SHIVAJI UNIVERSITY, KOLHAPUR

Revised Syllabus For

Bachelor of Science (Part I) Zoology

(Subject to the modifications to be made from time to time)
Syllabus to be **implemented from June 2013** onwards.

GENERAL OBJECTIVES OF THE COURSE
(Applicable to the Degree)
(Syllabus of B.Sc.I to be implemented from June 2013 onwards which is based on semester system)

A) Aims :

1) To impart the knowledge of animal 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 Zoology 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 fit for 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, natural phenomenon, manipulation of nature & environment by man.
2) Understanding the scientific terms, concepts, facts, phenomena& their interrelationships.
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 full time course.
- The duration of course shall be three years.

6. PATTERN

Pattern of Examination will be ***semester system .***

7. FEE STRUCTURE : (as applicable to regular)

- Refer brochure / prospectus of concern college affiliated to Shivaji University, Kolhapur.
- Other fee will be applicable as per University rules/norms.

8. IMPLEMENTATION OF FEES STRUCTURE :

In case of revision of fee structure, this revision for Part I, Part II and Part III academic years phase wise. - Refer brochure / prospectus of concern college affiliated to Shivaji University, Kolhapur.

_ **ADMISSION PROCEDURE** – State Govt. Guidelines regarding reservation.

9. EILIGIBILITY FOR ADMISSION :

• As per eligibility criteria prescribed for each course and the merit list in the qualifying examination.

• Candidate for being eligible for admission to B.Sc. Part I shall have passed XII Science Examination of the Maharashtra Board of Higher Secondary Education or its equivalent

10. MEDIUM OF INSTRUCTION :

The medium of instruction shall be in English.

11. STRUCTURE OF COURSE

B.Sc. I – Zoology

First year – No. of papers : Two

Sr. No.	Subject	Marks		
		I-Term	II-Term	Total
1	Paper-I	50	50	100
2	Paper-II	50	50	100
3	Practical	25	25	50
			Total =	250

12. SCHEME OF TEACHING

FIRST YEAR

Teaching scheme
(Hrs/Week)

Semester I

Sr.No.	Subject/paper	L	T	P	Total
1	Zoology paper-I	2½	-	-	2½
2	Zoology paper-II	2½	-	-	2½
3	Practical	-	-	04	04
				Total =	09

Semester II

Sr.No.	Subject/paper	L	T	P	Total
1	Zoology paper-III	2½	-	-	2½
2	Zoology paper-IV	2½	-	-	2½
3	Practical	-	-	04	04
				Total =	09

SECOND YEAR

Teaching scheme
(Hrs/Week)
Semester-III

Sr.No Subject/Paper	L	T	P	Total
1 Zoology Paper V-	3	-	-	
2 Zoology Paper VI	-3	-	-	
Total=6				
3 Practical I =		-	-	4
4 Practical II =		-	-	4
Total=8				

Teaching scheme
(Hrs/Week)
Semester-IV

Sr.No Subject/Paper	L	T	P	Total
1 Zoology Paper VII	-3	-	-	
2 Zoology Paper VIII-	3	-	-	
Total=6				
3 Practical I = P		-	-	4
4 Practical II = P		-	-	4
Total=8				

THIRD YEAR
Teaching scheme
(Hrs/Week)
Semester-V

Sr.No.Subject/Paper	L	T	P	Total
1 Zoology Paper IX	3	-	-	
2 Zoology Paper X	3	-	-	
3 Zoology Paper XI	3	-	-	
4 Zoology Paper XII	3	-	-	
Total= 12				
5 Practical I =		-	-	5
6 Practical II =		-	-	5
7 Practical III =		-	-	5
8 Practical IV =		-	-	5
Total=20				

Semester-VI

Sr.No.Subject/Paper	L	T	P	Total
1 Zoology Paper XIII	3	-	-	
2 Zoology Paper XIV	3	-	-	
3 Zoology Paper XV	3	-	-	
4 Zoology Paper XVI	3	-	-	
Total= 12				

5 Practical I = P			- -	5
6 Practical II = P			- -	5
7 Practical III = P			- -	5
8 Practical IV = P			- -	5
				Total=20

SECOND YEAR FISHERIES (IDS)

Teaching scheme

(Hrs/Week)

