

DAVANGERE UNIVERSITY, DAVANGERE



Syllabus

For

B.SC. ZOOLOGY

III AND VI SEMESTER

(2025-26)

B.Sc. Zoology Programme layout and Credit details

Subject Code	Title of the Paper	IA	Theory	Total	Teaching Hours/Week	Credits	Duration of Examination
24 SEP-ZT - 1	Animal Systematics and Biology of Non-Chordates	20	80	100	4	3	3
24 SEP-ZP - 1	Animal Systematics and Biology of Non-Chordates	10	40	50	4	2	3
24 SEP-ZT - 2	Animal Diversity – Biology of Chordates	20	80	100	4	3	3
24 SEP-ZP - 2	Animal Diversity – Biology of Chordates	10	40	50	4	2	3
24 SEP-ZT - 3	Animal Physiology and Biochemistry	20	80	100	4	3	3
24 SEP-ZP - 3	Animal Physiology and Biochemistry	10	40	50	4	2	3
24SEP-Z-OE-1	Economic Zoology	10	40	50	3	2	3
24 SEP-ZT - 4	Genetics and Evolution	20	80	100	4	3	3
24 SEP-ZP - 4	Genetics and Evolution	10	40	50	4	2	3
24SEP-Z-OE-2	Fisheries and Aquaculture	10	40	50	3	2	
24 SEP-ZT - 5	Molecular Cell Biology and Developmental Biology	20	80	100	4	3	3
24 SEP-ZP - 5	Molecular Cell Biology and Developmental Biology	10	40	50	4	2	3
24 SEP-ZT - 6	Endocrinology and Histology	20	80	100	4	3	3
24 SEP-ZP - 6	Endocrinology and Histology	10	40	50	4	2	3
24 SEP-ZT - 7	Immunology and Parasitology	20	80	100	4	3	3
24 SEP-ZP - 7	Immunology and Parasitology	10	40	50	4	2	3
24 SEP-ZT - 8	Wildlife Biology, Environmental Biology and Animal Behaviour	20	80	100	4	3	3
24 SEP-ZP - 8	Wildlife Biology, Environmental Biology and Animal Behaviour	10	40	50	4	2	3
Total Credits						46	

Please Note:

1. As per the SEP credits can be increased and minimum credit for the program is 128 that can be increased up to 150
2. In final year SEP expects incorporation of applied subjects. Hence, it is better to include Recombinant DNA Technology and Immuno-technology in 6th semester


Registrar
Davangere University
Shivangotri, Davangere.


Chairman
UGBOS in Zoology
Davangere University

Program layout and Credit details for B.Sc.Zoology I and II Semesters

Subject Code	Title of the Paper	IA	Theory	Total	Teaching Hours/Week	Credits	Duration of Examination
24 SEP-ZT -1	Animal Systematics and Biology of Non-Chordates	20	80	100	4	3	3
24 SEP-ZP - 1	Animal Systematics and Biology of Non-Chordates	10	40	50	4	2	3
24 SEP-ZT - 2	Animal Diversity – Biology of Chordates	20	80	100	4	3	3
24 SEP-ZP - 2	Animal Diversity – Biology of Chordates	10	40	50	4	2	3
Total						10	

III Semester:		IA	Theory	Total	Teaching hour /week	Credits	Duration of Examination
24 SEP-ZT-3	Animal Physiology and Biochemistry	20	80	100	04	03	03
24 SEP-ZP-3	Animal Physiology and Biochemistry	10	40	50	04	02	03
24 SEP-ZOE-1	Economic Zoology	10	40	50	03	02	03
VI Semester:							
24 SEP-ZT-4	Genetics and Evolution	20	80	100	04	03	03
24 SEP-ZP-4	Genetics and Evolution	10	40	50	04	02	03
24 SEP-ZOE-2	Fisheries and Aquaculture	10	40	50	03	02	03


 Date: 10/11/2023
 Signature: _____
 Name: _____
 Designation: _____

THEORY EXAMINATION QUESTION PAPER PATTERN (Semesters I –VI)

B.Sc. Degree Examination; 2024-25 onwards

(SEP Scheme; New Syllabus: 2024-25)

SUBJECT: ZOOLOGY

Paper:

Time: 3 Hours

Paper Code:

Max. Marks: 80

Instructions to candidates: 1) All sections are compulsory

2) Draw a neat and labelled diagrams wherever necessary.

