

Zoology-B.Sc. Semester-1 Syllabus 2020-21

Paper	Unit	Syllabus	Faculty
101	1	Mammalian Anatomy, Histology & Physiology of the Urinary System	Dr. Dimple Damore
		1. Two Kidneys, two ureters, one urinary bladder, and one urethra. 2. Anatomy and Histology of the kidneys. ➤ Overview of kidney functions ➤ External Anatomy of the Kidneys ➤ Internal Anatomy of the Kidneys. ➤ Blood and Nerve Supply of the Kidneys 3 The Nephron ➤ Parts of a Nephron ➤ Histology of the Nephron and Collecting Duct 4 Renal Physiology ➤ Glomerular Filtrations ➤ The Filtration Membrane ➤ Net Filtration Pressure ➤ Tubular Reabsorption ➤ Tubular Secretion ➤ Hormonal Regulation of Tubular Reabsorption and Tubular Secretion (Name of the Hormones and their function only) ➤ Counter Current Mechanism ➤ Micturition	
	2	(A) Continuation of Excretory system (of Unit 1)	Prof. GautamPrajapati
		1. Characteristics of Normal Urine 2. Summary of Abnormal Constituents of Urine 3. Clinical Connection: (Brief introduction) ➤ Nephroptosis (Floating Kidney) ➤ Kidney Transplant ➤ Proteinurea ➤ Ketonurea ➤ Glucosuria Stone in Kidney ➤ Renal failure ➤ Cystoscopy ➤ Dialysis	
		(B) Non Chordate Animal Diversity :	
		<i>Fasciola hepatica</i> (Liver fluke) -Type study ➤ Systematic position ➤ Habits and habitat ➤ External features ➤ Body wall ➤ Digestive system ➤ Respiration ➤ Excretory system ➤ Nervous system ➤ Reproductive system	

		<ul style="list-style-type: none"> ➤ Life cycle & Development ➤ Pathogenesis ➤ Parasitic Adaptations 	
	3	Genetics and Animal Biotechnology	Dr. KiranPrajapati
		<p>A. Genetics:</p> <ol style="list-style-type: none"> 1. Introduction to Gene 2. Introduction to Mendelian laws of Heredity. 3. Incomplete dominance (e.g. Mirabilis jalapa) 4. Co-dominance (e.g. Roan cattle) 5. Multiple alleles <p>e.g.</p> <ul style="list-style-type: none"> <input type="checkbox"/> ABO blood groups in human <input type="checkbox"/> Rh Factor Erythroblastosis foetalis <ol style="list-style-type: none"> 6. Polygenic inheritance (e.g. skin colour in humans) 7. Lethal genes (e.g. Yellow coat colour in mice, Thalesmia) 	
		<p>(B) Animal Biotechnology:</p> <ol style="list-style-type: none"> 1. Brief Introduction 2. Lab design and layout of small tissue culture laboratory 3. Some Lab facilities needed for setting up a tissue culture laboratory – <ul style="list-style-type: none"> ➤ Cultural vessels (Choice of culture vessels, Multiwell plates, Petri dishes, Culture flasks) ➤ Laboratory Equipments (Autoclave, CO₂ Incubator, Centrifuge, Laminar Airflow) 	
	4	<p>Economic Zoology</p> <ol style="list-style-type: none"> 1 Vermiculture and Vermicomposting Introduction, Definition, Scope and Importance of Vermitechnology, Suitable breeds, Construction of vermicompost pits (Outdoor & Indoor spaces), Properties and benefits of vermi-compost. 2 Dairy Farming - Introduction, Necessity & Scope of dairy Farming, Definition and importance of Domestication & Husbandry 3 Pearl Culture-Introduction, Formation & uses of Pearl, Pearl oyster farming (brief study) 	Prof. GautamPrajapati

