

SHIVAJI UNIVERSITY, KOLHAPUR.



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2009

Revised Syllabus For
Bachelor of Science (part III) Fisheries,

(Subject to modifications to be made time to time)

Syllabus to be implemented from June 2012

SHIVAJI UNIVERSITY, KOLHAPUR.

Revised Syllabus for Bachelor of Science

B. Sc. III – Fisheries –To be implemented from June 2012

GENERAL OBJECTIVES OF THE COURSE

A) Aims:

- 1) To impart the knowledge of fishery science to the pupils.
- 2) To make the pupils to use the knowledge in their daily life.
- 3) To make the pupils aware of natural resources and environment.
- 4) Application of knowledge in Fisheries for nutrition, agriculture & live stock.
- 5) To provide practical experiences which form a part of their learning processes.
- 6) To develop aptitude for scientific work & ability to pursue studies far Beyond graduation.
- 7) To encourage the pupils to take life science as a carrier which is the need now a days.
- 8) To make the pupils responsible citizen of the society.

B) Objectives -

- 1) To impart knowledge is the basic aim of education. The students are expected to acquire the knowledge of animal science, fishes , natural phenomenon, manipulation of nature & environment by man.
- 2) Understanding the scientific terms, concepts, facts, phenomenon & their interrelationship especially of fish.
- 3) Applications of the knowledge.
- 4) To develop skills in practical work, experiments & laboratory materials,instruments.
- 5) To develop interests in the subject & scientific hobbies.
- 6) To develop scientific attitude which is the major objective. This makes the students open minded, critical observations, curiosity, thinking etc.
- 7) Abilities to apply scientific methods, collection of scientific data, problem solving,organize science exhibitions, clubs etc.
- 9) Appreciation of the subject, contributions of scientists, scientific methods,scientific programs etc.

5. DURATION

- The course shall be interdisciplinary course.
- The duration of course shall be three years.

6. PATTERN

Pattern of Examination will be semester for theory and annual for practical With INTERNAL ASSESSMENT (Project/Seminar/Field work for theory) Scheme

7. MEDIUM OF INSTRUCTION:

The medium of instruction shall be in English.

8. STRUCTURE OF COURSE

B.Sc. III – Fisheries

THEORY – No. of Papers: Eight

Practical: Four

SEMESTER-V Theory

Sr. No.	Subject		Marks	Uni.	Internal
1	Fisheries	Paper- V	50	40	10
2	Fisheries	Paper- VI	50	40	10
3	Zoology	Paper- XI	50	40	10
4	Zoology	Paper- XII	50	40	10

Total=200 marks

SEMESTER-VI Theory

Sr. No.	Subject		Marks	Uni.	Internal
5	Fisheries	Paper-VII	50	40	10
6	Fisheries	Paper-VIII	50	40	10
7	Zoology	Paper-	50	40	10

		XV			
8	Zoology	Paper- XVI	50	40	10

Total=200 marks

PRACTICALS-Annual

09	Practical—I	50
10	Practical – II	50
11	Practical – III	50
12	Practical – IV	50
	Total	200

Theory +Practical Total 600 marks

9. SCHEME OF TEACHING AND EXAMINATION

Teaching scheme (Hrs/Week)

Sr. No	Sem. - V	Sem. - VI	L	P	Total
1	Fisheries paper V	Fisheries Paper VII	3		
2	Fisheries paper VI	Fisheries Paper VIII	3		
3	Zoology paper XI	Zoology Paper XV	3		
4	Zoology paper XII	Zoology Paper XVI	3		
	Total		12		12
	Practical I- P			5	
	Practical II- P			5	

	Practical III- P			5	
	Practical IV- P			5	
	Total			20	20
	Total				32

10. SCHEME OF EXAMINATION

Question paper will be set in the view of the / in accordance with the entire syllabus and preferably covering each unit of syllabi.

OTHER FEATURES

1. Required Books, Journals stated in each syllabus of Part I, Part II and Part III Zoology and Fisheries.

A) LIBRARY :

Reference and Text Books, Journals, and Periodicals, Reference Books for Advanced Studies.

B) SPECIFIC EQUIPMENTS: Necessary to run the Course (T.V., L.C.D., and

Overhead Projector), (Computer and necessary soft wares, operating systems etc.)

C) LABORATORY SAFETY EQUIPMENTS

- Fire Extinguishers at least two sets in each laboratory. (Lab. area 600 sq.ft.)
- Leakage of gases be avoided.
- Primary medical aid box (First Aid Kit)
- Sugar / Glucose – 500 gm pack: Pinch of sugar and a cup of drinking water in hypoglycemic condition. OR In extreme weakness of student or person concerned.

