

SHIVAJI UNIVERSITY, KOLHAPUR.



Accredited By NAAC with 'A++' Grade

CHOICE BASED CREDIT SYSTEM

Syllabus For

**B.Sc. Part - I
ZOOLOGY**

SEMESTER I AND II

(Syllabus to be implemented from June, 2022 onwards.)

Choice Based Credit System with Multiple Entry and Multiple Exit Options

To be implemented from the Academic Year 2022-23

First Year Bachelor of Science (Level-5) Programme Structure (NEP-2020 PATTERN)

Sub Zoology

SEMESTER-I (Duration-6 Months)							
Technical scheme							
Theory					Practical		
CGPA Courses	Course code	Credits	Number of Lecture per week	Hours	Credits	Number of Lecture per week	Hours
	DSC-15A	02	05	04	02	04	3.2
	DSC-16A	02					
	AECC-A	02	04	3.2			
	Total-(A)	06	09		02	04	
Non CGPA Course	SEC-I	-	-	-	02	04	04
	VBC-I	-	-	-	01	02	02
SEMESTER-II (Duration-6 Months)							
CGPA Courses	DSC-15B	02	05	04	02	04	3.2
	DSC-16B	02					
	AECC-B	02	04	3.2			
	Total-(B)	06	09				
Non CGPA Course	SEC-I	-	-	-	02	04	04
	VBC-I	-	-	-	01	02	02
Total-(A+B)		12	18		04	08	6.4

List of SEC Courses (A student can opt any SEC irrespective of his own faculty)

- ❖ Apiculture
- ❖ Sericulture
- ❖ Vermiculture
- ❖ CMLT
- ❖ Aquarium Maintenance
- ❖ Bioinformatics

Link for the pool of SEC courses from

National Skills Qualification Framework (NSQF)

(You may add or delete any courses as per available facilities)

https://drive.google.com/file/d/176Vwvx4SC2ONrt69XADruzI2qnfBPI_o/view?usp=sharing

B. Sc. Part – I Semester –I

ZOOLOGY

DSC – 15A (ANIMAL DIVERSITY-I)
Theory: 30 hrs. (37.5 lectures of 48 minutes)
Marks -50 (Credits: 02)

Unit 1:

Kingdom Protista	(3hrs.)
General characters and classification up to classes; Locomotory organelles and locomotion in Protozoa	
Phylum Porifera	(3hrs.)
General characters and classification up to classes; Canal System in <i>Sycon</i>	
Phylum Cnidaria	(3hrs.)
General characters and classification up to classes; Polymorphism in Hydrozoa	
Phylum Platyhelminthes	(3hrs.)
General characters and classification up to classes; Life history of <i>Taenia solium</i> and its parasitic adaptations	
Phylum Nematelminthes	(3hrs.)
General characters and classification up to classes; Life history of <i>Ascaris lumbricoides</i> and its parasitic adaptations	

Unit 2:

Phylum Annelida	(3hrs.)
General characters and classification up to classes; Metamerism in Annelida	
Phylum Arthropoda	(5hrs.)
General characters and classification up to classes; Vision in Arthropoda, Metamorphosis in Insects	
Phylum Mollusca	(3hrs.)
General characters and classification up to classes; Torsion in gastropods	
Phylum Echinodermata	(4hrs.)
General characters and classification up to classes; Water-vascular system in Asteroidea	

Total Periods – 30 hrs

B. Sc. Part – I Semester –I
ZOOLOGY
DSC – 16 A (Cell Biology and Evolutionary Biology)
Theory: 30 hrs. (37.5 lectures of 48 minutes)
Marks-50 (Credits: 02)

CELL BIOLOGY & EVOLUTIONARY BIOLOGY

Cell structure-	(2hrs.)
Cell theory and diversity in cell size and shape	
Structure of nucleus-	(2hrs.)
Nucleus with reference to Nuclear membrane, Nucleoplasm, Chromatin and nucleolus.	
Structure of Chromosome-	(3hrs.)
With reference to Morphology and organization (Nucleosome), Polytene Chromosomes	
Ultra structure and functions of the following	(8 hrs.)
Plasma membrane (Fluid Mosaic Model)	
Mitochondria	
Endoplasmic reticulum	
Golgi complex	
Lysosome	
Unit 2:	
History of Life	(2hrs.)
Major Events in History of Life : Introduction to theories of origin of life, study of theory of chemical evolution.	
Introduction to Evolutionary Theories	(5hrs.)
Lamarckism, Darwinism, Neo-Darwinism	
Direct Evidence of Evolution	(4hrs.)
Types of fossils, formation of fossils, dating of fossils	
Extinction	(4hrs.)
Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution	

