

Choice Based Credit System (CBCS)
Shri Swami Vivekanand Shikshan Sanstha's
VIVEKANAND COLLEGE (AUTONOMOUS)
KOLHAPUR

DEPARTMENT OF ZOOLOGY

Syllabus for the First Year B.Sc. (Zoology)

Program: (Undergraduate) B.Sc.

Course: Zoology

SYLLABUS OF COURSE TO BE OFFERED

Core Courses, Elective Courses & Ability Enhancement Courses

Credit Based Semester and Grading System with Effect from the
Academic Year **2021–2022**

New course structure to be implemented For B.Sc. I Subject Zoology)

Sr. No	Internal Examination DSC Course				Total (a+b+c+d)	Conversion of 80 marks in Total(I) (e)	SEE (Semester End Examination) DSC Course		Total (II) (f+g)= h	Total (I and II) (e+h) = i
	Paper-I (Two tests each of 10 marks) (a)	Paper-II (Two tests each of 10 marks) (b)	Home assignment Paper I (c)	Home assignment Paper II (d)			Paper-I (f)	Paper-II (g)		
1	20	20	20	20	80	20	40	40	80	100

Practical Examination B.Sc. I (as per BOS guidelines)

Sr.No.	Lab work	Journal (Punctuality, Neatness)	Attendance, and participation in the practical's, motivation	Total
1	40	5	5	50

Nature of Internal and SEE(Semester End Examination)Examination

- 1) For internal examination, there shall be two tests (online/offline) of ten marks and one home assignment of 20 marks for each paper per semester.
- 2) For internal examination there shall be conversion of 80 marks in 20 marks and for passing 7 marks is required out of 20.
- 3) For SEE (Semester End Examination), there shall be two papers (Paper I and Paper II) of each DSC course per semester, each of 40 marks.
- 4) There shall be combined passing for SEE (Semester End Examination) of Paper-I and Paper -II i.e 28 marks is required out of 80.
- 4) There shall be separate passing is mandatory for both internal and SEE (Semester End Examination).

Program outcomes (PSOs) Zoology

1. Understand the nature and basic concepts of Animal diversity, taxonomy, Comparative anatomy Developmental biology, physiology, Biochemistry, Genetics and Evolutionary Biology
2. Perform procedures as per laboratory standards in the areas of Animal diversity, taxonomy, Comparative anatomy, Developmental biology, physiology, Biochemistry, Genetics and Evolutionary Biology, Entomology, Sericulture, Biochemistry, Animal biotechnology, Immunology and research methodology
3. Understand the applications of applied zoology in Apiculture, Aquaculture, Agriculture and Medical zoology
4. Acquired knowledge about research methodologies and skills of problem solving methods
5. Students will contribute the knowledge for Nation building and society welfare.

COURSE OUTCOMES Zoology

B. Sc. I ZOOLOGY-DSC -1008A

On completion of the course students will be able to

1. Students are able to understand the importance of taxonomy.
2. Students are able to understand the evolution, history of life of nonchordata to Chordata.
3. Students are able to identify and classify the animals.
4. Students are able to understand parasitic adaptations in animals, preventive and control measures in

B. Sc. I ZOOLOGY-DSC -1008B

On completion of the course students will be able to

1. Students are able to understand phylogenetic evolution of chordate.
2. Students are able to understand the morphology about the Chordate animals.
3. Students can classify chordate.
4. To study the distinguish characters of chordate and non chordates.
5. Students can classify Venomous and non-venomous snakes

ZOOLOGY-DSC -1008C

On completion of the course students will be able to

1. Understand the comparative structures of integument,
2. Understand the comparative structure of skeletal system, digestive system, respiratory system, heart, aortic arches, kidney, respiratory organs, brain of vertebrates
3. Students are able to understand sense organs in vertebrates.

