

**Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce, and Science College, Ahmednagar
(Autonomous)
(Affiliated to Savitribai Phule Pune University, Pune)**



**National Education Policy (NEP)
Choice Based Credit System (CBCS)**

Programme Skeleton and Syllabus of

Zoology

**Implemented from
Academic Year 2023-24**

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's

New Arts, Commerce and Science College, Ahmednagar (Autonomous)

Board of Studies in Zoology

Sr. No.	Name	Designation
1.	Hon. Prof. Dr. S. N. Pokale	Chairman
2.	Hon. Dr. A. D. Harkal	Member
3.	Hon. Prof. R. J. Chavan	Academic Council Nominee
4.	Hon. Prof. S. S. Nanware	Academic Council Nominee
5.	Hon. Dr. S. S. Teradalkar	Vice-Chancellor Nominee
6.	Hon. Prof. B. A. Pawar	Alumni
7.	Hon. Ms. Manjushree Tadvalkar	Industry Expert
8.	Hon. Dr. B. K. Thorve	Member (co-opt)
9.	Hon. Ms. S. P. Salve	Member (co-opt)
10.	Hon. Shri. G. G. Wakchoure	Member (co-opt)
11.	Hon. Ms. G. R. Devdhe	Member (co-opt)
12.	Hon. Ms. S. S. Mote	Member (co-opt)
13.	Hon. Ms. P. N. Dongare	Member (co-opt)
14.	Hon. Ms. S. J. Wagh	Member (co-opt)

Credit Distribution: B.Sc. Zoology including Minor and OE and other courses.

	Type of Courses	III Yr	IV Yrs (Honours)	IV Yrs Research
Major Zoology	Discipline-Specific Courses (DSC)	46	74	66
	Discipline Specific Elective (DSE)	08	16	16
	Skill Enhancement Courses (SEC)	06	06	06
	Vocational Skill Courses (VSC)	08	08	08
	On-Job Training (OJT)	04	08	04
	Field Project (FP)	04	04	04
	Community Engagement and Service (CEP)	02	02	02
	Research project	00	00	12
	Research Methodology	00	04	04
	Indian Knowledge System	02	02	02
	Total (I, II and III Year)	80	124	124
Minor	Minor	20	20	20
Other Courses	Open Elective (OE)/ Multidisciplinary Courses	12	12	12
	Co-Curricular Courses	08	08	08
	Ability Enhancement Courses	08	08	08
	Value Education Courses	04	04	04
	Total	132	176	176

Programme Framework (Courses and Credits): B.Sc. Zoology (Minor)

Sr. No.	Year	Semester	Level	Course Type	Course Code	Title	Credits
1.	I	I	4.5	MNR-1	BS-ZO101	Applied Zoology I	03
2.	I	II	4.5	MNR-2	BS-ZO102	Applied Zoology II	03
3.	II	III	5.0	MNR-3	BS-ZO201	Animal Systematics and Diversity I	03
4.	II	IV	5.0	MNR-4	BS-ZO202	Animal Systematics and Diversity II	03
5.	III	V	5.5	MNR-5	BS-ZO301	Animal Physiology	04
6.	III	VI	5.5	MNR-6	BS-ZO302	Developmental Biology	04
							20

Ahmednagar Jilha Maratha Vidya Prasarak Samaj's
New Arts, Commerce and Science College, Ahmednagar
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Syllabus
B.Sc. Zoology (Minor)

Title of the Course: Applied Zoology I								
Year: I				Semester: I				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-1	BS-ZO101 T/P	02	01	03	60	30	70	100

Learning Objectives:

1. To understand the morphology and life cycle of Honey Bee.
2. To understand the Apiculture.
3. To understand the morphology and life cycle of Silkworm.
4. To understand the process of Sericulture.

Course Outcomes:

1. Understanding the morphology and life cycle of Honey Bee.
2. Understanding the Apiculture.
3. Understanding the morphology and life cycle of Silkworm.
4. Understanding the process of Sericulture.