Total Periods – 30 hrs

- **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 Hallgrímsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.
- Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XII Edition, John Wiley & Sons, Inc.
- DeRobertis EDP and DeRobertis EME – Cell and Molecular Biology
- C.B. Powar – Cell Biology, Himalaya Pub. House
- P. K. Gupta – Cell and Molecular Biology
- Cell Biology – Dr. N. Arumugam
- Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing
- Barton, N.H., Briggs, D.E.G., Eisen, J.A., Goldstein, D.B. and Patel, N.H. (2007). *Evolution*. Cold Spring Harbour Laboratory Press.
- Hall, B.K. and Hallgrímsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers
- Campbell, N. A. and Reece J. B. (2011). *Biology*. IX Edition, Pearson, Benjamin, Cummings.
- Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.

B. Sc. Part – I Semester –II
ZOOLOGY
DSC – 15 B (Animal Diversity and Insect Vector)

Theory: 30 hrs. (37.5 lectures of 48 minutes)

Marks-50 (**Credits: 02**)

Animal Diversity and Insect Vectors

Unit: I Animal Diversity

(16 hrs)

Type Study: Rat (*Rattus rattus*) (Physiology is not expected)

- Systematic position, Habit and Habitat
- Morphological Characters
- Digestive System
- Respiratory System
- Circulatory System (Composition of Blood and Heart)
- Excretory System
- Reproductive System
- Brain for Rat

Unit: II : Insect Vectors

1. Mosquito as an insect vector

(8hrs)

Mosquito born diseases with respect to causal organism, life cycle and symptoms

- a. Malaria
- b. Dengue
- c. Chikungunya
- f. Control Measures of mosquitoes

2. Housefly as an important mechanical vector

(2 hrs)

Housefly born diseases with respect to Causal organism, life cycle, symptoms

- a. Myiasis
- b. Control Measure of housefly

3. Flea as an insect vector

(4 hrs)

Flea born diseases with respect to Causal organism, life cycle and symptoms

- a. Plague
- b. Typhus fever
- c. Control of fleas

Total Periods – 30 hrs

B. Sc. Part – I Semester –II

ZOOLOGY

DSC – 16 B (Genetics)

Theory: 30 hrs. (37.5 lectures of 48 minutes)

Marks-50 (**Credits: 02**)

Genetics

Unit: 1

Introduction to Genetics (3hrs.)

Mendel's work on transmission of traits, Genetic Variations, Molecular basis of Genetic Information

Mendelian and postMendelian Genetics (8hrs.)

Principles of Inheritance, Incomplete dominance and co-dominance, gene interaction, Multiple alleles w.r.t. ABO, Rh blood groups and coat colour in rabbit, sex linked inheritance.

Linkage, Crossing Over (4hrs.)

Linkage and process of crossing over, Coupling and repulsion theory, Cytological evidence of crossing over.

Unit 2:

Mutations (8hrs.)

Chromosomal Mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy, induced gene mutation.

Sex Determination (7hrs.)

Chromosomal theory, Genic balance theory, Haploidy-Diploidy mechanism, Environmental Theory

Total Periods – 30 hrs

Suggested Readings :

- P.S.Varma &V.K.Agarwal–CellBiology,Genetics,MolecularBiology, Evolution andEcology
- R. P. Meyyan, N, Arumugam – Genetics &Evolution
- Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). *Principles of Genetics*. VIII Edition. WileyIndia.
- Snustad, D.P., Simmons, M.J. (2009). *Principles of Genetics*. V Edition. John Wileyand SonsInc.
- Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). *Concepts of Genetics*. X Edition. Benjamin Verma P. S. and Agarwal V. K. – Genetics, S. Chand and Company
- Strickberger – Genetics. C Millian Publications
- Winchester – Genetics, Oxford Publication
- Genetics by P.P. Meyyan, Cummings.
- Russell, P. J. (2009). *Genetics- A Molecular Approach*. III Edition. Benjamin Cummings.
- Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. *Introduction to Genetic Analysis*. IX Edition. W. H. Freeman and Co.
- Imms, A.D. (1977). *A General Text Book of Entomology*. Chapman & Hall, U K Chapman, R.F. (1998).
- *The Insects: Structure and Function*. IV Edition, Cambridge University Press, U K Pedigo L.P. (2002).
- *Entomology and Pest Management*. Prentice Hall Publication Mathews, G. (2011).
- *Integrated Vector Management: Controlling Vectors of Malaria*
- *Insect Vector Borne Diseases*. Wiley-Blackwell
- *Biology of Vertebrates* Walter & Sayles; (McMillan).
- *Chordate Zoology*, P.S. Dhami & J. K. Dhami - R. Chand & Co., New Delhi.
- *Modern Textbook of Zoology*, R.L. Kotpal, Rastogi Publications, Meerut.
- *The Life of Vertebrates*, 3rd Edition, 1993, J. Z. Young E. L. B.S. Oxford.
- *Chordate Zoology* - E.L. Jordan, S. Chand & Co., New Delhi.
- *The Phylum Chordata* - 1987, H.H. Newman, Distributor Satish Book Enterprise, Agra.
- *Comparative Anatomy of the Vertebrates* G. C. Kent.