ZOOLOGY-DSC -1008D

On completion of the course students will be able to

1. Understand the Gametogenesis, Fertilization, pattern of cleavage, fate map, germ layers and early development, movements, neurogenesis and organogenesis in animals.
2. Understand the implantation, placenta and metamorphosis in frog
3. Understand the control of development- Gene activation, determination, induction, Differentiation, intercellular communication, cell movements and cell death
4. Understand the Chick embryology

ZOOLOGY LAB(I) : DSC 1008A and B Practical B.Sc. I

On completion of the course students will be able to

1. Understand the classification and morphological peculiarities of non-chordata and chordata.
2. Understand identification of venomous and non venomous snakes.
3. Understand the life history stages of parasitic *Taenia solium*.
4. Temporary preparation of spicules and sponging fibres.
5. Understand of Paramecium culture and regeneration of hydra.
6. Able to prepare of permanent slides of fish scales.
7. Preparation of any two slides from practical one

ZOOLOGY LAB (II): DSC 1008C and D Practical B.Sc. I

On completion of the course students will be able to

1. Understand the comparative skeleton system of vertebrates.
2. Understand the developmental stages of frog.
3. Understand placental development, structure and types of placenta.
4. Understand the developmental stages of whole mount of chick embryo.
5. Able to understand frog/rat - sperm and ova

B. Sc. Part – I CBCS Syllabus with effect from June, 2021

ZOOLOGY-DSC -1008A

Semester: I Zoology-Paper- I

ANIMAL DIVERSITY

Theory: 30 Hours- (75 lectures of 48 minutes for Paper I and II) Credits -2

Paper- I

UNIT I:

Importance of Animal taxonomy	2
Kingdom Protista	3
General characters and classification up to classes; locomotion in Protozoa	
Phylum Porifera	3
General characters and classification up to classes; Canal System in <i>Sycon</i>	
Phylum Cnidaria	3
General characters and classification up to classes; Polymorphism in Hydrozoa, Locomotion and regeneration in hydra	
Phylum Platyhelminthes	2
General characters and classification up to classes; Morphology of <i>Taenia solium</i> and its parasitic adaptations, Preventive measures and control measures	
Phylum Nemathelminthes	3
General characters and classification up to classes; Life history of <i>Ascaris lumbricoides</i> and its parasitic adaptations, Preventive measures and control measures	

UNIT II

Phylum Annelida	3
General characters and classification up to classes; Metamerism in Annelida	
Phylum Arthropoda	4
General characters and classification up to classes; Social behavior in honey bee	
Phylum Mollusca	4
General characters and classification up to classes; Economic importance of mollusca	
Phylum Echinodermata	3
General characters and classification up to classes; Water-vascular system in Asteroidea; pedicellaria in echinodermmata.	

ZOOLOGY-DSC -1008B
Semester: I Zoology-Paper- II
ANIMAL DIVERSITY

Theory: 30 Hours

Credits -2

Paper- II

UNIT III

Phylogenetic tree in chordata	3
Protochordates	
General features and Phylogeny of Protochordata,	
Agnatha	4
General features of Agnatha and classification of cyclostomes up to classes, Peculiar characteristics of Petromyzon and myxine	
Pisces	4
General features and Classification up to orders; Difference between cartilaginous and bony fishes; importance of osmoregulation in Fishes	
Amphibia	4
General features and Classification up to orders; Parental care	

UNIT IV

Reptiles	4
General features and Classification up to orders; Venomous and non-venomous snakes, Types of venoms	
Aves	6
General features and Classification up to orders; Flight adaptations in birds	
Mammals	5
Classification up to orders; <i>dentition in mammals-rabbit, rat, human, dog, sheep</i>	

SUGGESTED READINGS

- Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
- Pough H. *Vertebrate life*, VIII Edition, Pearson International.
- Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.
- Kotpal R. L. Invertebrate zoology
- Kotpal R. L. Vertebrate zoology
- E.J. Jordan and P.S. Verma, Chordate zoology