SECTION-A

1. Answer all the following questions:

(2×10=20)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

SECTION-B

Answer any SIX of the following:

(5×6=30)

- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.

SECTION -C

Answer Any Three of the following: (10×3=30)

- 10. From Unit-I
- 11. From Unit-II
- 12. From Unit-III
- 13. From Unit-IV
- 14. From any of the Unit I to IV

*****Note: Equal Weightage should be given to All the Units under section A, B and C**

Theory Examination Question Paper pattern

B.Sc. Degree Examination: 2024-25 onwards
(SEP Scheme: New Syllabus: 2024-25)

SUBJECT: ZOOLOGY

(Open Elective)

Paper:

Time: 03 hours

Instruction to Candidates: 1) All sections are compulsory

2) Draw neat labeled diagrams wherever necessary.

Paper Code:

Max. Marks:40

SECTION – A

1. Answer all the following questions:

(1X10=10)

- a)
- b)
- c)
- d)
- e)
- f)
- g)
- h)
- i)
- j)

SECTION – B

Answer any FOUR of the following.

(5X4=20)

- 2.
- 3.
- 4.
- 5.
- 6.
- 7

SECTION – C

Answer any ONE of the following

(10X1=10)

- 8.
- 9.
- 10.

*** Note: Equal Weightage should be given to all the units under section A, B and C



Davanagere University
SEP-ZT-3 Animal Physiology and Biochemistry
 (56 Hours, 4 Hours of Teaching per Week)

Programme Name	B.Sc.	Semester	III
Course Title	Animal Physiology and Biochemistry		
Course Code	DSC-ZT-3	No. of credits	04
Hours of teaching	56 Hours	Exam duration	3 hours
Internal Assessment marks	20	Theory marks	80

Course Outcomes (COs) – Animal Physiology and Biochemistry

After successful completion of this course, students will be able to:

- CO1: Digestive and Muscle Physiology**
Explain the processes of digestion, nutrient absorption, and muscle contraction at the cellular and molecular level.
- CO2: Nerve Impulse Transmission**
Describe the structure and function of neurons, types of neurotransmitters, and mechanisms of nerve impulse conduction.
- CO3: Respiratory and Circulatory Physiology**
Understand the transport mechanism of gases, functions of respiratory pigments, and the dynamics of blood circulation and clotting.
- CO4: Excretion and Osmoregulation**
Demonstrate knowledge of renal physiology, homeostatic mechanism, and osmoregulation in vertebrates.
- CO5: Biomolecules and Enzymes**
Classify carbohydrates, proteins, and lipids and explain their biological functions; understand enzyme kinetics and regulation.
- CO6: Metabolic Pathways**
Analyze pathways of carbohydrate, lipid, and amino acid metabolism and relate them to energy production and nitrogen balance.
- CO7: Practical Skills**
Perform qualitative and quantitative biochemical tests, hematological counts, enzyme assays, and urine analysis, and interpret physiological data.

Animal Physiology & Biochemistry

Unit-I	(14 hours)
Chapter 1 Physiology of Digestion:	
Intracellular and Extracellular Digestion, Mechanical Digestion, Chemical digestion of Carbohydrates, Proteins and Lipids/Fats. Role of digestive enzymes, Bile salts, Absorptive areas & mechanism of absorption of nutrients.	
Chapter 2 Muscle Physiology:	
Structure & Types of Muscles, Proteins of contractile system, Mechanism & molecular Basis of muscle contractions, Excitation-contraction coupling.	
Chapter 3 Nerve Physiology:	
Structure and types of neurons, Neurotransmitters and their functions, Synapsis, Neuro-Muscular junctions, Generation and conduction of nerve impulse.	
Unit-II	(14 hours)
Chapter 4 Physiology of Respiration:	
Respiratory pigments (Chlorocruorin, Hemerythrin, Hemocyanin, Haemoglobin), Mechanism of transportation of Oxygen & Carbon dioxide, Bohr's Effect, Haldane effect. Hamburger Phenomena (Chloride Shift), Respiratory exchange ratio (Respiratory quotient).	
Chapter 5 Physiology of Circulation:	
Blood components, Blood clotting and clotting factors, Cardiac cycle, Cardiac output, Blood pressure, Functions of Arterial and Venous systems.	
Chapter 6 Physiology of Excretion and Osmoregulation:	
Structure and function of Nephron, Mechanism of urine formation, Homeostasis, Water and salt balance in the cell, Osmoregulation in vertebrates.	
Unit-III	(14 hours)
Chapter 7 Biomolecules:	
Structure, classification and biological importance of Carbohydrates, Proteins and Lipids, Vitamins.	
Chapter 8 Enzymes:	
IUB Classification of enzymes, nomenclature and Specificity of enzymes, Mechanism of enzyme action: Michaelis-Menten equation	
Chapter 9 Enzyme Inhibition:	
Reversible inhibition (Competitive, Non-comparative, Uncompetitive and Mixed inhibitions) and irreversible inhibition	