B. Sc. Part – I
ZOOLOGY PRACTICALS
Marks -50 (Credits: 02)
(DSC– 15A,B and 16 A,B:
LAB)

1. Study of the following specimens:

- i Study of *Amoeba*, *Euglena*, *Plasmodium*, *Paramecium*, w.r.t. classification and locomotion
- ii Study of *Sycon*, *Hyalonema*, and *Euplectella*, *Obelia*, *Physalia*, *Aurelia*, *Tubipora*, *Metridium*, *Taenia solium*, Male and female *Ascaris lumbricoides*, *Aphrodite*, *Nereis*, *Pheretima*, *Hirudinaria*, *Palaemon*, *Cancer*, *Limulus*, *Palaemnaeus*, *Scolopendra*, *Julus*, *Periplaneta*, *Apis*, *Chiton*, *Dentalium*, *Pila*, *Unio*, *Loligo*, *Sepia*, *Octopus*, *Pentaceros*, *Ophiura*, *Echinus*, *Cucumaria* and *Antedon*, w.r.t. classification and morphological peculiarities.

2. Study of the following:

- i T.S. or L.S. of *Sycon*,
- ii Life history *Taenia* and *Ascaris* and their parasitic adaptations.

3. Preparation of haemincrystals

4. Study Tour: Visit to any suitable place to study animal diversity or any place related to theory syllabus and submission of report.

5. Preparation of blood smear and identification of ABO and Rh blood groups

6. Cytological Preparations:

Mitochondria – Stained preparation of mitochondria from onion peeling / Hydrilla leaf / Oral mucosa by using Janus Green -B.

Polytene Chromosomes – Stained preparation of polytene chromosome in Chironomous larva / *Drosophila* larva.

7. Study of fossil evidences from plaster cast models and pictures.

8. Demonstration of Rat to study,

- Digestive system, Lungs, Heart, Kidney, Testis, Ovary and Brain of Rat

9. Study of Mendelian Inheritance and gene interactions (Non-Mendelian Inheritance) using suitable examples. Minimum 10 Examples on: Monohybrid & Dihybrid ratio, Incomplete dominance, Co-dominance, Multiple alleles, Sex linked inheritance, Linkage, Crossing over and Gene interaction.

10. Study of following insect vectors through permanent slides or photographs

1. Mosquito born diseases (Causal organism, symptoms and control measures)
 - a. Malaria
 - b. Dengue
 - c. Chikungunya
2. Housefly born diseases (Causal organism, symptoms and control measures)
 - a. Myiasis
3. Flea born diseases (Causal organism, symptoms and control measures)
 - a. Plague
 - b. Typhus fever

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.
- Practical Zoology by Kotpal.
- Practical Zoology by Verma and Agarwal. Physiology by C.C. Chattarji. Vol. I & II.
- Lehane, M. J. (1991). *Biology of blood sucking insects*. Harper Collins Academic, London.
- Service M. W. (1986). *Blood sucking insects : Vectors of disease, studies in biology*. No. 167, Arnold, London.

SCHEME OF MARKING (THEORY)

SEM	Core Course	Evaluation	Marks	Total Marks	Answer Books	Standard of passing(Min)
I	DSC - 15A	Semester wise	50	100	As per Instructions	35
	DSC - 16A	Semester wise	50			
II	DSC - 15B	Semester wise	50	100	As per Instructions	35
	DSC - 16B	Semester wise	50			

SCHEME OF MARKING (PRACTICAL)

Practical examination is annul

SEM	Course	Marks	Evaluation	Sections	Standard of passing
I and II	DSC – A(DSC 15A and DSC 16A) Lab and DSC - B (DSC 15B and DSC 16B) Lab	50	Annual	As per Instructions	35%

Nature of Theory Question Paper

B.Sc. I Zoology

Q.1 Ten multiple choice question (one mark each)	10
Q. 2 Attempt any two (Ten marks each)	20
i.	
ii.	
iii.	
Q.3 Attempt any four (five marks each)	20
i.	
ii.	
iii.	
iv.	
v.	
vi.	