RAJEEV GANDHI GOVT. POST GRADUATE COLLEGE, AMBIKAPUR, SURGUJA (CG), INDIA

Learning Outcomes based Curriculum Framework
FOR
UNDERGRADUATE PROGRAMME

B.Sc. (Zoology)

SEMESTER SYSTEM
SESSION 2023-2024

Rajeev Gandhi Govt. P.G. College Ambikapur

DEPARTMENT OF ZOOLOGY

Programme Outcomes

PO-1Knowledge and Understanding- After studying this program,student will be more equipped to learn and know about different biological system.

PO-2 Critical Thinking-Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and behavior of different forms of life.

PO-3 Problem Solving-Student will be able to explain how organisms function at the level of the gene,genome,cell,tissue and organ-system.

PO-4 Analytical reasoning-Analyze complex interactions among the various animals of different phyla,their distribution and their relationship with the environment.

PO-5 Academic Knowledge-Apply the Knowledge of internal structure of cell,its functions in control of various metabolic functions of organism.

PO-6 Research Skill-Correlates the physiological processes of animals and relationship of organ systems.

PO-7 Business Skill enhancement Course-Gain knowledge of Agro based small scale industries like Sericulture, fish farming, butterfly farming and vermi-compost preparation.

PO-8 Human welfare-Understands about various concepts of genetics and its importance in human health.

PO-9 Ethics awareness-Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties. Develop empathy and love towards the animals.

Program Specific Outcomes

1.PSO-Understand the nature-Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology.

2.PSO-Analyse the relationships among animals, plants and microbes.

3.PSO-Laboratory Knowledge-Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, tools and techniques of Zoology, Animal biotechnology, Immunology and research methodology.

4.PSO-Understand the applications of biological sciences in Apiculture, Aquaculture, Agriculture and Medicine.

5.PSO-Gains Knowledge about research methodologies, effective communication and skills of problem solving methods.

ACDEMIC PROGRAMME & SCHEMS
BSc.ZOOLOGY(NEP)

Class	Course Type	Course/Paper	Theory Credit/hrs	Practical Credit/hrs
I SEMESTER	DSCCZOO-1	Cell Biology and Non-Chordata	3/45	1/30
I SEMESTER	GECZOO-1	Human Physiology	3/45	1/30
I SEMESTER	VACZOO-1	Vermiculture	2/30	
II SEMESTER	DSCCZOO-2	Chordata and Embryology	3/45	1/30
II SEMESTER	GECZOO-2	Food Nutrition and Health	3/45	1/30
III SEMESTER	DSCCZOO-3	Anatomy and Physiology	3/45	1/30
III SEMESTER	DSECZOO-1	Fish and Fisheries	3/45	1/30
III SEMESTER	VACZOO-2	Sericulture	2/30	
IV SEMESTER	DSCCZOO-4	Vertebrate Endocrinology, Reproductive Biology, Behavior, Evolution and Applied Zoology	3/45	1/30
IV SEMESTER	DSECZOO-2	Economic Zoology	3/45	1/30
V SEMESTER	DSCCZOO-5	Ecology, Environmental Biology, Toxicology, Microbiology and Medical Zoology	3/45	1/30
V SEMESTER	DSECZOO-3	Diversity of Chordates	3/45	1/30
V SEMESTER	GECZOO-3	Biodiversity Conservation and Sustainable Development	3/45	1/30
VI SEMESTER	DSCCZOO-6	Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques	3/45	1/30
VI SEMESTER	DSECZOO-4	Fundamentals of Biochemistry	3/45	1/30
VI SEMESTER	GECZOO-4	Human Health and Diseases	3/45	1/30

DSCCZOO-1 Course outcome-B.Sc.-I Semester

Cell Biology and Non-Chordata

CO-1.To understands the structural organization and function of Intracellular organelles.

CO-2 Get a flavor of research by working on project besides improving their writing skills.

CO-3 Students will understand the structures, Positions and functions of Plasma membrane, Endoplasmic reticulum, Mitochondria and Golgi complex.

CO-4Students will acquire knowledge about Chromosomes and cell divisions.

CO-5.They will also know about cancer cell.

CO-6Undertake research in any aspect of animal physiology in future.

CO-7 Students will have learning about the basic taxonomy and systematic and classification of Protozoa, Porifera, Coelenterata.

CO-8Realize that very similar physiological mechanisms are used in very diverse organisms.

Mapping of Programme and Course outcome

(Cell Biology and Non-Chordata)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding	✓	✓						
PO-2	Critical Thinking			✓	✓				✓
PO-3	Problem Solving				✓				
PO-4	Analytical Reasoning							✓	
PO-5	Academic Knowledge							✓	
PO-6	Research Skill		✓		✓		✓		
PO-7	Business Skill								
PO-8	Human Welfare					✓			
PO-9	Ethics Awareness								

B.Sc. (Zoology)		**SEMESTER I**
COURSE TITLE: Cell Biology and Non-Chordata		
Paper Code: DSCCZOO-1		
Credit -3/45		**Practical-1/30**
Theory-100		**Practical-50**
Scheme of Marks: **(i)**Objective type questions (ii) Very Short Question (iii)Short Questions (iv) long type questions		
Unit I 18 hrs	1.The cell (Prokaryotic and Eukaryotic) 2.Organization of Cell: Extra-nuclear and nuclear (Plasma membrane, Mitochondria, Endoplasmic reticulum, Golgi body, Ribosome and Lysosome) 3.Nucleus, Chromosomes, DNA and RNA	
Unit II 18hrs	1.Cell division (Mitosis and Meiosis) 2.An elementary idea of Cancer cells and Cell transformation. 3.An elementary idea of Immunity: Innate& Acquired Immunity, Lymphoid organs, Cell of Immune System, Antigen, Antibody and their interactions	
Unit III 18 hrs	1.General characters and classification of phylum Protozoa, Porifera and Coelenterata up to order 2.Protozoa:Type study-Paramecium 3.Porifera: Type study- Sycon 4.Coelenterata: Type study- Obelia	
Unit IV 18hrs	1.General characters and classification of phylum Platyhelminthes, Nemathelminthes, Annelida and Arthropoda up to order 2.Platyhelminthes and Nemathelminthes: Type Study- Fasciola, Ascaris 3.Annelida: Type study-Pheretima 4.Arthropoda: Type study-Palaemone	
Unit V 18 hrs	1.General Characters and classification of Phylum Mollusca and Echinodermata up to order. 2.Mollusca: Type study-Pila 3.Echinodermata-Type study-Asterias(starfish)	

REFERENCES:

- Mordern Zoology-Dr.H.N.Baijal
- Unified Zoology-Dr.V.K.Tiwari
- NavbothUnified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena
- Zoology for Degree Students-I-Dr. V. K. Agrawal

B.Sc. Semester –I Paper-DSCC
Practical
Cell Biology and Non-Chordata

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium*, Binary fission and Conjugation in *Paramecium*

3. Study of *Sycon*(T.S. and L.S.), *Hyalonema, Euplectella, Spongilla*

4. Study of *Obelia, Physalia, Millepora, Aurelia, Tubipora, Corallium, Alcyonium, Gorgonia, Metridium, Pennatula, Fungia, Meandrina, Madrepora*

6. Study of adult *Fasciola hepatica*, *Taenia solium* and their life cycles (Slides/microphotographs)

7. Study of adult *Ascaris lumbricoides* and its life stages (Slides/micro-photographs)

8. Preparation of temporary stained squash of onion/arum root tip to study various stages of mitosis

GECZOO-1 Semester-I (BA/B.Sc.Math)
Course outcome
Interdisciplinary Course-GE Human Physiology

After successfully completing this course, the students will be able to:
CO 1- Understand the process of digestion and its control

CO 2- Develop understanding in muscle structure and contraction mechanism

CO 3- Learn the process of respiration and transport of gases

CO 4- Understand kidney structure and regulation of urine formation

CO 5- Understand heart structure and functioning

CO 6- Understand function of endocrine glands and formation of gametes.