Unit-IV	(14 hours)
Chapter 10 Carbohydrate Metabolism:	
Glycolysis, Aerobic and anaerobic fates of Pyruvate, Kreb's Citric Acid cycle, Aspartate-Malate shuttle & Glycerol 3-phosphate shuttle, Oxidative Phosphorylation, Glycogenesis, Glycogenolysis, Gluconeogenesis.	
Amino Acid Metabolism: Transamination, Deamination, Urea cycle, Fate of carbon Skeleton.	
Chapter 11 Lipid Metabolism:	
Fatty acid activation and Transportation into Mitochondria, β -Oxidation of fatty acids.	
Chapter 12 Amino Acid Metabolism:	
Transamination, Deamination, Urea cycle, Fate of carbon skeleton.	

References

Animal Physiology:

- 1) Richard W. Hill, Gordon A. Wyse, Margaret Anderson – Animal Physiology
- 2) Knut Schmidt-Nielsen – Animal Physiology
- 3) P.K. Gupta – Text book of Animal Physiology
- 4) R. Nagabhushanam & M.S. Kodarkar – Animal Physiology and Biochemistry
- 5) P.S. Verma, B.S. Tyagi, V.K. Agarwal – Animal Physiology and Ecology
- 6) Sherwood, Klandorf, Yancey – Animal Physiology: From Genes to Organisms
- 7) Richard W. Hill, Gordon A. Wyse, Margaret Anderson, Animal Physiology, Sinauer Associates
- 8) Knut Schmidt-Nielsen, Animal Physiology: Adaptation and Environment, Cambridge University Press
- 9) P.K. Gupta, Textbook of Animal Physiology, Rastogi Publications, India
- 10) Nagabhushanam & M.S. Kodarkar, Animal Physiology and Biochemistry, Oxford & IBH Publishing Co. Pvt. Ltd.
- 11) Animal Physiology and Ecology, P.S. Verma, B.S. Tyagi, V.K. Agarwal, Publisher: S. Chand Publication
- 12) Guyton and Hall, Medical Physiology

Biochemistry:

- 1) David L. Nelson, Michael M. Cox – Lehninger Principles of Biochemistry
- 2) Jeremy M. Berg, John L. Tymoczko, Lubert Stryer – Biochemistry
- 3) U. Satyanarayana & U. Chakrapani – Biochemistry
- 4) Debajyoti Das – Text book of Biochemistry
- 5) Donald Voet & Judith Voet, Biochemistry

Prescribed Practicals / Experiments

SEP-ZP-3 Animal Physiology and Biochemistry

(4 Hours of Teaching per Week)

Programme Name	B.Sc.	Semester	III
Course Title	Animal Physiology and Biochemistry		
Course Code	SEP-ZP-3	No. of credits	2
Hours of teaching		Exam duration	3 hours
Assessment marks	10	Practical marks	40