- Rules of animal ethics should be strictly followed.

LABORATORY INSTRUCTIONS

- 1) Always wear an apron inside the laboratory. Do not wear it outside.
- 2) Do not drink or eat inside the laboratory.
- 3) Do not place pencil, fingers or any material in the mouth. Moisten labels
With water.
- 4) Use microscopes and other instruments carefully.
- 5) Clean all used glassware such as test tube, pipettes, Petri-plates, glass slides.
- 6) Put cotton plugs, papers, matches, waste dissection material etc. in a waste-paper basket. Do not throw them in sink, not leave them on desk or floor.
- 7) Regard all cultures as pathogenic. Take every precaution against infection.
- 8) Report all accidents to the instructor immediately.
- 9) Wash hands thoroughly with soap and water before and after dissection and experiment.
- 10) Always turn off water, gas and electricity before leaving the laboratory.
- 11) When students enter in lab. they should have – A Laboratory Journal, pencil and eraser, foot rule, dissection box with dissecting instruments, a small napkin.
- 12) All drawings must be made with drawing pencil only.
- 13) As the journal is to represent student's bona fide work during the whole year, student should keep it as clean as possible and **DO NOT LOOSE IT.**
- 14) Students should not forget that unless their journals are certified, they are not allowed to appear for the University examination

SHIVAJI UNIVERSITY, KOLHAPUR

Revised Syllabus for

B. Sc. Part III Fisheries

[To be implemented from June 2012]

Semester V

Paper V

(Fishery Biology II and Aquaculture Management)

Sr No	Unit No	Topic /sub topic	No. of lectures
1	I	<p>A)Type study - Prawn (<i>Palaemon</i> sp.)</p> <p>i. Systematic position</p> <p>ii. Habits and habitat</p> <p>iii. External morphology</p> <p>iv. Functional anatomy of:</p> <p>a) Digestive system</p> <p>b) Respiratory system</p> <p>c) Circulatory system</p> <p>d) Excretory system</p> <p>e) Nervous system and sense organs- Eye and Statocyst.</p> <p>f) Reproductive system</p> <p>B. Prawn culture: Stocking, pond, Maintenance and harvesting.</p>	<p>10</p> <p>3</p>
2	II	<p>A) Type study— Fresh water bivalve</p> <p>1. Systematic position</p> <p>2. Habits and Habitat.</p> <p>3.External morphology.</p> <p>Functional anatomy of -</p> <p>a) Digestive system</p> <p>b) Respiratory system</p> <p>c) Excretory system</p> <p>d) Circulatory system</p> <p>e) Nervous system and sense organs</p>	11

Semester V
Paper VI
Fish Physiology II, Biostatistics and Bioinformatics.

Sr No.	Unit No.	Topic /sub-topic	No of lectures.
1	I	A. Study of endocrine glands Histology , role of hormones and their regulation with reference to: a) Pituitary gland b) Inter-renal gland c) Corpuscles of Stannius d) Gonads e) Hepatopaneas f) Thyroid gland	11
		B. Ecological and hormonal influence on maturation of gonads and spawning.	2
2	II	Breeding in Indian Major Carps. i Natural breeding . ii Induced breeding . iii Methods of obtaining eggs , spawn , fry and fingerlings from natural resources	5
		Breeding of ornamental fishes i) Oviparous ii) Live bearers.	4
		Biostatistics: Classification i. Definition ii Collection of data iii Basis of classification iv Types of classification	2
		Frequency distribution with examples. a) Principles b) Examples on grouped data c) Graphical representation i. Histogram for equal and unequal classes ii. Frequency Polygon and Frequency curve iii. Ogive curves	3

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Semester VI
Paper VII
Marine Ecology and Fisheries

Sr No.	Unit No.	Topic/ Sub-topic	No. of lectures.
1	I	Marine habitat <ul style="list-style-type: none"> a. Physical parameters b. Chemical parameters c. Classification of habitat d) Physico-chemical parameters of estuary Oceanographic instruments: <ul style="list-style-type: none"> i. Grabs ii. Dredges iii. Sacchi disc iv. Water samplers v. Reversing and non reversing thermometers vi. Plankton net 	8 6
2	II	Brackish water habitat fisheries: <ul style="list-style-type: none"> a) Definition of Brackish water b) Definition of estuary c) Types of estuary Characteristics and fauna of : <ul style="list-style-type: none"> i. Rocky shore ii. Muddy shotre iii. Sandy shore iv. Fauna in estuary -Permanent and migratory. 	4 11
3	III	Study of fisheries Crustacean fisheries Molluscan fisheries Study of fisheries of commercial importance	12

		with respect to Bionomics, food, feeding and economic importance of : a. Mackerel b. Pomfret c. Bombay duck d. Sardine Capture and culture fisheries: Milk fish, Tilapia, Perches, Anguilla, Hilsa, Asian sea bass and Mullet.	4
Total lectures			45