Semester I

SrNo	Subject/Paper	L	T	P	Total
1	Fishery Paper I	3	-	-	
2	Fishery Paper II	3	-	-	
					Total= 6
3 Practical I =			-	-	4
4 Practical II =			-	-	4
					Total=8

Semester II

Sr.No	Subject/Paper	L	T	P	Total
1	Fishery Paper III	3	-	-	
2	Fishery Paper IV	3	-	-	
					Total= 6
3 Practical I =			-	-	4
4 Practical II =			-	-	4
					Total=8

THIRD YEAR FISHERIES (IDS)

Semester -V

Sr.No	Subject/Paper	L	T	P	Total
1	Fishery Paper V	3	-	-	
2	Fishery Paper VI	3	-	-	
3	Zoology paper XI	3			
4	Zoology paper XII	3			
					Total= 6
3 Practical III =			-	-	5
4 Practical IV =			-	-	5
					Total=8

Semester- VI

Sr.No.	Subject/Paper	L	T	P	Total
1	Fishery Paper VII	3	-	-	
2	Fishery Paper VIII	3	-	-	
3	Zoology Paper XV	3	-	-	
4	Zoology Paper XVI	3	-	-	
					12
5 Fishery Paper V,VI					
	Practical		-	-	5
6 Fishery Paper VII, VIII					
	Practical		-	-	5
7 Zoology Paper XI,XII					
	Practical		-	-	5
8 Zoology Paper XV,XVI					
	Practical		-	-	5
					Total ==20

13 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.

14. STANDARD OF PASSING

As prescribed under rules & regulations for each degree.

16. EQUIVALENCE IN ACCORDANCE WITH TITLES AND CONTENTS OF PAPERS (FOR REVISED SYLLABUS)

Refer copy of revised syllabus

OTHER FEATURES

1. INTAKE CAPACITY / NUMBER OF STUDETNS :

As per university rules.

2. TEACHERS QUALIFICATIONS :

- As prescribed by norms.
- Workload for each teacher 20 lectures per week.
- Workload details should be as per Apex body/UGC/State Govt./Universitynorms.

3. 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., Overhead Projector), (Computer and necessary softwares and 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 personconcerned.
- Rules of animal ethics should be strictly followed.

D) 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) Discard all used glassware such as test tube, pipettes, petry-plates, glass slides in a receptacle meant for it.
6) Put cotton plugs, papers, matches, waste dissection material etc. in a wastepaper 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 bonafide 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.

Syllabus – (As per U.G.C. guidelines) for B.Sc. I Zoology to be submitted to the Shivaji University, Kolhapur (To be implemented from June 2013)

Semester System

Detailed Syllabus for B.Sc. I
Aims and Objectives-

A) Aims-

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2) To make the pupils to use the knowledge in their daily life.
3) To make the pupils aware of natural resources and environment.
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SHIVAJI UNIVERSITY,KOLHAPUR

Revised Syllabus for
B.Sc. Part – I
(Introduced from June 2013 onwards)
Semester-I
Paper –I
TITLE OF PAPER - (Animal Diversity –I)

A) Lectures / Contact hours per unit – 40
B) Contact hours per practical – 04

UNIT – I

1) Principles of Classification (Five Kingdom Method) Salient features and classification up to classes with suitable examples of Kingdom Protista and Kingdom Animalia with reference to Phylum –Porifera, Coelenterata, Platyhelminthes, Nemathelminthes and Annelida. 5

2) Protista – Paramoecium 7
a) Morphology
b) Locomotion
c) Nutrition
d) Osmoregulation
e) Reproduction (Binary fission and conjugation)

UNIT – II

1) Porifera –Sycon 6
a) Morphology
b) Cell types
c) Canal System and its significance

2) Coelenterata –Hydra 6
a) Morphology
b) Locomotion
c) Nutrition
d) Reproduction

UNIT – III

1) Platyhelminthes –Tape worm 3
a) Morphology
b) Parasitic adaptations

II) Nemathelminthes – Ascaris 3
a) Morphology
b) Parasitic adaptations

UNIT – IV

2) Annelida –Earthworm 10
a) Digestive System
b) Circulatory system
c) Excretory system
d) Nervous system
e) Reproductive System & Cocoon Formation