1. Qualitative tests for Carbohydrates (Glucose, Fructose, Sucrose & Starch), Proteins and Lipids.
2. Enzyme activity: Salivary Amylase (Effect of temperature & pH).
3. Determination of pH of given samples by using pH meter.
4. Estimation of Hemoglobin by Sahli's method.
5. Total count of WBCs by using Hemocytometer.
6. Total count of RBCs by using Hemocytometer.
7. Differential count of WBCs.
8. Urine examination: pH, normal and abnormal constituents of urine.
9. Study of effect of hypotonic, isotonic and hypertonic solutions on the RBCs.
10. Demonstration of Pulse rate, Blood Pressure / ECG (Computer simulation if apparatus is not available).
11. Measurement of lung capacity by using spirometer or Ballon method.
12. Colleges are flexible to add any practical depending on the available facilities

Davanagere University
SEP-Z-OE-1 ECONOMIC ZOOLOGY

(32 hours, 2 hours of teaching per week)

Programme Name	B.Sc.	Semester	III
Course Title	ECONOMIC ZOOLOGY		
Course Code	SEP-Z-OE-1	No. of credits	2
Hours of teaching	32 Hours	Exam duration	3 hours
Assessment marks	10	Theory marks	40

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- Understand that management of economic aspects of animal husbandry and beneficial arthropods.
- Understand the methods and techniques of rearing of fowls, dairy farming, silk moths and their larvae and cultivable honey bees and their products.
- Understand the biological (ecological and reproductive) aspects of the arthropods that are economically important.
- Understand and distinguish beneficial insects and non-beneficial insects through their morphology.

Unit-I Animal Husbandry

(16 Hours)

Chapter 1:

Poultry: History and scope. Poultry breeds - classes of fowls; indigenous and exotic breeds. Poultry farm management. Rearing house equipment. Poultry feed (starter & finisher) and its composition. Broilers and layers rearing; Nutritive value of eggs and meat. Poultry diseases and their control (viral, bacterial – one each).

Dairy Farming: History and scope. Management of farm animals. Cattle breeds and their maintenance. Processing, preservation and marketing of milk. Milk and milk by products; breeding technique and artificial insemination.

Unit-II Economically important Arthropods

(16 Hours)

Chapter 2:

Sericulture: Morphology and life cycle of *Bombyx mori*. Rearing of silkworms: equipments used, environmental conditions and food. Harvest and post-harvest technology, Chawki &

later Worm rearing methods. Silkworm Disease: Pebrine, Muscardine, Flacherie and Glacherie.

Apiculture: Morphology, life cycle & species of honeybees. Social Organization. Modern methods of bee keeping, equipment used. Economic importance of honey and by products. Diseases of honey bee (protozoan and bacterial – one each)

References:

- 1) Economic Zoology, Vinita Jaiswal and Kamal Kumar Jaiswal, PHI learning private limited, New Delhi. ISBN-978-81-203-4886-8.
- 2) Economic Zoology, Sagarika Chowdary, New Central Book Agency (NCBA), ISBN-978-9352550517, 935255051X.
- 3) Economic Zoology, Jayasurya, N.C. Nair, et al., Saras Publication.
- 4) The Economic importance of Insects, Dennis Hill, Springer Neatherlands, ISBN: 9789401153485, 9401153485.
- 5) Economic Zoology, textbook for university students, G.S.Shukla, Rastogi Publications.

Davanagere University
SEP-ZT-4 Genetics and Evolution
(56 Hours, 4 Hours of Teaching per Week)

Programme Name	B.Sc.	Semester	IV
Course Title	Genetics and Evolution		
Course Code	DSC-ZT-4	No. of credits	03
Hours of teaching	56 Hours	Exam duration	3 hours
Assessment marks	20	Theory marks	80

Course Outcomes (COs) – Genetics and Evolution

Unit I: Classical and Mendelian Genetics

1. CO1: Describe Mendel's laws of inheritance, apply test and back crosses to determine genotypic and phenotypic ratios.
2. CO2: Explain non-Mendelian inheritance such as incomplete dominance, codominance, multiple allelism, and gene interactions.
3. CO3: Understand linkage, crossing over, and construct basic genetic maps using recombination frequencies.

Unit II: Cytogenetics and Human Genetics

4. CO4: Differentiate various mechanisms of sex determination including genetic and environmental systems.
5. CO5: Interpret inheritance patterns of X-linked and Y-linked traits; analyze human pedigrees.
6. CO6: Identify and explain chromosomal aberrations and numerical anomalies; discuss their implications in human syndromes.