Reference books

1. The marine and fresh water fishes of Ceylon by Munro
2. Commercial sea fishes of India by Talwar P.K. and R.K. Kacher
3. FAO species identification sheets for fishery purpose. Vol. I, II
4. An introduction to the Pacific Fisheries. by Royce U.F.
5. Giant prawn farming, New M.B. (ed). Elsevier Scientific Publishing Co. Amsterdam.
6. Fresh water prawn farming : A manual of the culture of *M. rosenbergii*, New M.B. and S. Sngholka, 1982, FAO, Fish. Tech. Pap. 225 FAO, Rome.
7. The biology and culture of Tilapias. Pullin R.S.V. and R.H. Lowe – McConnel (Eds)
8. Bivalve culture in Asia and Pacific, Davy, F.B. and M. Brahm (Eds), 1982, IDRC-200. IDRC Asia, Regional office, Singapore.
9. Fish and fisheries of India by Thingrajan V.G., 1982, Hindustan Publishing Corporation, New Delhi.

Semester VI
Paper VIII
Fish Pathology and Fishery Technology

Sr No.	Unit No	Topic/ Sub-topic	No of lectures.
1	I	Fishing gear technology: i. Materials used in fishing gears ii. Properties of fibers iii. Numbering system iv. Net making by braiding and cutting , mounting of webbing, rigging of various gears, principles of mending. knots, hitches and bends.	5
		Fish spoilage: a) Criteria for freshness of fish b) Post mortem changes i. Rigor mortis ii. Bacterial spoilage iii. Chemical spoilage	5
		Fish pathology: i) Signs of sickness and effects on fish ii) Pathological procedure for diagnosis of fish diseases	5
2	II	Fish pathology: Aetiology, symptoms and control measures for the following: i. Viral diseases ii. Bacterial diseases iii. Fungal diseases iv. Protozoan diseases v. Epizootic ulcerative syndrome (EUS) vi. Worm diseases vii. Crustacean diseases	13
3	III	Fish preservation and processing techniques: Principles and methods with reference to: a. Refrigeration and freezing	12

		b. Drying c. Salting d. Smoking e. Canning Fish products and by-products: a. Fish body oil b. Fish liver oil c. Fish meal d. Isinglass e. Fish protein concentrate f. Fish glue g. Fish manure	5
Total lectures			45

Reference books

- 1. Fisheries technology - Balchandran**
- 2. General topics in fishery by Ravi Reddy, Mohan Babare, Ramraopatil.**
- 3. Fisheries-Its methods and applications by Rounsfall G.A. and W.H.**
- 4. Everhart**
- 5. Manual of methods in fish biology by S.P. Biswas**
- 6. Inland fishes of India and adjacent countries (vol.I,II) by Talwar**
- 7. P.K.andA.G.Jhingran.**
- 8. Hand book of museum techniques by Aiyyappan A. and S.T.**
- 9. Satyamurthy.**
- 10.Fisheries Ecology by Pitcher T.J. and P.J.T. Hart.**
- 11.Fish stock assessment : A manual of basic methods.**
- 12.Manual of methods of fisheries biology, Pisciculture by Laevastu T.**
- 13.History of fishes by Norman**
- 14.Fish and fisheries by B.N. Yadav**
- 15.The Cambridge Natural History by HimeshShiploy**
- 16.Proceedings of the symposium on living resources of the seas around**
- 17.India-CMFRI-1073Spl. pub. Cochin**
- 18.Standard methods for the examination of water and waste water**
APHA
- 19.1981,American public health association, Washington D.C.**

B.Sc.III Fisheries

Practical I -Annual Pattern(based on papers V and VI)