ZOOLOGY-DSC -1008C
Semester: II Zoology-Paper- III
COMPARATIVE ANATOMY OF VERTEBRATES
Theory: 30 Hours - (75 lectures of 48 minutes for paper I and II) Credits -2

Paper- III

Unit I

Integumentary System	4
Derivatives of integument w.r.t. glands and digital tips	
Skeletal System	3
Appendicular Skeletons	
Digestive System	4
Brief account of alimentary canal and digestive glands	
Respiratory System	5
Brief account of Gills, lungs, air sacs and swim bladder	

Unit II

Circulatory System	4
Evolution of heart and aortic arches	
Urinogenital System	4
Succession of kidney, Evolution of urinogenital ducts	
Nervous System	3
Comparative account of brain	
Sense Organs	3
Types of receptors	

ZOOLOGY-DSC -1008D
Semester: II Zoology-Paper- IV
DEVELOPMENTAL BIOLOGY OF VERTEBRATES

Paper- IV

Unit III

Early Embryonic Development

10

Gametogenesis: Spermatogenesis and oogenesis w.r.t. mammals, vitellogenesis in birds; Fertilization: external (amphibians), internal (mammals), blocks to polyspermy; Early development of frog and humans (structure of mature egg and its membranes, patterns of cleavage, fate map, up to formation of gastrula); types of morphogenetic movements; Fate of germ layers; Neurulation in frog embryo.

Late Embryonic Development

8

Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta in mammals.

Unit IV

Control of Development

5

Fundamental processes in development (brief idea) – Gene activation, **specification** determination, Differentiation, intercellular communication, cell movements and cell death

Chick embryology

7

Development of chick embryo up to 72 hours

SUGGESTED READINGS

- Kardong, K.V. (2005) *Vertebrates' Comparative Anatomy, Function and Evolution*. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). *Comparative Anatomy of the Vertebrates*. IX Edition. The McGraw-Hill Companies.
- Hilderbrand, M and Gaslow G.E. *Analysis of Vertebrate Structure*, John Wiley and Sons.
- Walter, H.E. and Sayles, L.P; *Biology of Vertebrates*, Khosla Publishing House.
- Gilbert, S. F. (2006). *Developmental Biology*, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.
- Balinsky, B.I. (2008). *An introduction to Embryology*, International Thomson Computer Press.
- Carlson, Bruce M (1996). *Patten's Foundations of Embryology*, McGraw Hill, Inc.

ZOOLOGY LAB (I) : DSC 1008 A and B (Practical)
Semester: I
ANIMAL DIVERSITY

60 Hours (75 Lectures) Credits 2

1. Study of the following specimens:
2. Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Hyalonema, and Euplectella, Obelia, Physalia, Aurelia, Metridium, Taenia solium, Male and female Ascaris lumbricoides, Aphrodite, Pheretima, Hirudinaria, Palaemon, Cancer, Limulus, Scolopendra, Apis, Chiton, Dentalium, Pila, Unio, Sepia, Pentaceros, Ophiura, Echinus, Cucumaria and Antedon, Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Torpedo, Labeo, Exocoetus, Anguilla, Ichthyophis, Salamander, Bufo, Chelone, Chamaeleon, Draco, Naja, Crocodylus, any six common birds from different orders, Sorex, Bat, Funambulus, Loris
3. Study of life history stages of Taenia solium.
4. Temporary preparation of spicules and sponging fibres.
5. Preparation of Paramecium culture
6. To study the regeneration of hydra.
7. Temporary preparation of pedicellaria
8. Key for Identification of Venomous and non-venomous snakes.
9. Identification of birds with the help of key.
10. Preparation of permanent slides of cycloid and placoid scales.
11. Preparation of any two slides from practical one
12. Visit to sea shore or any water body / Natural history museum and submission of report
13. An “animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

ZOOLOGY LAB (II): DSC 1008 C and D (Practical)