Unit III: Evolution – Part 1

7. CO7: Understand and compare classical and modern theories of evolution including natural and sexual selection.
8. CO8: Discuss evidences of evolution and describe mechanisms such as mutation, gene flow, and selection.
9. CO9: Apply Hardy-Weinberg law to assess population genetic equilibrium and understand factors affecting it.

Unit IV: Evolution– Part 2

10. CO10: Explain evolutionary patterns like divergent, convergent, co-evolution, adaptive radiation and extinction.
11. CO11: Describe mechanisms of speciation and distinguish between microevolution and macroevolution.

12. CO12: Trace the evolutionary history of horse and humans, linking fossil and anatomical evidence with molecular data.

Genetics and Evolution

Unit-I Classical and Mendelian Genetics		(14 hours)
Chapter 1: Mendelian Principles; Mendel's laws of inheritance		
Law of segregation and independent assortment, Test cross and back cross		
Chapter 2: Extensions of Mendelian Genetics		
Incomplete dominance, Codominance, Multiple alleles (e.g., Coat colour in rabbits, ABO blood group in Humans), Gene interactions: (Supplementary, Complementary, Dominant epistasis, Recessive epistasis, Dominant- Recessive epistasis and lethal genes)		
Chapter 3: Chromosomal Basis of Inheritance		
Chromosome theory of inheritance, Linkage and crossing over (Morgan's experiments), Construction of genetic maps using recombination frequencies		
Unit-II Cytogenetics and Human Genetics		(14 hours)
Chapter 1: Sex Determination:		
Genetic sex determination (XX-XY System, ZZ-ZW System, XX-XO System), Haplodiploidy (Arrhenotoky). Environmental sex determination: Temperature dependent sex determination, Social Or Behavioural sex determination and Parasitic or Host-Dependent sex determination. Sex-linked inheritance: X-linked inheritance in Humans (Haemophilia & Colour blindness), Y linked inheritance (Holandric inheritance), Examples of Y-linked traits in Humans.		
Chapter 2: Human Cytogenetics		
Chromosomal Aberrations Structural abnormalities: (Deletions, duplications, inversions, translocations) Numerical abnormalities: Aneuploidy and Euploidy. Human chromosomal disorders: Down's syndrome, Turner's syndrome, Klinefelter's syndrome.		
Chapter 3: Pedigree Analysis		
Symbols and interpretation, Autosomal dominant, Autosomal recessive, and X-linked inheritance patterns, Pedigree patterns of Y-Linked inheritance and Y linked inheritance patterns		

Unit-III Evolution-Part 1	(14 hours)
Chapter 1: History and Theories of Evolution	
Lamarck's theory of inheritance of acquired characters, Darwin-Wallace theory of Natural Selection, Darwin's theory on Sexual selection and artificial selection. Neo-Darwinism (Modern synthetic theory of Evolution)	
Chapter 2: Evidence of Evolution	
Fossil evidence, comparative anatomy, embryology, Molecular biology and biochemistry, biogeography. Mechanism of Evolution (mutation, genetic drift, gene flow, selection)	
Chapter 3: Genetic Variation and Hardy-Weinberg Law	
Sources of variation: mutation, recombination, Hardy-Weinberg principle: assumptions and Applications (one example with calculations), Factors disrupting equilibrium: mutation, migration, selection, genetic drift.	
Unit IV: Evolution-Part 2	(14 hours)
Chapter 1: Patterns of Evolutions	
Divergent, Convergent, Parallel, Coevolution, Adaptive radiations and Extinctions).	
Chapter 2: Speciation	
Mechanisms of reproductive isolation, Speciation and Macroevolution: Modes of speciation (Allopatric, Sympatric, Parapatric and Peripatric), Microevolution (Features, Mechanisms and Examples), Macroevolution (Features, Mechanisms and Examples)	
Chapter 3:	
Evolution: Human and Horse.	