Mapping of Programme and Course outcome

(GE- Human Physiology)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6
PO-1	Knowledge, understanding	✓	✓				✓
PO-2	Critical Thinking		✓	✓	✓		
PO-3	Problem Solving				✓		✓
PO-4	Analytical Reasoning						
PO-5	Academic Knowledge			✓			
PO-6	Research Skill		✓	✓	✓	✓	✓
PO-7	Business Skill						
PO-8	Human Welfare			✓	✓	✓	
PO-9	Ethics Awareness						

GE Zoology	**SEMESTER- I(BA/B.Sc. Math/B.Com)**	
COURSE TITLE: Human Physiology		
Course Type	**GECZOO-1**	
Theory-100 Marks	**Practical-50 Marks**	
Question Pattern- (i) Objective Type Question- MCQ, fill up the blanks, True/False,Total-12 Q (ii) Very short answer type-word limit 70-100, total-05 Q (iii) Short answer type-word limit, 200-250, total-05 Q (iv) Long answer type-word limit , 500-600, total-o5 Q		
Unit I 15 hrs	**How are processes of digestion and excretion accomplished in man** Digestive system and glands: Structure and functions. Digestion and absorption of nutrients: carbohydrates, fats and proteins. Neural and hormonal control of digestion. Excretory system: Functional anatomy of kidney.	
Unit II 15 hrs	**An overview of muscular function and respiration in man** Structure of smooth, skeletal and cardiac muscles. Neuromuscular junction. Mechanism of muscle contraction. Respiration: External and internal respiration. Transport of carbon dioxide and oxygen in blood and tissues.	
Unit III 15 hrs	**Cardiovascular functions in man** Structure of heart. Coordination of heartbeat; control of heart beat (neural and hormonal) Blood cells and blood vessels. Cardiac cycle. ECG. Lymph and lymph vessels	
Unit IV 15 hrs	**Endocrine and reproductive physiology** Structure and function of endocrine glands *viz.*, pituitary, thyroid, parathyroid, pancreas, adrenal, ovaries and testes.	

Recommended readings

1. Tortora, G.J. and Derrickson, B.H. (2009) Principles of Anatomy and Physiology (12th edition) John Wiley and Sons, Inc.

2. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology (9th edition) McGraw Hill.

3. Guyton, A.C. and Hall, J.E. (2011) Textbook of Medical Physiology (12th edition) Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.

4. Marieb, E. (1998) Human Anatomy and Physiology (4th edition) Addison-Wesley.

5. Kesar, S. and Vashisht, N. (2007) Experimental Physiology, Heritage Publishers.

Practical- Human Physiology

1. Estimation of Haemoglobin through haemocytometer.
2. Measurement of blood Pressure with the help of Sphygnomanometer.
3. Study of Digestive glands- Liver and Pancreas
4. Study of Kidney- through Slides and models
4. Study of Muscles
5. Study of endocrine glands- slides of Thyroid, Adrenal, Pancreas, etc.

VACZOO-1 B.Sc. SEMESTER-I

Course OutcomesVermiculture

After completing the course the students will able to demonstrate:-

CO 01- Understand the organic solid waste can be managed through vermiculturing.

CO 02- Vermicomposting can be used for biodegradable waste management.

CO 03-Vermi-compost is superior to traditional compost due to its ability to improve the soil structure and to increase its water-holding capacity.

CO 04- Explain the ecological characteristics and beneficial of earthworm have been clearly demonstrated.

CO 05- Demonstrate the experimental technique for Vermiculture.

CO 06- Discuss the improvement of plant growth and yield.

CO 07- Understand the, how does vermicomposting help the environment.

CO 08- To understand the improvement of soil physical, chemical and biological properties.

Mapping of Programme and Course outcome

(Vermiculture)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding								✓
PO-2	Critical Thinking		✓						✓
PO-3	Problem Solving	✓			✓			✓	
PO-4	Analytical Reasoning			✓					
PO-5	Academic Knowledge								✓
PO-6	Research Skill		✓	✓	✓	✓			✓
PO-7	Business Skill	✓			✓		✓		✓
PO-8	Human Welfare	✓		✓	✓	✓	✓		
PO-9	Ethics Awareness				✓		✓	✓	

Value Added Course for PG Students	
COURSE CODE:	**VACZOO-1**
COURSE TITLE: VALUE ADDED COURSE- VERMICULTURE	
Objective: To know the importance of Vermiculture	
UNIT- 1 05Hrs.	Introduction to Vermiculture, Biotransformation, Organic fertilizers
UNIT-2 05Hrs	Pheretima posthuma- A type study
UNIT-3 05Hrs	Biology of Eiseniafetida, Biology of Eudriluseugenine
UNIT-4 05Hrs	Economic important, their value in maintenance of soil structure, choosing the right worm, identify the species of earthworms
UNIT-5 05Hrs	Vermicompost Technology, Nutritive value of vermicompost,
SUGGESTED READINGS	1. Vermitechnology, Saras Publication, M.SeethaLekshmy, R. Santhi 2. Vermiculture Technology, Norman Q.Arancon 3. The Worm Farmer's Handbook,RhondaL.Sherman. 4. Worms at Work:Harnessing the Awesome Power of Worms with Vermiculture and Vermicomposting, Christal Stevens.

Practical: Vermiculture-Identify the different types of earth worms (collection),

Study the development of Eiseniafetida and Eudriluseugeniae,

Maintanance of vermicompost and climatic conditions,

Study of diseases and their enemies.

Process of Vermiculture

DSCCZOO-2 Course Outcome-B.Sc.-II Semester

Chordata and Embryology

Course Outcome-

CO- 1.Studentsstudy the classification, structural peculiarities of Hemichordata, protochordata and their evolutionary Importance.

CO-2.Students will be able to analyse the Comparative knowledge to Petromyzon and Myxine.

CO-3. Students will be able to understand the principles of taxonomy, systematics and classification of Chordata.

CO -4. Students will be able to gain a comprehensive knowledge of Poisonous and non poisonous snakes.

CO -5. Students will understand about snake venom and poison apparatus.

CO-6. Students will be able to analyze the process of metamorphosis of amphibians.

CO-7.Students will be able to gain a comprehensive knowledge about Migration, Flight adaptation and Perching mechanism in Bird.