Semester: I

COMPARATIVE ANATOMY AND DEVELOPMENTAL BIOLOGY OF VERTEBRATES

60 Hours (75 Lectures) Credits 2

1. Osteology:
 - a) Disarticulated skeleton of fowl and rabbit
 - b) Comparative study of Pectoral and pelvic girdle of amphibia to mammals
 - c) Mammalian skulls: One herbivorous and one carnivorous animal.
 - d) Demonstration of axial and appendicular skeleton of frog
2. Study of developmental stages of frog
3. Frog - Study of whole mounts and sections through permanent slides – cleavage stages, blastula, gastrula, neurula, tail bud stage, tadpole external and internal gill stages.
4. Study of the different types of placenta- histological sections through permanent slides or Photomicrographs.
5. Examination of gametes - frog/rat - sperm and ova through permanent slides or photomicrographs.
6. Preparation of whole mount of chick embryo
7. Drosophila culture and study of life cycle of Drosophila

8. Visit to Artificial fish breeding centre or any hatchery centre and submission of report

SUGGESTED READINGS

- Ruppert and Barnes, R.D. (2006). *Invertebrate Zoology*, VIII Edition. Holt Saunders International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). *The Invertebrates: A New Synthesis*, III Edition, Blackwell Science
- Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
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- Carlson, Bruce M. (1996). *Patten's Foundations of Embryology*, McGraw Hill, Inc.

Nature of Question Paper

- Instructions:** 1) All the questions are **compulsory**.
2) Answers to the two sections should be written in separate answer books.
3) Figures to the right indicate **full** marks.
4) Draw neat labeled diagrams **wherever** necessary.

Time: 2 hours

Total Marks: 40

Paper I

Q.1. Choose correct alternative. (8)

- i).....
A) B) C) D)
- ii).....
A) B) C) D)
- iii).....
A) B) C) D)
- iv).....
A) B) C) D)
- v).....
A) B) C) D)
- vi).....
A) B) C) D)
- vii).....
A) B) C) D)
- viii).....
A) B) C) D)

Q.2. Attempt any Two. (16)

- A)
- B)
- C)

Q.3. Attempt any Four (16)

- A)
- B)
- C)
- D)
- E)
- F)

Paper II

Q.4. Choose correct alternative. (8)

- i).....
A) B) C) D)
- ii).....
A) B) C) D)
- iii).....
A) B) C) D)

- iv).....
 A) B) C) D)
- v).....
 A) B) C) D)
- vi).....
 A) B) C) D)
- vii).....
 A) B) C) D)
- viii).....
 A) B) C) D)

Q.5. Attempt any Two. (16)

- A)
 B)
 C)

Q.6. Attempt any Four (16)

- A)
 B)
 C)
 D)
 E)
 F)

SCHEME OF MARKING (THEROY)

Sem.	Core Course	Marks	Evaluation	Papers	Answer Books	Standard of passing
I	DSC1008A	40	Semester wise	Paper I	As per Instruction	35% (14 marks)
	DSC1008B	40	Semester wise	Paper II	As per Instruction	35% (14 marks)
II	DSC1008C	40	Semester wise	Paper III	As per Instruction	35% (14 marks)
	DSC1008D	40	Semester wise	Paper IV	As per Instruction	35% (14 marks)

SCHEME OF MARKING (CIE) Continuous Internal Evaluation

Sem.	Core Course	Marks	Evaluation	Sections	Answer Books	Standard of passing
I	DSC1008 A	20	Concurrent	-	As per Instruction	35% (7 marks)
II	DSC1008 B	20	Concurrent	-	As per Instruction	35% (7 marks)

SCHEME OF MARKING (PRACTICAL)

Sem.	Course	Marks	Evaluation	Sections	Standard of passing
I AND II	DSC1008 A and B (Pr)	50	Annual	As per Instruction	35% (18)
	DSC1008 C and D (Pr)				

***A separate passing is mandatory**