognathus bindus* (Valenciennes,1835) along the Ratnagiri Coast of Maharashtra	Biswajit Borah	Dr. V. H. Nirmale Dr. R. A. Pawar Shri. B. P. Bhosale Sr. S.Y. Metar
04	Studies on the Biology of Indian Sand Whiting *Sillagosinham*(Forsskal,1175) along the Ratnagiri Coast of Maharashtra	Sawant Prutha P.	Shri. B. P. Bhosale Dr. S. D. Naik Dr.V.H. Nirmale Dr. S. Y. Metar
2015			
01	Indigenous Knowledge in Management of Stake net Fishery (Wan) along the Ratnagiri Coast of Maharashtra	Uskelwar Laxman S.	ShriB.P.Bhosale
02	Studies on the Biology of Tiny Shrimp *Parapenaeopsis stylifera* (Edwards,1837) of Ratnagiri Coast of Maharashtra	Miss. RawangaveRekha S.	Dr.S.D.Naik
03	Biological Studies of Blood Clam *Tegillarca (Anadara) rhombea*(Born,1778) along Ratnagiri Coast, Maharashtra	Miss.Meshram Asawari M.	Dr.(Mrs)S.A.Mohite
04	Studies on the Biology of Malabar Tongue Sole *Cynoglossus macrostomus* (Norman,1928) Along the Ratnagiri Coast of Maharashtra	Miss. Bhalekar Pooja V.	Dr.V.H.Nirmale
05	Study of Sexual Size Dimorphism in Mantis Shrimp	Kondowe Benjamin N.	Dr. R. A. Pawar
2016			
01	Biological studies on moustached Thryssa, *Thryssa mystax* (Schneider, 1801) along the Ratnagiri coast of Maharashtra	Kende D. R.	Dr. V. H. Nirmale
02	Morphometrics, Food and feeding and reproductive biology of white sardine, *Escualosa thoracata* (Valenciennes, 1847) of Ratnagiri Coast	Gurjar U. R.	Dr. M. S. Sawant
03	Studies on Capture Fisheries of Krishna River in Sangali District of Maharashtra	KokateAmit A.	Bhosale, B. P.
04	Study of Spatio-Temporal Variations in the Sponge of Ratnagiri Coast, Maharashtra, India	Shishir Kumar	Mohite S. A.
2017			
01	Truss morphometric analysis of Great Clam *Meretrix meretrix* from Ratnagiri, Maharashtra, India	Miss DarokarSheetal R.	Dr. Mrs. S. A. Mohite
02	Biological Studies on dussumier'sThryssa,	Pawase Sudarshan	Dr.V.H.Nirmale

	Thryssa dussumieri(Valenciennes, 1848) along the Ratnagiri coast of Maharashra	V.	
03	Identification of Finfish Seed and its seasonal variation along the Kasarveli Estuary of Ratnagiri Coast of Maharashtra	Balkate Jayesh J.	Naik, S. D.
2019			
01	Biological studies on the Shrimp Scad, *Alepes djedaba* (Forsskal, 1775) along the Ratnagiri coast of Maharashtra	Bandkar D. S.	Dr. V. H. Nirmale
02	Biological studies on the Jinga Shrimp *Metapenaeus affinis* (H. Milne Edwards, 1837) along Ratnagiri coast of Maharashtra	Dongre S. J.	Dr. S. Y. Metar
03	Taxonomic evaluation of species of the family Leiognathidae along the coast of Maharashtra	Godavarikar A. M.	Dr. S. S. Gangan

2.5. LIST OF M.F.Sc. (FISH BIOTECHNOLOGY) THESIS

SR. NO.	YEAR	TITLE OF THE THESIS	NAME OF THE STUDENT	GUIDE & CHAIRMAN, SAC
Degree awarded				
1	2012	Molecular discrimination of six mullet species from Ratnagiri coast using Random Amplified Polymorphic DNA(RAPD) markers	Miss. P.G. Nadkar	Dr. M.S. Sawant
2	2013	Morphometric and molecular studies on three Portunid crabs off Ratnagiri coast	Shri. M.M.Bhosale	Dr. R.A.Pawar
3	2013	Effect of biotechnological inputs on crustacean health and water condition	Miss. U.R.Gaikwad	Dr. R.A.Pawar
4	2013	Molecular identification of oyster species using Random Amplified Polymorphic DNA(RAPD) analysis	Miss. P.V. Salvi	Dr. M.S. Sawant
5	2014	Molecular identification of marine clams of Family Veneridae from Ratnagiri using Random Amplified Polymorphic DNA(RAPD) analysis	Miss. M.B.Kendre	Dr. M.S. Sawant
6	2014	Karyotyping and chromosomes variations in edible Veneridae clams along Ratnagiri coast, Maharashtra	Shri. Shaikh A.L.S.A.Hakim	Dr. S.A.Mohite
7	2014	Morphometric and genetic analysis of Pink Perch, *Nemipterus japonicus* along the west coast of India	Shri. Hakim M.M.	Dr. M.S. Sawant
8	2015	Effect of probiotics on health indices	Miss. P. D.	Dr. R.A.Pawar