Detailed Syllabus:

Unit	Name of Topic	Lectures Allotted
1.	Apiculture: An introduction to Apiculture, Study of habit, habitat and nesting behaviour of <i>Apis dorsata</i> , <i>Apis indica</i> , <i>Apis florea</i> and <i>Apis mellifera</i> . Life cycle, Colony organization and division of labour, Polymorphism, Bee behaviour and bee communication. Bee keeping equipments : a) Bee box (Langstroth type) b) Honey extractor c) Smoker d) Bee-veil e) Gloves f) Hive tool g) Bee Brush h) Queen excluder Bee keeping and seasonal management. Bee products (collection methods, composition and uses: a) Honey b) Wax c) Bee Venom d) Propolis e) Royal jelly f) Pollen grains Diseases and enemies of Bees: a) Bee diseases – Protozoan, Bacterial, Viral, Fungal – with two examples. b) Bee pests – Wax moth (Greater and Lesser), Wax beetle. c) Bee Enemies – Bee eater, King crow, Wasp, Lizard, Bear, Man.	(15)

Bee pollination

2. Sericulture: (15)

An introduction to sericulture, Study of different types of silk moths, their distribution and varieties of silk produced by Mulberry, Tassar, Eri and Muga silkworms in India.

External morphology and life cycle of *Bombyx mori*.

Cultivation of mulberry (moriculture): **a)** Varieties for cultivation, **b)** Rainfed and irrigated mulberry cultivation – Fertilize schedule, Pruning methods and leaf yield.

Harvesting of mulberry: **a)** Leaf plucking **b)** Branch cutting **c)** Whole shoot cutting.

Silk worm rearing: **a)** Types of rearing **b)** Rearing house

c) Rearing techniques **d)** Important diseases and pests.

Post harvest processing of cocoons:

a) Harvesting and Preparation of cocoons for marketing

b) Stiffling, Sorting, Storage, Deflossing and Riddling

c) Cocoon cooking, Reeling Equipment and Rereeling, Washing and Polishing.

Role of Sericulture in Rural Economy.

Unit	Name of Practical	Practical Allotted
1.	Study the morphology of Honey bee	(01)
2.	Study the life cycle of Honey Bee	(01)
3.	Study of sting apparatus of Honey bee	(01)
4.	Study of mouth parts, thoracic appendages (legs and wings) of Honey Bee	(01)
5.	Study of various bee keeping equipments	(01)
6.	Study of bee products, bee pests and bee enemies	(02)
7.	Study the morphology of <i>Bombyx mori</i>	(01)
8.	Study of life cycle of <i>Bombyx mori</i> .	(01)
9.	Study of any five equipments Sericulture.	(01)
10.	Compulsory study tour/visit to sea coast/fishery institute/sericulture farm/ apiculture institute / agricultural farm.	(02)

Suggested Readings/Material:

1. Destructive and useful Insects, their habit and Control, 1973. C.L. Metcalf and W. p. Flint, Tata McGraw Hill Publications, New Dehli.
2. A Text Book Of Entomology, 1974. V.K. Mathur and K.D. Upadhayay, Goel Printing Press, Barani.
3. Imm's Text Book of Entomology, Vol I & II, Richard and Owen.
4. Biology of Insects, 1992. S.C. Saxena. Oxford and IBH Publishing Co., New Dehli.

Bombay, Calcutta.

5. Bee and Bee Keeping, 1978, Roger A. Morse, Conell University Press, London.
6. The Behaviour & Social Life of Honey Bees, C.R. Ribbandas, Dover Publication inc. New York.
7. Principal of Sericulture, 1994. Hisao Arguo, Oxford & Co.
8. An Introduction of Sericulture, 1995. G.Ganga, J. Sulochana, Oxford & IBH Publication Co. Bambay
9. FAQ Manual of Sericulture. Vol I Mulberry Cultivation, Vol II Silkworm Rearing. Central Silk Board, Bangalore.

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Syllabus
B.Sc. Zoology (Minor)

Title of the Course: Applied Zoology II								
Year: I				Semester: II				
Course Type	Course Code	Credit Distribution		Credits	Allotted Hours	Allotted Marks		
		Theory	Practical			CIE	ESE	Total
MNR-2	BS-ZO201 T/P	02	01	03	60	30	70	100

Learning Objectives:

1. To understand the fisheries and fishery techniques.
2. To understand the the various freshwater fishes
3. To understand the agricultural pest management
4. To understand the various harmful insects for agriculture.

Course Outcomes:

1. Understanding the fisheries and fishery techniques.
2. Understanding the the various freshwater fishes
3. Understanding the agricultural pest management
4. Understanding the various harmful insects for agriculture.