CO-8.Students will be able to evaluation of Prototheria, Metatheria, Eutheria and their affinities.

Mapping of Programme and Course outcome

(Chordata and Embryology)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding		✓					✓	
PO-2	Critical Thinking				✓		✓		
PO-3	Problem Solving				✓	✓			
PO-4	Analytical Reasoning	✓	✓	✓					✓
PO-5	Academic Knowledge								
PO-6	Research Skill				✓	✓		✓	
PO-7	Business Skill					✓			
PO-8	Human Welfare					✓			
PO-9	Ethics Awareness				✓			✓	

B.Sc. (Zoology)		SEMESTER II	
COURSE TITLE: Chordata and Embryology			**DSCCZOO-2**
Credit -4			
Theory-3/45	**Practical-1/30hrs**	**Theory-100**	**Practical-50**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions			

Unit I 18 hrs	1.Classification of Hemichordata 2. Hemichordata-Type study-Balanoglossus 3. Classification of Chordates upto orders. 4. Protochordata-Type study-Amphioxus. 5. A comparative account of Petromyzon and Myxine.
Unit II 18hrs	1. Fishes-Skin & Scales, migration in fishes, Parental care in fish. 2. Amphibia-Parental care and Neoteny. 3. Reptilia-Poisonous & Non-poisonous Snakes,Poison apparatus, snake venom and Extinct Reptiles.
Unit III 18 hrs	1. Birds-Flight Adaptation, Migration, and Perching mechanism, Discuss-Birds are glorified reptiles. 2. Mammals-Comparative account of Prototheria, Metatheria, Eutheria and Affinities. 3. Aquatic Mammals and their adaptations.
Unit IV 18hrs	1.Fertilization 2. Gametogenesis, Structure of gamete and Types of eggs. 3.Cleavage 4. Development of Frog up to formation of three germ layers. 5. Parthenogenesis
Unit V 18 hrs	1. Embryonic induction, Differentiation and Regeneration. 2. Development of Chick (a) Up to formation of three germ layers. (b) Extra-embryonic membranes. 3. Placenta in mammals.

REFERENCES:

- Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena
- Zoology for Degree Students-I-Dr. V. K. Agrawal

Zoology
B.Sc.II Semester
Practical
CHORDATA AND EMBRYOLOGY

The practical work will, in general be based on the syllabus prescribed in theory and the candidates will be required to show knowledge of the following:-

- Identification with Reasons
- (a) Protochordata: Balanoglossus, Branchiostoma
- b) Agnatha: Petromyzon
- c) Fishes: Scoliodon, Sphyrna, Pristis, Torpedo, Mystus, Heteropneustes, Labeo rohita, Exocoetus, Hippocampus, Anabas, Flat fish
- d) Amphibia: Necturus, Bufo (Duttaphrynus) melanostictus, Rana (Hoplobatrachus) tigerinus, Hyla, Tylototriton, Axolotl larva
- e) Reptilia: Chelone, Trionyx, Hemidactylus, Varanus, Calotes, Chamaeleon, Draco, Vipera, Naja, Hydrophis,
- f) Mammalia: Bat (Insectivorous and Frugivorous), Funambulus (Indian Palm squirrel)
- g) Study of whole mounts of developmental stages of chick embryo through permanent slides: 24, 48, and 96 hours of incubation .
  (Alternative methods: By Clay/Thermacol/drawing/ Model etc.)
- Adaptive characters of Aquatic, terrestrial, Arial and desert animals.
- Museum specimen Chordata.
- Slides-Chordata, frog embryology, Chick embryology and cytology.

B.Sc.IInd Semester

GECZOO-2 Food Nutrition and Health

Course Outcome-

1.CO-The course covers the basic concepts of balanced diet for people of different ages besides focusing on the consequences of malnutrition and the deficiency diseases and the diseases caused due to poor hygiene.

2.CO-Understand the role of food and nutrients in health and disease.

3.CO- Implement strategies for food access, procurement, preparation and safety that are relevant for the culture, age, literacy

4. CO-Perform food system management and leadership functions that consider sustainability in business.

Mapping of Programme and Course outcome

(Food Nutrition and Health)

		CO-1	CO-2	CO-3	CO-4
PO-1	Knowledge, understanding	✓			
PO-2	Critical Thinking				
PO-3	Problem Solving	✓	✓		
PO-4	Analytical Reasoning			✓	
PO-5	Academic Knowledge				
PO-6	Research Skill	✓			
PO-7	Business Skill				✓
PO-8	Human Welfare	✓	✓		
PO-9	Ethics Awareness				

B.Sc.Zoology		**SEMESTER- II**
COURSE TITLE: Food, Nutrition and Health		
Course Type GECZOO-2		
Marks-Theory 100	**Practical-50**	
Theory-3/45hrs	**Practical 1/30 hrs**	
Question Pattern- (i) Objective Type Question- MCQ, fill up the blanks, True/False,Total-12 Q (ii) Very short answer type-word limit 70-100, total-05 Q (iii) Short answer type-word limit, 200-250, total-05 Q (iv) Long answer type-word limit , 500-600, total-o5 Q		
Unit I 15 hrs	**Food and dietary nutrients** Basic concept of food, concept of balanced diet, macronutrients- carbohydrate, lipids, proteins-definition, classification and their dietary source and role.	
Unit II 15hrs	**Micronutrients and Vitamins** Vitamins- Water soluble and fat soluble vitamins, their source and importance, Important minerals- Iron, Ca, Phosphorous, Iodine, Selenium and Zinc- their biological function.	
Unit III 15 hrs	**Nutrient deficiency diseases** Basic concept of health, common nutrition deficiency diseases- protein malnutrition (eg. Kwashiorkor and Marasmus), Vitamins deficiency, Iron deficiency and Iodine deficiency disorders- their symptoms, treatment, prevention and government initiatives if any.	
Unit IV 15hrs	**Disease caused by microorganisms** Food and water-borne infections- bacterial diseases, cholera, dysentery, typhoid fever; Viral diseases- Hepatitis, Poliomyelitis etc.; Protozoan diseases- amoebiasis etc.; Parasitic diseases- taeniasis and ascariasis.	

Practical- Food, Nutrition and Health

1.Study of the stored grain pests from slide/photographs

2.Preparation of temporary mounts of the stored grain pests.

3.Learn the basics about protein in food.

4.Pulses and legumes

5.Vitamin deficiency diseases.

6.Study of Iodine Deficiency Diseases with model.

7.Project work the related topics

DSCCZOO-3 Course out Come-B.Sc.-III Semester
Anatomy and Physiology
(Comparative Anatomy of various organ systems of Vertebrates)

CO-1.Students will have understood the structure of different Integument and its derivatives.

CO-2.They will also understand the Comparative anatomy of various organ systems of vertebrates.

CO-3.Understands about structure, composition of scales, hair and feathers.

CO-4.Student will undertake research in any aspect of animal physiology.

CO-5. Course provides students comprehensive understanding about Circulatory system and Urinogenital system.

CO-6. Students gain evolutionary knowledge about Heart and Aortic arches.

CO-7. Course provides students comprehensive understanding about neurobiology, neurophysiology, molecular neurobiology.