Total Periods: 40

Revised Syllabus for
B.Sc. Part – I
(Introduced from June 2013 onwards)
Semester-I
Paper –II

TITLE OF PAPER –(Cell Biology and Genetics)

UNIT-I
Cell biology

1) Study of principles & applications of light and electron microscope 2
2) General organization of Prokaryotic & Eukaryotic cell 2
3) Nucleus with reference to Nuclear membrane, Nucleoplasm, Chromatin and nucleolus. 2
4)Chromosome with reference to morphology and organization (solenoid model) 2
5) Polytene Chromosome-structure and significance. 2

UNIT–II - Cell biology
Ultra structure and functions of the following.

i) Plasma membrane (Fluid Mosaic Model) 2
ii) Mitochondria 2
iii) Endoplasmic reticulum 2
iv) Ribosomes 2
v) Golgi complex 2
vi) Lysosome
vii) Cytoskeleton- Microtubules & microfilaments 2

UNIT – III Genetics

1) Mendelian Principles 8
a) Principle of unit characters
b) Principle of dominance (Monohybrid cross)
c) Principle of segregation (Monohybrid cross)
d) Principle of independent assortment (Dihybrid cross)

UNIT –IV Genetics

1) Co-dominance and Incomplete Dominance 3
2) Multiple alleles - Coat colour in Rabbit and ABO blood group system 3
3) **Human genetics** 4
a) Phenylketonuria
b) Sickle cell anaemia

Total Periods: 40

List of Recommended Books:

1) Hyman, L. H. – The invertebrates, Vol. I (McGraw Hill)
2) Hyman L.H. – The invertebrates, Vo. II (McGraw Hill)
3) Barnes R. D. – Invertebrate Zoology (W.B. Saunders Co.)
4) Pearse / Buchschaum – Living invertebrates, Blackwell Scientific Publications, California
5) Parker and Haswell – A Text Book of Zoology – Invertebrates Vol. I Edited by Marshall and Williams, C.B.S. Publishers and Distributors, New Delhi.
6) P. S. Dhami and J.K. Dhami – Invertebrates, S. Chand and Company. New Delhi

7) De Robertis EDP and De Robertis EME – Cell and Molecular Biology
8) C.B. Powar – Cell Biology, Himalaya Pub. House
9) Verma P. S. and Agarwal V. K. – Genetics, S. Chand and Company
10) Strickberger – Genetics. C Millian Publications
11) Winchester – Genetics, Oxford Publication
12) Cell Biology – Dr. N. Arumugam
13) Genetics by P.P. Meyyan
14) A Text Book of Invertebrates – N. C. Nair, N. Soundara Pandian, S. Leelavathy, T. Murugan
15) R. L. Kotpal – Modern Text Book of Zoology, Invertebrates
16) E. L. Jordan & P. S. Varma – Invertebrate Zoology
17) P. S. Varma & V. K. Agarwal – Cell Biology, Genetics, Molecular Biology, Evolution and Ecology
18) R. P. Meyyan, N, Arumugam – Genetics & Evolution
19) P. K. Gupta – Cell and Molecular Biology

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Revised Syllabus for
B.Sc. Part – I
(Introduced from June 2013 onwards)
Semester-II
Paper –III
TITLE OF PAPER - (Animal Diversity –II,)

C) Lectures / Contact hours per unit - 40
D) Contact hours per practical – 04

UNIT – I

1) Classification - Salient features and classification of chordates up to order of the following with suitable examples –Urochordata, Cephalochordata, Agnatha, Pisces and Amphibia. 5

UNIT – II

1) Cephalochordata – Amphioxus 6
a) Morphology
b) Digestive system and feeding mechanism
c) Circulatory system
d) Excretory system
2) Cyclostomata – General Characters 1
3) Pisces – a) Scales in fishes 4
b) Fins in fishes
c) Structure of gills in cartilaginous and bony fish

UNIT – III

1) Amphibia –Frog 12
a) Morphology
b) Digestive system and physiology of digestion
c) Respiratory system and mechanism of respiration
d) Blood vascular system
i) Structure and working of heart
ii) Arterial system

iii) Venous system
iv) Blood – Composition and function.