Zoology-B.Sc. Semester-3 Syllabus 2020-21

Paper	Unit	Syllabus	Faculty
201	1	<p>ANIMAL DIVERSITY (Nonchordates) – Systematics : Salient features and Classification of Invertebrates, starting from Kingdom upto Classes, giving reasons & suitable examples (as per practical syllabus) :</p> <p>Phylum :</p> <ol style="list-style-type: none"> 1. Protozoa 2. Porifera 3. Coelenterata 4. Platyhelminthes 5. Nematelminthes 6. Annelida 	Prof. GautamPrajapati
	2	<p>ANIMAL DIVERSITY (Nonchordates) – Type study & General Topics : General structure & morphology with functional anatomy of the following animal :</p> <p>A Annelida : Type – Earthworm (<i>Pheritimaposthuma</i>) - Classification, Habits & Habitat, Ext. characters, Body wall, Digestive system, Circulatory system, Excretory system, Nervous system, and Reproductive systems & reproduction</p> <p>B General topics :</p> <ol style="list-style-type: none"> 1. Coelenterata: Coral reefs (Introduction, Formation, Types, Importance) 2. Types of Symmetry (Radial, Biradial, Bilateral, Spherical) 3. Types and significance of Coelom. 4. Types and significance of Metamerism. 	Prof. GautamPrajapati
	3	<p>PARASITOLOGY :</p> <ol style="list-style-type: none"> 1. General Introduction: Parasite, Host, Host-parasite Relationships 2. Types of Parasites: Endoparasites (Obligate, Facultative), Exoparasite 3. Types of Hosts: Definitive, Intermediate, Reservoir 4. Morphology, Life cycle, Pathogenesis, Laboratory Diagnosis and Prophylaxis of the following human parasites: <p>Protozoan Parasites: <i>Entamoebahistolytica</i>, <i>Leishmaniadonovani</i></p> <p>Helminthes Parasites: <i>Taeniasolium</i>, <i>Wuchereriabancrofti</i></p>	Dr. KiranPrajapati
	4	<p>GENETICS & ANIMAL BIOTECHNOLOGY :</p> <p>Genetics :</p> <ol style="list-style-type: none"> 1. Pleotropism 	Dr. KiranPrajapati

		<p>2. Duplicate genes (15:1 ratio, e.g. Fruit shape in Shepherel's purse)</p> <p>3. Multiple genes (e.g. Biochem. pathway of Tryptophan in <i>E. coli</i>)</p> <p>4. Mutations :</p> <ul style="list-style-type: none"> - Definition - Mutable & Mutator genes - Reverse mutation - Paramutations - Frame-shift mutations and their types - Mutagens (Radiation & Chemical agents) <p>Biotechnology : Equipments for animal cell culture laboratory, in brief :</p> <ol style="list-style-type: none"> 1. Water bath. 2. Magnetic stirrer 3. Variable volume micropipettes 4. Cryostorage containers 5. Inverted microscope. 	
202	1	<p>ANIMAL DIVERSITY (Chordates) – Systematics : Salient features & Classification, starting from Kingdom upto Orders, with reasons & suitable examples (as per practical syllabus) of Protochordata, Cyclostomata, Pisces & Amphibia.</p>	Dr. Dimple Damore
	2	<p>ANIMAL DIVERSITY (Chordates) – Type Study & General Topics : A. General structure & morphology with functional anatomy of the following animal : Chondrichthyes: Type – Shark – (<i>Scoliodon sorrakowah</i>) : Ext. characters, Digestive system, Heart, Arterial system, Venous system, Respiratory system, Urinogenital systems, Nervous system (Brain & Cranial nerves), Sense organs (Membranous labyrinth & Ampulla of Lorenzini). B. General topics : 1. Comparison of chordates with non-chordates. 2. Affinities of Cephalochordata. 3. Neoteny (Types and affecting factors) 4. Identification of venomous and non-venomous snakes of India - Venomous : Russel's viper, Krait, Cobra, King cobra, Marine snake. - Non-venomous : Boa, Pythons, Rat snake. 5. Poison apparatus and biting mechanism of Snake</p>	Dr. Kiran Prajapati
	3	PHYSIOLOGY AND HISTOLOGY	Dr. Dimple Damore

		<p>Physiology of Body Fluids: 1) Introduction, Significance, Compartments, Compositions 2) Dehydration, Water Intoxication (Overhydration) 3) Composition of Cerebrospinal fluid (CSF) 4) Composition of Milk</p> <p>Human Histology Histology of Tongue, Stomach, Small intestine, Liver, Pancreas, Lung, Bone and Cartilage</p>	
	4	<p><i>MAMMALIAN PHYSIOLOGY AND ENDOCRINOLOGY</i> A Digestion and Absorption of following dietary components in mammals: Carbohydrates, Proteins, Lipids, Nucleic acids B Mammalian Endocrinology: Brief Structure, Hormones, Functions & Disorders of Pituitary, Thyroid, Parathyroid, Pancreas, Adrenal, Ovary and Testis</p>	Dr. Dimple Damore