CO-8 Develop an understanding of the evolution of vertebrates thus integrating structure, function and development.

Mapping of Programme and Course outcome

Anatomy and Physiology

(Comparative Anatomy of various organ systems of Vertebrates)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding	✓		✓					✓
PO-2	Critical Thinking		✓			✓		✓	
PO-3	Problem Solving						✓		✓
PO-4	Analytical Reasoning		✓				✓	✓	
PO-5	Academic Knowledge	✓						✓	
PO-6	Research Skill		✓		✓		✓		
PO-7	Business Skill								
PO-8	Human Welfare				✓	✓		✓	
PO-9	Ethics Awareness								

B.Sc. (Zoology)DSCCZOO-3 SEMESTER III		
COURSE TITLE: Anatomy and Physiology (Comparative Anatomy of various organ systems of Vertebrates)		
Marks Theory-100		**Practical-50**
Theory Credits -3/45 hrs		**Practical Credits 1/30 hrs**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions		
Unit I 18 hrs	1. Integument and its derivatives: structure of scales, hair and feathers. 2. Alimentary canal and digestive glands in vertebrates 3. Respiratory organs: Gills and lung, air-sac in birds.	
Unit II 18hrs	1.Endoskeleton(a) Axial Skeleton-Skull and Vertebrae,(b) Appendicular Skeleton, Limbs and girdles. 2. Circulatory system: Evolution of heart and aortic arches. 3.Urinogenital system: Kidney and excretory ducts.	
Unit III 18 hrs	1.Nervous system: General plan of brain and spinal cord. 2.Ear and Eye structure and function 3.Gonads and genital ducts.	
Unit IV 18hrs	1.Digestion and absorption of dietary components. 2.Physiology of heart, cardiac cycle and ECG 3. Blood Coagulation. 4. Respiration: mechanism and control of breathing	
Unit V 18 hrs	1.Excretion:Physiology of excretion, osmoregulation, 2.Physiology of muscle contraction 3.Physiology of nerve impulse, Synaptic transmission	

REFERENCES:

- Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena
- Zoology for Degree Students-I-Dr. V. K. Agrawal

Practical

DSCC-Anatomy and Physiology

The Practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:

- Study of the representative examples of the different chordates (Classified characters)
- Dissection of various systems of Scoliodon-Afferent and Efferent branchial cranial nerves, internal ear.
  Alternative methods: By clay/ Thermacol/ Drawing/Model etc.)
- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog, Varanus, Fowl and Rabbit.
- Theoretical discussion in Physiology
- Study of compound microscope
- Microscopic study of epithelial and connective Tissue
- Microscopic study of muscular and nervous Tissue
- Determination of clotting time
- Determination of bleeding time
- Determination of heart rate and pulse rate
- Recording the blood pressure

DSECZOO-1 B.Sc.III SEMESTER-DSEC

Fish and Fisheries

After successfully completing this course, the students will be able to:-

CO1- A detailed understanding of evolutionary strategies and morphological innovations, gene and genome duplication, evolutionary genetics, biogeographical distribution of major groups of fishes.

CO2- An overview of adaptations of fishes to environmental extremes- temperature, pressure, stress.

CO3-Understanding growth and metabolism of fishes by regulation of food intake by neuropeptides and hormones, environmental factors and feed intake.

CO 4- Evaluation of defense mechanism in fishes and their regulation.

CO 5- Learning of fish reproduction for better yield in fish farming.

Mapping of Programme and Course outcome

(Fish and Fisheries)

		CO-1	CO-2	CO-3	CO-4	CO-5
PO-1	Knowledge, understanding	✓			✓	
PO-2	Critical Thinking	✓	✓		✓	
PO-3	Problem Solving					
PO-4	Analytical Reasoning		✓			
PO-5	Academic Knowledge	✓				
PO-6	Research Skill		✓			✓
PO-7	Business Skill					✓
PO-8	Human Welfare					✓
PO-9	Ethics Awareness				✓	

B.Sc.-Zoology	DSECZOO-1	SEMESTER -III
COURSE TITLE: FISH AND FISHERIES		
Theory Marks-100	**Practical Marks-50**	
Theory Credits-3/45 hrs	Practical Credits-1/30 hrs	

Unit I 12 hrs	Introduction and Classification: General description of fish; Account of systematic classification of fishes (uptoclasses); Classification based on feeding habit, habitat and manner of reproduction.
Unit II 12hrs	Morphology and Physiology: Locomotion in fishes; Types of Scales, Use of scales in Classification and determination of age of fish,Gills and gas exchange, Swim Bladder: Types and role in Respiration, buoyancy.
Unit III 12 hrs	Osmoregulation in Elasmobranchs: Reproductive strategies (special reference to Indian fishes), Electric organs, Bioluminiscience, Mechanoreceptors, Parental care; Migration
Unit IV 12hrs	Fisheries: Inland fisheries, Edible fresh water fishes. Carp culture, Qualities of culturable fishes,Carp fishes,Ponds for Carp culture and their management,procedure of carp culture,transport of various stages of fish,Cage culture,Pen culture,diseases of carp fishes and their control.Fish preservation and processing.
Unit V 12hrs	Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Pen and cage culture; Polyculture; Composite fish culture; Brood stock management; Induced breeding of fish; Management of finfish hatcheries; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish, Fishery by-products

Q Bone and R Moore, Biology of Fishes, Talyor and Francis Group, CRC Press, U.K. •

D. H. Evans and J. D. Claiborne, The Physiology of Fishes, Taylor and Francis Group, CRC Press, UK von der Emde, R.J. Mogdans and B.G. Kapoor. •

The Senses of Fish: Adaptations for the Reception of Natural Stimuli, Springer, Netherlands • C.B.L. Srivastava, Fish Biology, Narendra Publishing House •

J.R. Norman, A history of Fishes, Hill and Wang Publishers •

S.S. Khanna and H.R. Singh, A text book of Fish Biology and Fisheries, Narendra Publishing House

PRACTICALS
FISH AND FISHERIES

1. Morphometric and meristic characters of fishes

2. Identification of Petromyzon, Myxine, Pristis, Exocoetus, Hippocampus, Gambusia, Labeo, Heteropneustes, Anabas

3. Study of different types of scales (through permanent slides/ photographs).

4. Study of crafts and gears used in Fisheries (Photoghaphs)

5. Water quality criteria for Aquaculture: Assessment of pH, alkalinity, Salinity.

6. Study of air breathing organs in Channa, Heteropneustes, Anabas and Clarias

DSCCZOO-4 Course out Come-B.Sc.-IV Semester

Vertebrate Endocrinology, Reproductive biology, Behavior and Evolution

CO-1.They will learn detail of endocrinology with classification of hormones, their biosynthesis.

CO-2.Understand the basic organization of the Endocrine disorder of Pituitary, Thyroid and Pancreas.

CO -3. Students of this class will be able to understand the importance of hormones in the Gametogenesis.

CO-4. After successfully completing this course, the students will be able to demonstrate knowledge of key concepts in animal behavior.

CO-5.Learn a wide range of theoretical and practical techniques used to study animal behavior.