UNIT – IV
e) Excretory system and physiology of urine formation 12
f) Reproductive system
g) Nervous system – Brain and spinal cord
h) Sense organs – Eye and Ear

Total periods: 40

Revised Syllabus for
B.Sc. Part – I
(Introduced from June 2013 onwards)
Semester-II
Paper –IV
TITLE OF PAPER - (Ecology, Ethology, Evolution and Applied Zoology)

UNIT – I
1) Ecology 16
a) Abiotic factors- Temperature, Light, Water & Soil
b) Biotic factors – i) Intraspecific associations
ii)Interspecific associations
c) Brief idea of species, community, Niche and Ecosystem
d) Food chain, Ecological pyramids and energy flow with reference to pond and grass land ecosystem

UNIT – II
1) Ethology 8
a) Mimicry in monarch butterfly and in stick insect. Camouflage in chameleon
b) Courtship behavior in Scorpion and weaver bird
c) Social behavior in Honey bees

UNIT – III
1) Evolution 8
a) Formation and dating of fossils
b) Connecting link- Peripatus and Archaeopteryx
c) Living fossil – King crab (limulus) and Sphenodon

UNIT – IV
1) Applied Zoology – Sericulture 8
a) Types of silk moth
b) Morphology of mulberry silk moth
c) Life Cycle
d) Rearing of silk moth
e) Economic importance

Total Periods: 40

List of Recommended Books:

1) Evolution & Biostatistics – by N. Arumugam & R. P. Meyyan.
2) Environmental Studies – Based on UGC syllabus – N. Arumugam & V. Kumaresan
3) Organic Evolution – N. Arumugam
4) Chordate Zoology – A. Thangamani, S. Prasanna Kumar, N. Arumugam, L. M. Narayanan
5) Ecology – By E. P. Odum
6) The Protochordates – by S. H. Bhamrah and Kavita Juneja – Anmol Publications, New Delhi
7) Introduction to Protochordata – S. H. Bhamrah and Kavita Juneja – Anmol Publications, New Delhi
8) Chordate Zoology – S. Chand Company, New Delhi
9) Text Book of Zoology – Vertebrates, Vol. II – T. J. Parker and W. A. Haswell Edited by Marshall and Williams, CBS Publications and Distributors, New Delhi.
10) E. L. Jordan – Chordate Zoology, S. Chand and Company, New Delhi.
11) Odum – Ecology (Amerind)
12) Fundamentals of Ecology – Odum – (Saunders)
13) Ecology – Rickelfs (W.H. Freeman)
14) Immelamann – Introduction of Ethology (Plenum Press)
15) The Foundations of Ethology (Spinger Verlog)
16) Economic Zoology – Shukla and Upadhyaya – Rastogi Publications
17) Economic Zoology – Venkitraman (Sudarshana Publishers)
18) A Text Book of Chordates – A. Thangamani, L. M. Narayan, S. Prasannakumar, N. Arumugam
19) R. L. Kotpal – Modern Text Book of Zoology, Vertebrates
20) A. Arumugam, J. Johnson Rajeshwar, S. Arumuam, R. Ram Prabhu – Applied Zoology

B.Sc.I
Theory Paper- Zoology.
Nature of Question Paper
Semester-I and II.
(Paper-I to IV)

Day :-
Date :_
Time :- 2 Hours. **Total Marks :- 50.**

Q.1. Multiple choice questions. **10 Marks.**
(1 to 10)

Q.2. Attempt any Two out of three. **20 Marks.**
1)
2)
3)

Q.3. Write short notes on any four (out of six) 20 Marks.

1)
2)
3)
4)
5)
6)

Practical Course in Zoology for B. Sc. I

Annual pattern
Practicals based on paper I & II

UNIT – I

A.

1) Classification and morphological peculiarities of Nonchordates up to classes
a) Protista – Amoeba, Paramoecium, Euglena, Plasmodium.
b) Porifera – Sycon, Spongilla, Hyalonema / Euplectella.
c) Coelenterata – Hydra, obelia, Aurelia, Sea anemone, Gorgonia
d) Platyhelminthes – Planaria, Liverfluke, Tapeworm
e) Nemathelminthes – Ascarisf) Annelida – Nereis, Earthworm, Leech.

B.