Zoology-B.Sc. Semester-5 Syllabus 2020-21

Paper	Unit	Syllabus	Faculty
301		ECOLOGY, ANIMAL DIVERSITY (Nonchordates))	
	1	<p>ECOLOGY:</p> <p>A. Biotic Community:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Concept of community <input type="checkbox"/> Community stratification interrestrial habitat <input type="checkbox"/> Community periodicity <p>B. Ecological Succession:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Kinds of Succession <input type="checkbox"/> Process of succession <input type="checkbox"/> Patterns of succession (Hydrosere, Xerosere) <input type="checkbox"/> Significance of Ecological Succession. 	Dr. KiranPrajapati
	2	<p>ANIMAL DIVERSITY (Nonchordate)</p> <p>Type Study & General Topics:</p> <p>A. General structure & morphology with functional anatomy of the following animal:</p> <p>Arthropoda: Type - Scorpion (Palamnaeus) - Classification, Habit & Habitat, Ext. characters, Digestive system, Book-lungs, Circulation system, Excretory organs, Nervous system, Sense organs and Reproductive systems.</p>	Prof. GautamPrajapati
		<p>B. General topics:</p> <p>Porifera : Skeleton and Canal systems.</p> <p>Coelenterata : Polymorphism.</p> <p>Annelida : Ecology of polychaeta, Nephridia&Coelomoducts.</p>	
	3	<p>ANIMAL DIVERSITY (Nonchordate)</p> <p>Type Study & General Topics:</p> <p>A. General structure & morphology with functional anatomy of the following animal:</p> <p>Mollusca : Type - Cuttlefish (Sepia officinalis) - Classification, Habit & Habitat, External Characters, Digestive System, Respiratory system, Circulation system, Excretory system, Nervous system, Sense organs and Reproductive systems.</p> <p>B. General topics:</p> <p>Arthropoda : Crustacean larvae and Excretory organs.</p> <p>Mollusca : Shell, Foot and Torsion - Detorsion.</p>	Dr. Dimple Damore
	4	<p>ANIMAL DIVERSITY (Nonchordate)</p> <p>Type Study & General Topics:</p> <p>A. General structure & morphology with functional anatomy of the</p>	Dr. KiranPrajapati

		<p>following animal: Echinodermata : Type- Starfish (Asterias) - Classification, Habit & Habitat, External Characters, Body wall, Digestive system, Water vascular system, Reproductive system. B. General topics: Echinodermata : Larval forms. Minor phyla : General characters of Phoronida, Brachiopoda and Echiuroidea.</p>	
302		ANIMAL DIVERSITY (Chordates)	
	1	<p>ANIMAL DIVERSITY (Chordates) - Type Study : General structure & morphology with functional anatomy of the following animal : Osteichthyes : Type - Labeo (Labeorohita) - Classification, Habit & Habitat, External characters, Digestive System, Respiratory system, Heart, Arterial & Venous systems, Brain and Urinogenital system.</p>	Prof. GautamPrajapati
	2	<p>ANIMAL DIVERSITY (Chordates) - Type study : General structure & morphology with functional anatomy of the following animal : Aves : Type - Pigeon (Columba livia) - Classification, Habit & Habitat, External characters, Digestive system, Respiratory system, Circulatory systems, Brain, Urinogenital system, Types of feathers.</p>	Prof. GautamPrajapati
	3	<p>ANIMAL DIVERSITY (Chordates) - General topics: Pisces : Differences between Chondrichthyes&Osteichthyes, Swim bladders, Accessory respiratory organs, Parental care and Migration. Dipnoi : Habits, Habitat and peculiarities of Protopterus, Lepidosiren and Neoceratodus. Amphibia : Parental care.</p>	Prof. GautamPrajapati
	4	<p>ANIMAL DIVERSITY (Chordates) - General topics : Reptilia : Temporal fossae, Dinosaurs (Brontosaurus, Triceratops, Tyranosaurus, Dimetrodon, Stegosaurus, Pteranodon, Ichthyosaurus,</p>	Prof. GautamPrajapati