CO-6.Thinking ability, flexibly and apply knowledge to new behavior problem.

CO -7. Students will be able to biological and chemical pest control.

CO -8. Gives knowledge of silk worm rearing and Mulberry cultivation.

Mapping of Programme and Course outcome

(Vertebrate Endocrinology, Reproductive biology, Behavior and Evolution)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding	✓			✓		✓		
PO-2	Critical Thinking		✓	✓	✓	✓	✓		
PO-3	Problem Solving			✓		✓			✓
PO-4	Analytical Reasoning		✓						
PO-5	Academic Knowledge			✓	✓	✓			
PO-6	Research Skill		✓					✓	
PO-7	Business Skill						✓	✓	✓
PO-8	Human Welfare					✓			✓
PO-9	Ethics Awareness								

B.Sc. (Zoology)DSCCZOO-4 SEMESTER IV	
COURSE TITLE: Vertebrate Endocrinology, Reproductive Biology Behavior and Evolution	
Theory Marks-100	**Practical Marks-50**
Credit –Theory-3/45	**Practical-1/30h**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions	
Unit I 18 hrs	1.Structure and function of Endocrine glands. 2.Hormone receptor 3.Biosynthesis and secretion of thyroid, adrenal, ovarian and testicular hormones 4.Endocrine disorder of pituitary, thyroid, adrenal and pancreas
Unit II 18hrs	1.Reproductive cycle in vertebrates 2.Menstruation, lactation and pregnancy 3.Mechanism of parturition 4.Hormonal regulation of gametogenesis
Unit III 18 hrs	1.Evidences of organic evolution 2.Theories of organic evolution 3.Variation, Mutation, Isolation and Natural selection 4.Evolution of Horse
Unit IV 18hrs	Introduction to Ethology: Branches and concept of ethology 2. Patterns of Behaviour, Taxes, Reflexes, Drives and Stereotyped behaviour. 3.Reproductive behavioural patterns.
Unit V 18 hrs	1.Drugs and behavior, Hormones and Behaviour 2.Elements of Pest Control:Chemical & Biological Control

- REFERENCES: Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena
- Zoology for Degree Students-I-Dr. V. K. Agrawal

DSCCZOO-4-Vertebrate Endocrinology, Reproductive biology, Behavior and Evolution

B.Sc. IV Semester

Practical

The Practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:

Alternative methods: By clay/ Thermacol/ Drawing/Model etc.)

- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- .Histological study of embryology
- Identification of species and individual of honey bee.
- Life cycle of honey bee and silkworm.
- Exercise based on Evolution and Animal behavior.
- Thyroid disorders
- Hypothalamus-Pituitary disorders
- Endocrine disorders in Childhood
- Principle of inheritance and variation
- Study of Evolution of Man
- Geotaxis in Earthworm
- Orientation of an animal to light
- Chemical communication in ants
- Nest and nesting habits of the birds
- Visit to sericulture/Pisciculture/Apiculture centre and prepare a short report

DSEZOO-2 Course outcome-B.Sc.-IV Semester

Economic Zoology

CO-1 After successfully completing the course, the students will be able to economic important of vertebrate.

CO-2 Acquire the skills to manage a dairy farm or to start one with adequate inputs.

CO-3 Identify the types of insect pests particularly the most common one.

CO-4 To impact training in extension management and transfer of Fish culture.

CO-5 Understand the effective way of insect pest management strategy.

CO-6 Understand conditioning factors and how they can be manipulated aquaculture.

CO-7 Identify where to purchase equipment and demonstrate how to assemble Sericulture.

CO-8 After completing this course the learner will be able to critical understanding of environmental impact.

Mapping of Programme and Course outcome

(Economic Zoology)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding								
PO-2	Critical Thinking				✓				✓
PO-3	Problem Solving				✓		✓		
PO-4	Analytical Reasoning			✓			✓		
PO-5	Academic Knowledge					✓			
PO-6	Research Skill		✓	✓			✓	✓	
PO-7	Business Skill	✓	✓			✓		✓	
PO-8	Human Welfare	✓	✓			✓			
PO-9	Ethics Awareness	✓	✓						✓

B.Sc. (Zoology)DSECZOO-2	SEMESTER IV
COURSE TITLE: Economic Zoology	
Theory Marks-100	**Practical-50**
Theory-3/45	**Practical-1/30**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions	
Unit I 18 hrs	Sericulture Apiculture Poultry keeping Lac culture Element of pest control and biological control Mites and ticks and their control
Unit II 18hrs	Prawn culture Edible fresh water fishes Pisciculture By products of fishing Industry Pearl culture
Unit III 18 hrs	Economic Importance of mammals Dairy Industry Wool Industry Leather Industry
Unit IV 18hrs	Wild life in India and its Management Environmental management system Basic concepts and issues, global environmental problems-ozone depletion Peoples participation in resource conservation and environmental protection

- REFERENCES: Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena
- Zoology for Degree Students-I-Dr. V. K. Agrawal

Zoology

B.Sc.IV Semester- Economic Zoology

Practical

The Practical work in general shall be based on the syllabus prescribed and the students will be required to show the knowledge of the following:

- Study of the representative examples of the different Bee(Classified characters)
- Dissection of various systems Silk worm.
  Alternative methods: By clay/ Thermacol/ Drawing/Model etc.)
- Simple microscopic technique through unstained or stained permanent mount.
- Study of prepared slides histological, as per theory papers.
- Study of limb girdles and vertebrae of Frog.Varanus, Fowl and Rabbit.
- Identification of species and individual of honey bee, Silk worm, Fishes,
- Life cycle of honey bee and silkworm.
- Exercise based on Pearl formation.
- Identify the Natural resources-water, fresh air, soil, plants/trees, animals and measure them
- Attempt to find its costs in terms of use in the ecosystem

Scheme of Practical Exam

- Major dissection (Cranial nerves/efferent branchial vessel) 10
- Exercise based on pearl formation 05
- Exercise based on applied zoology 05
- Exercise based on ecosystem 04
- Spotting-8 16
- Viva 05
- Sessional marks. 05

DSCCZOO-5 Course outcome-B.Sc.-V Semester

Ecology, Environmental Biology: Toxicology, Microbiology and Medical Zoology

CO-1.Students will understand the various features and aspects of population ecology, community ecology and ecosystem ecology.

CO-2.They will acquire knowledge about environmental biology in details.

CO-3.Understands laws of limiting factor of environment.

CO-4. It provides opportunities for student's research projects, internships in assessing the effects of poisonous animal.

CO-5.They will also know the various tools and techniques related to industrial microbiology.

CO-6. Understanding of Industrial microbiology and production of penicillin .

CO-7. Student's gains knowledge about microbiology of milk and milk production.

CO-8.They also will acquire knowledge about some parasites for their life cycle, pathology, diagnosis, symptoms and treatment.