		of Koi carp and Goldfish	Deshmukh	
9	2018	Molecular taxonomy of penaeid shrimps along Maharashtra coast	Miss. A.R.Dhawade	Dr. R.A.Pawar
10	2018	Inter-species hybridization among molly (*Poecilia spp*.) species	Shri. K.S.Naik	Dr. M.S. Sawant
11	2018	Molecular taxonomy of mudskipper along Maharashtra coast	Shri. N.M.Salunke	Dr. R.A.Pawar
12	2018	Induced molting of mud crab by spinach extract for producing soft shell	Shri. A.N.Shahare	Dr. S.D.Naik
13	2018	Spatio-temporal metagenomic profiling of bacterial diversity of aquaculture sediments	Shri. U.S. Chacharkar	Dr. R.A.Pawar
14	2019	Study on karyotyping of freshwater crab *Barytelphusa spp.*	Miss. S.M.Padyar	Dr. S.D.Naik
15	2019	Comparative genomics of fish genome for identification of candidate genes using *In Silico* approach	Shri. S.S. Randhawa	Dr. R.A.Pawar
16	2019	*In Silico* characterization, homology modelling and structure - based functional annotation of *Labeo rohita* growth hormone receptor protein	Shri. B.C. Dhandare	Shri. B.P. Bhosale
17	2020	Study of anti - microbial activities of extracts from marine sponge, H*yrtios cavernosus* (Vacelet, Vasseur & Levi, 1976) from Ratnagiri coast.	Shri. D.K. Pawaskar	Dr. S.A.Mohite

2.6. LIST OF Ph.D. (FISHERIES RESOURCES MANAGEMNT) THESIS

2016			
01	Comparative Biological Studies on Bivalves of Mirya and Aare-Ware Rocky Shores of Ratnagiri, Maharashtra, India	Pakhmode, Pallavi K.	Mohite S. A.
2018			
01	Evaluating marine capture fisheries of Ratnagiri with respect to Ecosystem- based Indicators	Kolhe Suraj, S.	Pawar, R. A.
2019			
01	Ethnoecological studies on Common Brackish Water Fishes along the South Kokan Coast of Maharashtra	Uskelwar, Laxman,S.	Sawant, M. S.

3.1. Research:

Apart from some collaborative research work conducted, the department has to date completed many research projects of which five are externally funded by various agencies like ATMA, Rajiv Gandhi Science & Technology Commission, Govt. of Maharashtra, National Agriculture Innovative Projects and National Fisheries Development Board. Department has many recommendations approved by the Joint AGRESCO to its credit. Two externally funded projects are currently going on.

The departmental research work addresses some major areas of importance or concern such as biodiversity assessment, clam resources, mud crabs, specimen preservation, by-catch and fishing of non-target fish species, stock assessment and population dynamics.

3.2. Ongoing research projects

Sr. No.	Title of the project	Principal Investigator/ Co-Investigator
1	Studies on the antibacterial activities of marine sponge, *Haliclona (Reniera) manglaris* (Alcolado, 1984) from Ratnagiri coast	Dr. S.A.Mohite (P.I.)
2	Stock assessment of Indian oil sardine and Indian mackerel.	Dr. R.A.Pawar (P.I.)
3	Storage studies on traditional clam product, *Mulyache kaple*.	Dr. V.H.Nirmale (Co-P.I.)
4	Study of indigenous knowledge used in design of traditional gears along the south Konkan coast of Maharashtra	Dr. V.H.Nirmale (Co-P.I.)
5	Studies on ornamental fish landed as bycatch along the Ratnagiri coast of Maharashtra	Dr. V.H.Nirmale (Co-P.I.)

4. Extension:

The department has conducted various extension program for the fishermen, fish farmers and also for school students. Awareness programs pertaining to Endangered aquatic species, monsoon ban on fishing, freshwater prawn farming etc. were conducted by the department in campus as well as at Harnai, Guhagar, Vengurla, Malvan, Purnagad, Adiware, Mirkarwada, Karla and Agar Naral villages.

The department has also published many news articles, extension booklets, pamphlets, glossary and handbooks related to the topics such as biodiversity, mangroves, sponges and other marine organisms etc.

5. Amenities and laboratories:

U.G. Laboratory & museum:

The department has a spacious laboratory for conducting the U.G. practicals. The laboratory can accommodate about 25 students at time with sufficient working space for each student. Similarly the department has a well equipped laboratory for P.G. students.

A well arranged museum has been maintained by the department. Preserved specimens of more than 250 Fresh water, Brackish water and Marine fishes, shellfishes and other aquatic animals are displayed here. The museum has recently acquired taxidermy specimens of some aquatic animals. The museum also has many shellfish specimens collected from all over India. The museum has been attracting students as well as tourists.