		Iguanodon). Aves : Birds are glorified reptiles, Migration. Mammalia : Adaptations of aquatic mammals, Dentition (dental formulae of Human, Cow, Horse, Rat, Elephant, Dog, Cat).	
303		ANIMAL BIOCHEMISTRY	
	1	<p>CARBOHYDRATES : Introduction, definition and classification of Carbohydrates. Asymmetry, Isomers, Optical isomerism and Mutarotation. Formulation of Monosaccharides (Fischer and Haworth formula) Monosaccharides : <ul style="list-style-type: none"> ■ Definition, General formula. ■ Classification upto Hexoses (with structures of suitable examples). ■ Chemical properties : a) Reaction involving glycosidic -OH group. b) Reactions involving both, -OH as-well-as -CHO/-C=O groups : <input type="checkbox"/> Oxidation : Sugar acids, Oxidation with metal hydroxides. <input type="checkbox"/> Reduction : Reduction with sodium amalgam, Reduction with strong mineral acids, Reduction with dilute alkalis. <input type="checkbox"/> Osazone test: Reaction with phenyl hydrazine. </p>	Dr. Dimple Damore
	2	<p>CARBOHYDRATES : Disaccharides : <ul style="list-style-type: none"> ■ Definition. ■ Flow-chart of classification based upon the type of glycosidic linkages. ■ Occurrence, formation, structure, properties and hydrolysis of Sucrose, Lactose, Maltose and Cellobiose. Polysaccharides : <ul style="list-style-type: none"> ■ Definition. ■ Flow-chart of classification, based upon structures and functions. ■ Occurrence, formation, structure, properties and hydrolysis of : a) Homopolysaccharides - Starch, Glycogen, Inulin, Cellulose and Chitin. b) Heteropolysaccharides - Mucopolysaccharides : Hyaluronic </p>	Dr. Dimple Damore

		acid, Chondroitin Sulphates, Heparin. ■ Biological significance of Carbohydrates.	
	3	<p>PROTEINS : Introduction and Definitions. Amino Acids : General Structure ■ Classification (based upon the composition of the side chain/R group) (based upon the number of amino and carboxylic groups) ■ Nonprotein amino acids Peptides : ■ Formation of Peptide Bond, N- and C- terminals ■ Naming of peptide chain Protein Structure: Chemical Bonds: a) Primary - Peptide bond b) Secondary - Disulfide, Hydrogen, Hydrophobic and Ionic. Protein Configuration: a) Primary structure (Amino acid sequence) b) Secondary structure (α-helix formation, β - Pleated Sheet) c) Tertiary structure (Folding of the peptide chain) d) Quaternary structure (Protein-protein interactions)</p>	Dr. Dimple Damore
	4	<p>PROTEINS: Classification of proteins: a) Based upon shape - Globular and Fibrillar. b) Based upon composition & solubility - Simple, Conjugated and Derived. Properties : Physical - Colour & Taste, Shape & Size, Molecular weight, Colloidal nature, Denaturation, Amphoteric nature and Solubility. Chemical - a) Hydrolysis b) Reactions involving -COOH group : - Reaction with alkalies (Salt formation) c) Reactions involving -NH₂ group : - Reaction with mineral acids (Salt formation) - Reaction with formaldehyde d) Reaction involving R group (Biuret test) ■ Biological significance of proteins</p>	Dr. Dimple Damore
304		CYTOLOGY AND CANCER BIOLOGY	
	1	<p>CYTOLOGY (Tools and Techniques) : 1. Electron Microscopes (TEM, SEM) 2. Fluorescence microscope</p>	Dr. KiranPrajapati