References:

Genetics:

- 1) D. Peter Snustad & Michael J. Simmons, Principles of Genetics, Wiley publication
- 2) Robert J. Brooker, Genetics: Analysis and Principles, McGraw-Hill Education
- 3) William S. Klug, Michael R. Cummings, Charlotte A. Spencer, Michael A. Palladino, Concepts of Genetics, Pearson Education
- 4) P.K. Gupta, Genetics Rastogi Publications (India)
- 5) E.J. Gardner, D.P. Snustad, Principles of Genetics, John Wiley publication
- 6) Benjamin Lewin, Genes IX

Evolution:

- 1) Douglas J. Futuyma & Mark Kirkpatrick, Evolution, Sinauer Associates (Oxford University Press)
- 2) Douglas J. Futuyma, Evolutionary Biology, Sinauer Associates
- 3) Monroe W. Strickberger, Jones & Bartlett, Evolution, / CBS Publishers & Distributors (India)

- 4) C. L. Camp, H. J. Allison, An Introduction to Evolutionary Biology, Macmillan Publication
- 5) P.S. Verma & V.K. Agarwal, S. Principles of Evolution, Chand Publishing (India)

Prescribed Practicals / Experiments

SEP-ZP-4 Genetics and Evolution

(4 Hours of Teaching per Week)

Programme Name	B.Sc.	Semester	III
Course Title	Genetics and Evolution		
Course Code	SEP-ZP-4	No. of credits	2
Hours of teaching		Exam duration	3 hours
Assessment marks	10	Theory marks	40

1. Problems on Mendelian and Non-Mendelian Inheritance: Monohybrid & Dihybrid crosses, Incomplete dominance, Complete dominance
2. Study of blood groups in Humans
3. Pedigree chart analysis
4. Human Karyotyping (Photographic/Software-based Analysis): Normal male and Normal female. Abnormal Karyotype analysis (Down's Syndrome, Turner's Syndrome, Klinefelter's Syndrome)
5. Study of normal and mutant forms (White eye, Ebony, yellow body, vestigial wings, of *Drosophila melanogaster*)
6. Mounting of giant chromosome of *Drosophila* / Chironomous larvae
7. Preparation and staining of buccal smear to detect Barr body in females.
8. Problems on Multiple allelism and Sex linked inheritance.
9. Fossil study and Identification
8. Study of Homologous and Analogous Organs
9. Hardy-Weinberg Equilibrium – Calculations
10. Colleges are flexible to add any practical depending on the available facilities

Davanagere University

SEP-Z-OE-2 FISHERIES AND AQUACULTURE

(32 hours, 2 hours of teaching per week)

Programme Name	B.Sc.	Semester	IV
Course Title	FISHERIES AND AQUACULTURE		
Course Code	SEP-Z-OE-2	No. of credits	2
Hours of teaching	32 Hours	Exam duration	2 hours
Assessment marks	10	Theory marks	40

Course Outcomes (COs):

After successful completion of the course, the student will be able to:

- Understand the biological aspects of the aquatic organisms which are economically important and understand that natural and artificial methods of fisheries and its cultivable methods
- Understand the management of economic aspects of aquaculture and fisheries and methods and techniques required to initiate aquaculture as a self-employment venture.

Unit-I: Fisheries

(20 Hours)

Chapter 1:

Fisheries: Inland and marine. Aquaculture species: Carps, cat fishes, murels, cold water and ornamental fishes. Types of fish rearing ponds and their management. Aquarium fishes and their maintenance. Fish preservation and processing. Fish by products. Fish diseases: Protozoan and bacterial diseases (one each).

Unit-II: Aquaculture

(12Hours)

Aquaculture: Prawn (fresh water and marine), pearl natural and artificial), trout culture and their management. Indian aquaculture industry,

References:

- 1) Economic Zoology, Vinita Jaiswal and Kamal Kumar Jaiswal, PHI learning private limited, New Delhi. ISBN-978-81-203-4886-8.
- 2) Economic Zoology, Sagarika Chowdary, New Central Book Agency (NCBA), ISBN-978-9352550517, 935255051X.
- 3) Aquaculture: Principles and Practices, Second edition, T.V.R. Pillay and M.N.Kutty, Blackwell Publishing, ISBN-10:1-4051—532-1.
- 4) Aquaculture and the environment, Second edition, T.V.R. Pillay, Balckwell Publishing, ISBN-1-4051-0167-9.
- 5) Economic Zoology, Jayasurya, N.C. Nair, et al., Saras Publication.



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