Mapping of Programmeand Course outcome

(Ecology, Environmental Biology: Toxicology, Microbiology and Medical Zoology)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding	✓							
PO-2	Critical Thinking		✓			✓			
PO-3	Problem Solving		✓			✓		✓	✓
PO-4	Analytical Reasoning				✓				
PO-5	Academic Knowledge			✓					
PO-6	Research Skill		✓	✓			✓		
PO-7	Business Skill						✓	✓	
PO-8	Human Welfare					✓	✓	✓	✓
PO-9	Ethics Awareness	✓					✓		✓

B.Sc. (Zoology)	DSCCZOO-5	SEMESTER V
COURSE TITLE: Ecology, Environmental Biology: Toxicology, Microbiology and Medical Zoology		
Theory Marks-100	**Practical Marks-50**	
Theory-3/45	**Practical-1/30**	
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type question		

Unit I 18 hrs	(Ecology) • Aims and scopes of ecology • Major ecosystems of the world-Brief introduction • Population-Characteristics and regulation of densities • Communities and ecosystem • Bio-geo chemical cycles • Air &water Pollution • Ecological Succession
Unit II 18hrs	(Environmental Biology) • Laws of limiting factor • Food chain in fresh water ecosystem • Energy flow in ecosystem –Trophic levels • Conservation of natural resources • Environmental impact assessment
Unit III 18 hrs	(Toxicology) • Definition and classification of Toxicants • Basic Concept of toxicology • Principle of systematic toxicology • Heavy metal Toxicity(Arsenic, Mercury, Lead, Cadmium) • Animal poisons-snake venom, scorpion & bee poisoning • Food poisoning
Unit IV 18hrs	(Microbiology) • General and applied microbiology • Microbiology of domestic water and sewage • Microbiology of milk & milk products • Industrial microbiology: fermentation process, production of penicillin, alcoholic beverages, bioleaching
Unit V 18 hrs	(Medical Zoology) • Brief introduction to pathogenic microorganisms, Ricketssia, Spirochaetes, AIDS and Typhoid • Brief account of life history & pathogenicity of the following pathogens with reference to man: prophylaxis & treatment • Pathogenic protozoan's-Entamoeba, Trypanosome & Plasmodium • Pathogenic helminthes-Schistosoma • Nematode pathogenic parasites of man Vector insects

REFERENCES:

Genetics P.S.Verma and V.K.Agarwal

Mordern Zoology-Dr. H. N. Baijal

Unified Zoology-Dr.V. K. Tiwari

Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta

B.Sc.V SEMESTER

Zoology

Ecology, Environmental Biology: Toxicology, Microbiology and Medical Zoology

Practical

The practical work in general shall be based on syllabus prescribed in theory.

The candidates will be required to show knowledge of the following:

- Estimation of population density, percentage frequency, relative density.
- Analysis of producers and consumers in grassland.
- Detection of gram-negative and gram-positive bacteria.
- Blood group detection(A,B,AB,O)
- R.B.C.andW.B.C.count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat.
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

Scheme of marks distribution Time:3:30 hrs

- Hematological Experiment 08
- Ecological Experiment: Grassland Ecosystem/Population Density/Frequency/relative density 06
- Bacterial staining 05
- Biochemical experiment 06
- Practical based on Instrumentation(Chromatography/pH meter/microscope/centrifuge. 05
- Spotting (5 spots) 10
- Viva 05
- Sessional 05

B.Sc. V SEMESTER

Paper-DSECZOO-3 **DIVERSITY OF CHORDATES**

Course Outcome

CO-1Develop an understanding of the evolution of vertebrates thus integrating structure, function and development.

CO-2 Understand the morphology of vertebrates with their ecology, behaviour and physiological adaptation in diverse habitats.

CO-3 Detailed discussions of major organ systems.

CO-4 Undertake research in any aspect of animal physiology in future.

Relationship of Programmeand Course out Come

(DIVERSITY OF CHORDATES)

		CO-1	CO-2	CO-3	CO-4
PO-1	Knowledge, understanding	✓	✓		
PO-2	Critical Thinking			✓	✓
PO-3	Problem Solving		✓		
PO-4	Analytical Reasoning			✓	
PO-5	Academic Knowledge	✓			
PO-6	Research Skill	✓	✓		✓
PO-7	Business Skill				
PO-8	Human Welfare				
PO-9	Ethics Awareness				

DSEC- Zoology DSECZOO-3SEMESTER-V			
COURSE TITLE:DIVERSITY OF CHORDATES			
Theory Marks-100	**Practical Marks-50**	**Theory Credits-3/45 hrs**	**Practical Credits-1/30hrs**
Question Pattern- (i) Objective Type Question- MCQ, fill up the blanks, True/False,Total-12 Q (ii) Very short answer type-word limit 70-100, total-05 Q (iii) Short answer type-word limit, 200-250, total-05 Q (iv) Long answer type-word limit , 500-600, total-o5 Q			
Unit I 12 hrs	Introduction to Chordates and Protochordates: General characteristics and outline classification of chordates General characteristics of Hemichordata, Urochordata and Cephalochordata; Retrogressive metamorphosis in Urochordata		
Unit II 12hrs	Agnatha and Pisces: General characteristics and classification of cyclostomes up to class, Classification of Pisces up to order, General characteristics of Chondrichthyes and Osteichthyes, Migration, Osmoregulation and Parental care in fishes		
Unit III 12hrs	Amphibia and Reptilia: General characteristics and classification up to order; Parental care in Amphibians ,General characteristics, distribution and affinities of Sphenodon,Difference between poisonous and non-poisonous snakes, Poison apparatus and Biting mechanism in snakes		
Unit IV 12hrs	Aves and mammals : General characteristics and classification of Aves up to order; Archaeopteryx — general characteristics and phylogenetic importance, Flight adaptations and Migration in birds; Flying and perching mechanism in birds, General characters and classification of mammals up to order; Affinities of Prototheria, Echolocation of Bats, Adaptive radiation of mammals with reference to locomotory appendage		

- **DIVERSITY OF CHORDATES**
- Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press. •
- Pough H. Vertebrate life, VIII Edition, Pearson International. •
- Darlington P.J. The Geographical Distribution of Animals, R.E. Krieger Pub Co. •
- Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc. •
- Ganguly, Sinha and Adhikari – Biology of Animals, Vol II • Parker and Hall – Text Book of Zoology, Vol II

B.Sc.V Semester DSEC

DIVERSITY OF CHORDATES

PRACTICALS

- **1. Protochordata**
- *Balanoglossus, Herdmania, Branchiostoma,* Colonial UrochordataSections of
- *Balanoglossus*through proboscis and branchiogenital regions, Sections of
- *Amphioxus* through pharyngeal, intestinal and caudal regions. Permanent slide of
- *Herdmania*spicules
- **2. Agnatha**
- *Petromyzon, Myxine*
- **3. Fishes**
- *Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes,*
- *Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/ Diodon,*
- *Anabas*, Flat fish
- **4. Amphibia**
- *Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra*
- **5. Reptilia**
- *Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon,*
- *Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus*
- Key for Identification of poisonous and non-poisonous snakes
- **6. Aves**
- Study of six common birds from different orders. Types of beaks and claws
- **7. Mammalia**
- *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus, Loris, Herpestes,*
- *Erinaceous.*
- Mount of weberianossicles of *Mystus,* pecten from Fowl head
- Dissection of Fowl head (Dissections and mounts subject to permission)
- Power point presentation on study of any two animals from two different classesby students (may be included if dissections not given permission)

UNDERGRADUATE SEMESTER-V

GECZOO-3 Biodiversity conservation and sustainable development

Course Outcome-

CO-1 Develop understanding for the environment which is largely degraded in the current scenario**.**

CO-2 Understand the importance of biodiversity and the consequences of biodiversity loss.