1) Earthworm

a) Dissection of – i) Digestive system
ii) Nervous system
iii) Circulatory system
iv) Reproductive system

b) Mounting of -
i) Blood glands
ii) Septal nephridium
iii) Seteae

2) Mounting of Sponges (Demonstration)
i) Spicules
ii) Spongin fibres

UNIT – II

A) **Study of following**

a) Paramoecium - Binary fission and conjugation
b) Sycon - T.S. / L. S.
c) Hydra - W.M. with bud, T.S. of hydra through ovary & testis
d) Ascaris - male, female

B) **Cytological Preparations.:**

a) Mitochondria – Stained preparation of mitochondria from onion peeling / Hydrilla leaf / Oral mucosa by using Janus Green B.
b) Polytene Chromosome – Stained preparation of Polytene chromosome in chironomous larva/ Drosophila larva.

C) **Examples in Genetics** – Examples based on Monohybrid cross, Dihybrid cross and Multiple Alleles (At least 10 examples must be solved)

Practicals based on paper III & IV

UNIT – III

A) Classification of Chordates up to order
a) Urochordata - Herdmania, Salpa, Doliolum
b) Cephalochordata - Amphioxus
c) Cyclostomata – Petromyzon, Myxine
d) Pisces – Dog fish, Hammer headed fish, Sting ray, Electric ray, Labeo, Flying fish, Sea horse, Eel fish
e) Amphibia – Ichthyophis, Frog, Toad, Salamander

B) Study of following
a) Amphioxus – T.S. through pharynx, T.S. through intestine, T.S. through tail
b) i) Various types of fins in fishes
ii) Homocercal & Heterocercal tail in fishes
iii) Gills of cartilaginous and bony fishes

C) Mounting of Fish scales
i) Placoid
ii) Cycloid
D) Frog - Demonstration of Heart, Digestive system, Lungs, Kidneys, Ovaries, Testis, Blood and Brain Axial and Appendicular skeleton

Unit IV

A) Ecology- Ecological pyramids(at least four)

B) Ethology- 1) Mimicry in stick insect, Camouflage in chameleon
2) Honey bee - Observation of Queen, Drone, Worker bees and Bee hive.

C) Evolution- 1) Connecting link – Peripatus
2) Living fossil – Limulus

D) Applied Zoology -1) Sericulture - Life cycle of mulberry silk worm.- Egg, larva, cocoon, adult (male & female)

Study Tour – Visit to sea shore or any other suitable place to study Ecosystem, Animal Diversity, Animal behavior etc.

B.Sc.I Practical Examination

Day and Date :- **Total Marks-50.**
Time :-

Q.1. Dissect ----------So as to expose its---------system.	10.
Q.2. Make a temporary stained preparation of _____	05.
Q. 3 Make a stained cytological preparation of ----------	05
Q.4. Solve the given example from genetics	06.
Q. 5 Ecological pyramid/ Sketch and label ---------- system of frog	04
Q.6. Spotting.	10.

1) Identify, Classify giving reasons
2) Identify and Describe.
3) Identify, mention the morphological peculiarities.
4) Identify, sketch and label the parts.
5) Identify, Classify giving reasons.
6) Identify and Describe.
7) Identify, mention the morphological peculiarities.
8) Identify, sketch and label the parts.
9) Identify and give the functions
10) Identify and describe its ethological peculiarities

Q. 7 Study tour report	05
Q.8. Journal.	05

B.Sc.I Skeleton paper for Practical Examination

To be implemented from June 2013

Maximum marks- 50

Q.1. Dissection.	10.
Q.2. Temporary stained preparation	05.
Q. 3 Cytological preparation	05
Q.4. Example from genetics	06.
Q. 5 Ecological pyramid/ Sketch and label ---------- system of frog	04
Q.6. Spotting.	10.

1) Identify, Classify giving reasons
2) Identify and Describe.
3) Identify, mention the morphological peculiarities.
4) Identify, sketch and label the parts.
5) Identify, Classify giving reasons.
6) Identify and Describe.
7) Identify, mention the morphological peculiarities.
8) Identify, sketch and label the parts.
9) Identify and give the functions
10) Identify and describe its ethological peculiarities

Q. 7 Study tour report	05
Q.8. Journal.	05

It is resolved that the sub committee appointed for revision of B.Sc.I. Zoology Syllabus, suggest that practical examination shall be conducted by respective colleges on behalf of university.