Detailed Syllabus:

Unit	Name of Topic	Lectures Allotted
1.	Fisheries: An introduction to fisheries and its types (in brief) : Freshwater fisheries, Marine fisheries, Brackish water fisheries. Different types of ponds used in fishery : Nursery pond, Rearing pond, Stock pond Habit, habitat and culture methods of following freshwater forms : a) Rohu (<i>Labeo rohita</i>), b) Catla (<i>Catla catla</i>), c) Mrigal (<i>Cirrhinus mrigala</i>), d) Giant prawn (<i>Macrobrachium rosenbergi</i>) Harvesting methods of following marine forms : a) Harpadon, b) Mackerel, c) Lobster, d) Pearl oyster Crafts and gears in Indian Fishery : a) Crafts – Catamaran, Machwa, Dinghy, Dug out canoe, Built – up boat, b) Gears – Gill net, Dol net, Purse net, Rampani net, Cast net Fishery byproducts : a) Fish meal, b) Fish flour, c) Liver oil, d) Ising glass, e) Fish glue f) Fish manure, g) Fish fin soup Fish preservation technique : a) Chilling, b) Freezing, c) Salting, d) Drying, e) Canning	(15)

2. **Agricultural Pests and their control:** **(15)**

An introduction to Pest, types of pests (agricultural, household, stored grain, structural, veterinary, forestry and nursery)
Major insect pests of agricultural importance (Marks of identification, life cycle, nature of damage and control measures)
a) Jowar stem borer, **b)** Red cotton bug, **c)** Brinjal fruit borer
d) Mango stem borer, **e)** Pulse beetle, **f)** Rice weevil
Non insect pest : Rats and Bandicoots, Crabs, Snails, Slugs, Birds and Squirrels
Pest control practices in brief : Cultural control, Physical control, Mechanical control, Chemical control, Biological control, Pheromonal control and Concept of IPM in brief
Plant protection appliances : Rotary duster, Knapsack sprayer, CynogasPump.
Hazards of pesticides on human and antidotes.

Unit	Name of Practical	Practical Allotted
1.	Identification, Classification and study of habit, habitat and economic importance of the following: a) Rohu, Catla, Mrigal, Pomphret. b) Prawn, Crab, Oyster.	(02)
2.	Study and maintenance of Aquarium.	(01)
3.	Study of any three types of crafts and gears in fishing	(01)
4.	Study of insect pests with respect to marks of identification, nature of damage and economic importance (Examples related to theory course)	(01)
5.	Study of pest control appliances (Sprayer/Duster)	(01)
6.	Submission of field visit report along with at least five Photographs/ sketches of insect pest/fishes/any animal corresponding to theory courses	(02)
7.	Study tour/visit to sea coast/fishery institute/sericulture farm/apiculture institute / agricultural farm.	(02)

Suggested Readings/ Material:

1. Fishes . Mary Chandy. N.B.T. India, 2005.
2. Economic Zoology, Shukla Upadhyay, Rastogi Publication, Meerut, India, 1998.
3. Fisheries Developments, K.K. Trivedi, Oxford and IBH Pub. Co.
4. Marine Fishes in India, 1990, D.V.Bal & K. Virabhdra, tata McGraw Hill Publication.
5. Fishery Management, 1990, S.C.Agarwal, Avinash Publication House, New Dehli.
6. Entomology & Pest Management. Pedigo L.P. Prentice Hall, India 1996.
7. General & Applied Entomology, Nayar K.K. & T.N. Ananthkrishnan & B.V.Davi Tata McGraw Hill Publication, New Dehli.
8. Insects. M.S. Mani, NBT, India, 2006.

9. Agricultural Pests: Biology & Control Measures, B.M.Deoray and T.B.Nikam, Nirali Publication, Pune, 1990.
10. Insects & Mites of Crops in India. M.R.G.K. Nair – by ICAR, New Dehli.
11. The Science of Entomology. W.S.Romosor and J.G. Stoffolano, McGraw Hill Publication, 1988.
12. Agricultural Insect Pests of India and their Control, Dennis S.Hill, Cambridge University Press.
13. Applied Entomology. Vol. I & II. K.P. Srivastava. Kalyani Publication, Ludhiyana, New Dehli.
14. Principles of Insect Pest Management. G.S. Dhaliwal and Ramesh Arora, Kalyani Publications, Ludhiyana.
15. Pest Management and Pesticides: Indian Scenario. Editor- B. Vasantaraj David, Namrutha Publications, Madras (Chennai).
16. Concepts of Insect Control. Ghosh M.R. Wiley Eastern Ltd. New Dehli.