		<p>3. Confocal Microscope</p> <p>4. Paper chromatography (Ascending and Descending)</p> <p>5. PAGE - Slab gel electrophoresis</p>	
	2	<p>CYTOLOGY :</p> <p>1. Karyotyping and Karyotype</p> <p>2. Ultrastructure and functions of Plasma membrane:</p> <p>a) Brief introduction of chemical composition.</p> <p>b) Ultrastructure - 'Fluid Mosaic model' only.</p> <p>c) Specialized structures of plasma membrane :</p> <ul style="list-style-type: none"> - Specialization due to outpushings/evaginations. - Specialization due to inpushings/invaginations. - Specializations due to contact : <p>Desmosomes, Hemi-desmosomes, Septate desmosomes, Tight junctions, Gap junctions, Terminal bars and Interdigitation.</p> <p>d) Functions of plasma membrane :</p> <p>Permeability, Osmosis, Diffusion, Facilitated transport, Active transport, Endocytosis, Exocytosis.</p>	Dr. KiranPrajapati
	3	<p>CYTOLOGY :</p> <p>1. Classification of chromosomes based upon :</p> <ul style="list-style-type: none"> - the location of their centromeres - their functions (i.e. somatic & sex chromosomes) <p>2. Ultrastructure & general functions of :</p> <p>A) Metaphase Chromosome - (Chromatin, Chromatids, Nucleosome, Centromere, Kinetochore, Telomere, Secondary constriction, Euchromatin, Heterochromatin)</p> <p>B) Giant chromosomes - Polytene chromosome and Lampbrush chromosome.</p> <p>3. Cell differentiation</p> <ul style="list-style-type: none"> - Hammerling' s experiment on Acetabularia, - Bantook' s experiment on zygote of Mayetiola destructor, - Spemann' s experiment on eggs of newt and Somatic hybridization <p>4. Ultrastructure & general functions of Cilia/Flagella.</p> <p>5. Ultrastructure & general functions of Centrioles/Basal bodies.</p> <p>6. Cell cycle</p>	Dr. KiranPrajapati
	4	<p>CANCER BIOLOGY:</p> <p>1. What is cancer?</p> <p>2. Types of cancer.</p> <p>3. Characteristics of cancer cells.</p> <p>4. Possible causes of carcinogenesis :</p> <p>a) Mutation theory</p>	Dr. KiranPrajapati

		b) Metabolic theory. c) Hormonal disturbance theory. e) Irritation theory. 5. Chemical carcinogens. 6. Mechanism by which carcinogens induce cancer. 7. Oncogenic viruses. 8. Retroviruses.	
305		SUBJECT ELECTIVE COURSE (SEC)	
		POLLUTION, CYTOLOGICAL/ HISTOTECHNOLOGY TECHNIQUES	
	1	POLLUTION : Various pollutants & their effects on living organisms ■ Air Pollutants : a) Gaseous - CO, SO ₂ , NO ₂ b) Particulate - Dust, Lead, Aerosol. Effects of air pollution on living organisms Effects of ozone depletion on human health ■ Water Pollutants : Biological organisms (bacteria & protozoan), acids, alkalies, dyes, hydrogen sulphide, pesticides, fertilizers, toxic metals (Fluoride, Mercury, Arsenic), faeces, domestic wastes, and suspended matters. Effects of water pollution on living organisms ■ Noise pollution and its effects on physical health	Prof. GautamPrajapati
	2	POLLUTION : ■ Soil/Land Pollutants and their effects: a) Industrial solid wastes - Toxic metals like Cu, Pb, Ni. b) Urban wastes - Garbage, paper, glasses, metal cans, plastics, faeces. c) Agricultural sources - Wastes from cattle sheds & poultry farms, fertilizers, pesticides and fumigants. ■ Radioactive Pollutants and their effects. ■ Biological Treatment of Effluents: 1. Trickling filters system 2. Stabilization Ponds. 3. Aerated lagoons. ■ Role of an individual in the prevention of pollution.	Prof. GautamPrajapati
	3	CYTOLOGICAL TECHNIQUES : ■ Introduction. ■ Types of slide preparations - W.M., smears, squashes, sections. ■ Fixation & Fixatives : a) Purpose of fixation.	Dr. Dimple Damore

		<p>b) Some commonly used chemical fixatives : Acetic acid, Potassium dichromate, Ethanol, Formaldehyde, Osmium tetroxide, Bouin's fixative, Carnoy's fixative.</p> <p>c) Some specialized chemical fixatives : Dichromate fixatives - Zenker's fluid, Helly's fluid, Heidanhain's fluid. Chromic acid fixatives - Lo Bianco's fluid. Mercuric fixatives - Gilson's fluid, Lebrun's fluid.</p> <p>d) Removal of fixatives - Lugol's solution, Lenoir's fluid, Lithium carbonate.</p>	
	4	<p>HISTOTECHNOLOGY TECHNIQUES:</p> <ul style="list-style-type: none"> ■ Fixation by Freezing : <ul style="list-style-type: none"> a) Freeze-Drying method. b) Freezing-Substitution method. c) Freeze-Etching method. ■ Dehydration. ■ Embedding. ■ Sectioning by Rotatory microtome, Cryotome, Ultramicrotome. ■ Staining & Stains for light microscopy and electron microscopy. <p>Importance of Histotechnology</p>	Dr. Dimple Damore