CO-3 Follow the concept of green technology and the eco-friendly practices and otherprospects of environment protection.

CO-4 Understand and practice appropriate legal/regulatory and ethical issues in the context of the work environment.

CO-5 Design research projects.

Mapping of Programme and Course outcome

(Biodiversity conservation and sustainable development)

		CO-1	CO-2	CO-3	CO-4	CO-5
PO-1	Knowledge, understanding	✓			✓	
PO-2	Critical Thinking	✓	✓			
PO-3	Problem Solving	✓	✓	✓		
PO-4	Analytical Reasoning					
PO-5	Academic Knowledge		✓		✓	
PO-6	Research Skill	✓	✓	✓		✓
PO-7	Business Skill					
PO-8	Human Welfare	✓	✓	✓		✓
PO-9	Ethics Awareness	✓				

B.Sc. (Zoology) GEC ZOO-3 SEMESTER V		
COURSE TITLE:-Biodiversity conservation and sustainable development		
Theory Marks-100		**Practical Marks-50**
Credit Theory-3/45		**Practical-1/30**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions		
Unit I 18 hrs	Anthropogenic impact on environment- Man as an animal species in the ecosystem. Population explosion. Carrying capacity, exploitation of resources due to urbanization, industrialization and agricultural practices, Pollution of air, water, soil and noise, radioactive pollution. Deforestation-Threats to biodiversity Extinction of species.	
Unit II 18hrs	Depletion and contamination of resources- Natural resources-Land resources, Air and water resources, Conventional fuel, wood, fossil fuel, Non conventional or alternate source of energy. Sun, Wind, Bio-energy, Nuclear etc.	
Unit III 18 hrs	Bio- diversity and resource conservation programmes- Management of wastes and disposal, Concepts of three Rs: reduce,reuse and recycle. Biodiversity conservation-In-situ eg.Sanchuaries, National parks, biosphere Reserves, Word heritage sites, Exsitueg-Botanical gardens, Gene banks, cryopreservation etc, Rain water harvesting, ground water recharge.	
Unit IV 18hrs	Sustainable development and green technology- Sustainable development, biosafety of GMOs and LMOs, Environmental movements, Role of Government, NGO's, Ecological footprint, International treaties and conventions, IPCC-Environmental law and acts, National Environment Policy.	

REFERENCES:

- Genetics P.S.Verma and V.K.Agarwal
- Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari

B.Sc. V Semester

DSEC- Biodiversity conservation and sustainable development

Practical

1. Estimation of population density, percentage frequency, relative density.

2.Analysis of producers and consumers in grassland.

3.Detection of gram-negative and gram-positive bacteria

4.Monitoring of dust load at different sites.

5.Rapid soil test for pH, alkalinity etc

6.Rapid water quality test for temperature, pH, nitrate

7. Visit to environmental analysis lab.

8.Field work for resource conservation and environmental protection

9. Project Report on a visit to a Sewage treatment plant

10.Group discussion or Seminar presentation on the syllabus related topics

11.Fresh water Management-Pollution, reasons, severity of problem, impact for the present and the future, its impact and possible solutions

12.Atmosphere Management-Pollution, global warming/climate change, stratospheric ozone depletion its impact and possible solutions

13. Identification and study of common insects, fish, birds, mammals of a particular area.

Course out Come-B.Sc.VI Semester-DSCCZOO-6

Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques

CO-1.Students will learn the fundamental genetics like linkage and linkage map.

CO-2.Understanding the chromosome anomalies and associated diseases.

CO-3.Knowledge about gene and chromosomal mutation.

CO-4.To studies the mechanism of active transport and its role in mitochondria and Endoplasmic reticulum.

CO-5. Understanding of general idea about pH and buffer .

CO-6.They will also understand the nature, mechanism of protein and their metabolism.

CO-7.To understands the scope and importance of tissue culture, hybridoma, transgenic animals and gene library.

CO -8.Students gain knowledge about various tools & techniques used in biological systems and gives them insight about their use in research.

.

Mapping of Programme and Course outcome

(Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques)

		CO-1	CO-2	CO-3	CO-4	CO-5	CO-6	CO-7	CO-8
PO-1	Knowledge, understanding	✓						✓	
PO-2	Critical Thinking			✓					
PO-3	Problem Solving					✓			
PO-4	Analytical Reasoning		✓		✓				
PO-5	Academic Knowledge		✓				✓		
PO-6	Research Skill					✓			✓
PO-7	Business Skill								
PO-8	Human Welfare					✓			
PO-9	Ethics Awareness								

B.Sc. (Zoology) DSCC ZOO-6 SEMESTER VI	
COURSE TITLE: Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques	
Theory Marks-100	**Practical Marks-50**
Credit –Theory-3/45	**Practical-1/30**
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type questions	
Unit I 18 hrs	(Genetics) • Linkage & Linkage maps, Sex Determination and Sex linkage • Gene interaction-Incomplete dominance & Codominance, Supplementary gene, Complementary gene, Epistasis, Lethal gene, Pleiotropic gene and multiple alleles. • Mutation: Gene and chromosomal mutation • Human genetics: Chromosomal alteration: Down, Edward, Patau, Turner and Klinefelter Syndrome Single gene disorders: Alkaptonuria, Phenylketonuria, Sickle cell anemia, albinism and colour blindness.
Unit II 18hrs	(Cell Physiology) • General idea about pH & buffer • Transport across membrane: Diffusion and Osmosis • Active transport in mitochondria & endoplasmic reticulum • Enzymes-classification and Action
Unit III 18 hrs	(Biochemistry) • Amino acids & peptides-Basic structure & biological function • Carbohydrates & its metabolism-Glycogenesis; Gluconeogenesis; Glycolysis; Glycogenolysis; Cori-cycle • Lipid metabolism-Oxidation of glycerol; Oxidation of fatty acids • Protein Catabolism-Deamination, transamination, transmethylation
Unit IV 18hrs	(Biotechnology) • Application of Biotechnology • Recombinant DNA & Gene cloning • Cloned genes & other tools of biotechnology (Tissue culture, Hybridoma, Trasgenic Animals and Gene library)
Unit V 18 hrs	(Biotechnique) 1.Principle & techniques about the following (i) pH meter (ii) Colorimeter (iii) Microscopy-Light microscopes: Compound, Phase contrast & Electron microscopes (iv) Centrifuge (v) Separation of biomolecules by chromatography & electrophoresis

REFERENCES:

- Genetics P.S.Verma and V.K.Agarwal
- Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta
- R.P. Unified Zoology Dr. S.M. Saxena

B.Sc.VI SEMESTER

Zoology

Genetics, Cell Physiology, Biochemistry, Biotechnology and Biotechniques

Practical

The practical work in general shall be based on syllabus prescribed in theory.