Sr No	Unit No	Topic /sub-topic	No. of Practicals.
1	I	Dissection of Prawn a . Digestive system . b . Nervous system . c .Mountings . i .Mouth parts ii .Thoracic appendages iii .Abdominal appendages iv .Cornea v .Statocyst Dissection of Bivalve . a . Digestive system b . Nervous system c . Study of : i. Gills ii. Heart iii. <i>Glochidium</i> larva	4
			4
2	II	Identification of larval / life cycle stages of: a. Prawn / Shrimp b. Mytilus c. Fish Identification of following: a. Weeds: Eichornia, Marcelia, Hydrilla, Pistia, Spirogyra.	2
		b. Weed fishes: Rasbora , <i>Puntiusticto</i> , and <i>Tilapia</i> c. Predatory fishes: <i>Clarius</i> , <i>Anabas</i> and Eel.	3
		d. Food and fertilizers: Lime, NPK fertilizers and fish meal.	1

		Identification and histological study of following fish organs: <ol style="list-style-type: none"> Pituitary gland Testis Ovary Hepato-pancreas 	
3	III	Examples based on Biostatistics: Any ten examples as per syllabus Bioinformatics -Study of Computer and computer devices, peripherals- input & output devices. Examples of bioinformatics in relation to nucleotides and amino acid sequences. Estimation of sulphate , Phosphate and Nitrate from watersample. Visit to fish farm to study management. Submission of tour report at the time of practical examination. A suitable project related to subject should be carried out and report thereof be submitted at the time of practical examination .	3 1 2

Practical II Annual pattern (based on papers VII and VIII)

Sr No	Unit No	Topic/ sub-topic	No. of practicals.
1	I	1 Analysis of gut contents in fish. 2. Estimation of fish blood chloride. 3. Total RBCs and WBCs counts. 4. Estimation of hemoglobin of fish.	5
2	II	1. Determination of fecundity 2. Determination of moisture content of fish. 3. Ovo- diametry & study of stages of maturity. 4. Gonadosomatic index (GSI) and conditioning Factor	5
3	III	1. Fish morphometry – Length-weight relationship 2. Study of ecological adaptations of the following: a. <i>Mytilus</i> b. <i>Echeneis</i> c. Exocoetus d. <i>Anguilla</i> e. Pleuronectes 3. Study of oceanographic instruments. 4. Observations of mortality with respect to: a. Stocking density b. Use of different chemicals – LC 50 5. Study of Economic importance of: a. Bombay duck b. Mackerel c. Pomfret d. Sardine	5
4	IV	1. Study of pathological condition of fish and treatment. a. Fin rot b. Argulus c. Nematode	4

		2. Study of knots , hitches & bends. 3. Organoleptic tests for freshness of fish. 4. Visit to sea shore/ fish market / processing factories.A report of visit be submitted at the time of university practical examination.	
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COMMON NATURE OF QUESTION FOR THEORY PAPER MENTIONED SPERATELY:

**B.Sc. III FISHERIES
Practical Examination
Skeleton question Paper
Practical I**

	<u>Marks</u>
Q1. Major Dissection	12
Q2. Temporary Mounting	05
Q3 Ecological Experiment	06
Q4 Example on Biostatistics and Bioinformatics	07
Q5. Identification (Fivespots)	05
Q6 Project Report and Viva-voce	10
Q7. Journal	05
Total - 50	

Practical II

	Marks
Q1. Fecundity / Ovo-diameter	06
Q2. Estimation of blood chloride / total blood cell count	10
Q3. Morphometry	05
Q4. Gut content analysis of fish	07
Q5. Identification (Fivespots)	10
Q6. Excursion report and viva voce	07
Q7. Journal	05
Total - 50	

B.Sc. III FISHERIES

EQUIVALANCE TO OLD SYLLABII

Semester pattern Equivalence to old syllabus Annual pattern

Fisheries old

Paper III - Fishery biology II Aquaculture Management ,
Fish physiology II and Biostatistics.

Fisheries semester

New papers

Paper V - Fishery Biology II and Aquaculture
Management.

Paper VI- Fish Physiology II , Biostatistics and Bioinformatics.

Zoology old

Paper VII Physiology, Endocrinology, Environmental Biology and
Toxicology.

Zoology semester –

New papers

Paper XI- Physiology

Paper XII- Endocrinology, Environmental Biology and Toxicology.

Fisheries old

PAPER IV- Marine ecology and fisheries, fish pathology and
Fishery technology

Fisheries semester

New papers

Paper VII - Marine ecology and fisheries

Paper VIII- Fish pathology and Fisheries Technology.

Zoology old

Paper VIII Molecular Biology, Biotechnology, Biotechnology and Applied
Zoology.

Zoology semester

New papers

Paper XV- Molecular Biology, Biotechnology and Biotechnology

Paper XVI- Applied Zoology.