The candidates will be required to show knowledge of the following:

- Measurement of blood pressure using sphygmomanometer.
- Blood group detection(A,B,AB,O)
- R.B.C.andW.B.C.count
- Blood coagulation time
- Preparation of hematin crystals from blood of rat.
- Observation of Drosophila, wild and mutant.
- Chromatography-Paper or gel.
- Colorimetric estimation of Protein.
- Mitosis in onion root tip.
- Biochemical detection of Carbohydrate, Protein and Lipid.
- Study of permanent slides of parasites, based on theory paper.
- Working principles of pH meter, colorimeter, centrifuge and microscope.

Scheme of marks distribution Time:3:30 hrs

- Hematological Experiment 08

- Bacterial staining 06
- Biochemical experiment 06
- Practical based on Instrumentation(Chromatography/pH meter/microscope/centrifuge. 10
- Spotting (5 spots) 10
- Viva 05
- Sessional 05

B.Sc. VI SEMESHTER

DSECZOO-4 FUNDAMENTALS OF BIOCHEMISTRY

CO-1 Understand about the importance and scope of biochemistry.

CO-2 Understand the concept of enzyme,its mechanism of action and regulation.

CO-3 Learn the preparation of models of peptides and nucleotides.

CO-4 Learn biochemical test for amino acids, carbohydrates, proteins and nucleic acids.

CO-5 Learn measurement of enzyme activity and its kinetics.

Mapping of Programme and Course outcome

(FUNDAMENTALS OF BIOCHEMISTRY)

		CO-1	CO-2	CO-3	CO-4	CO-5
PO-1	Knowledge, understanding	✓				
PO-2	Critical Thinking		✓	✓		
PO-3	Problem Solving					✓
PO-4	Analytical Reasoning		✓		✓	
PO-5	Academic Knowledge		✓			
PO-6	Research Skill					✓
PO-7	Business Skill					
PO-8	Human Welfare					✓
PO-9	Ethics Awareness					

DSEC-Zoology	DSECZOO-4 SEMESTER- VI		
COURSE TITLE:FUNDAMENTALS OF BIOCHEMISTRY			
Theory Marks-100	**Practical Marks-50**	**Theory Credits-3/45 hrs**	**Practical Credits-1/30 hrs**
Question Pattern- (i) Objective Type Question- MCQ, fill up the blanks, True/False,Total-12 Q (ii) Veryshort answer type-word limit 70-100, total-05 Q (iii) Short answer type-word limit, 200-250, total-05 Q (iv) Long answer type-word limit , 500-600, total-o5 Q			
Unit I 12hrs	Carbohydrates**:** Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates		
Unit II 12hrs	Lipids:Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Glycolipids, Steroids		
Unit III 12 hrs	Protiens: Amino acids- Structure, Classification and General properties of α-amino acids; Physiological importance of essential and non-essential α-amino acids. Proteins- Bonds stabilizing protein structure; Levels of organization in proteins; Denaturation; Introduction to simple and conjugate proteins		
Unit IV 12hrs	Nucleic acids:Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids Base pairing, Denaturation and Renaturation of DNA:Types of DNA and RNA, Complementarity of DNA		
Unit V 12 hrs	Enzymes :Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action,-Enzyme kinetics, Factors affectingrate of enzyme-catalyzed reactions, Enzyme inhibition- Regulation of enzyme action		

Cox, M.M and Nelson, D.L. (2008).Lehninger's Principles of Biochemistry, V Edition, W.H. Freeman and Co., New York. •

Berg, J.M., Tymoczko, J.L. and Stryer, L. (2007). Biochemistry, VI Edition, W.H. Freeman and Co., New York. •

Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009).

Harper's Illustrated Biochemistry, XXVIII Edition, International Edition, The McGraw- Hill Companies Inc. •

Hames, B.D. and Hooper, N.M. (2000).Instant Notes in Biochemistry, II Edition, BIOS Scientific Publishers Ltd., U.K. •

Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M. and Losick, R. (2008).Molecular Biology of the Gene, VI Edition, Cold Spring Harbor Lab. Press, Pearson Pub.

PRACTICALS-DSECZOO-4

FUNDAMENTALS OF BIOCHEMISTRY

1. Qualitative tests for carbohydrates, proteins and lipids

2. Qualitative estimation of Urea & Uric acid

3. Paper chromatography of amino acids.

4. Quantitative estimation of water soluble proteins following Lowry Method

5.Preparation of models of amino acids and dipeptides

6.Estimation of calcium in egg shell

7.Estimation of albumen and yolk quantity in egg

Semester-VI: GECZOO-4

Human Health and diseases

CO-After completing this course the learners will be able to

CO-1-Develop the implement public health interventions

CO-2-Increase their skills,attitudes and knowledge towards causes of diseases.

CO-3-Apply knowledge of the principles of disease,injury prevention and control.

CO-4 Increase their skills towards knowledge of community health improvement.

CO-5 Prepare expert educational outreach lectures and presentation.

Mapping of Programme and Course outcome

(**Human Health and diseases**)

		CO-1	CO-2	CO-3	CO-4	CO-5
PO-1	Knowledge, understanding	✓			✓	
PO-2	Critical Thinking					✓
PO-3	Problem Solving		✓			
PO-4	Analytical Reasoning	✓			✓	
PO-5	Academic Knowledge					
PO-6	Research Skill	✓	✓	✓		✓
PO-7	Business Skill					
PO-8	Human Welfare	✓		✓		✓
PO-9	Ethics Awareness					

B.Sc. (Zoology) GECC ZOO-4 SEMESTER V		
COURSE TITLE: Human Health and diseases		
Theory Marks-100	**Practical Marks-50**	
Credit Theory-3/45	**Practical-1/30**	
Scheme of Marks: **(i)**Objective type questions(ii) Very Short Question (iii)Short Questions (iv) long type question		
Unit I 18 hrs	Non communicable disease-like coronary heart disease,hypertention, diabetes mellitus Brief introduction of pathogenic microorganism Ricketesia Spirochaets Introduction to Parasitic protozota and human disease	
Unit II 18hrs	AIDS- Historical back ground of AIDS Transmission of HIV Pathology of HIV infection Prevention from HIV infection AIDS control programme	
Unit III 18 hrs	Brief account of life history and pathogenicity of the following pathogens with references to man prophylaxis and treatment- Pathogenic protozoans Entamoeba Trypanosome Plasmodium	
Unit IV 18hrs	Pathogenic helminthes-Schistosoma Nematode pathogeneic parasites of man An elementary ideaof cancer	

REFERENCES:

- Genetics P.S.Verma and V.K.Agarwal
- Mordern Zoology-Dr. H. N. Baijal
- Unified Zoology-Dr.V. K. Tiwari
- Navboth Unified Zoology-Dr.PreetiKhare and Dr.R.T.Mehta

Practical

Human Health and diseases

Semester-VI

1.General discussion, distinguishing characters and classification of selected

Protozoa

Helminth

Nematods

2.Study the permanent slide and specimens of parasitic protozoans and helminthes.

3.State the diseases transmitted by above insect vectors.

4.Project report submission on any one protozoan diseases.

5.Model of AIDS control programme

6. Model of cancer control programme