

Teaching Plan Year 2019

Name of the faculty member: Prof Nayeem Khan

Designation: Associate Professor

Department: Zoology

Subject: Zoology

Semester: 4th

Subject/Title Code: GENETICS AND EVOLUTIONARY BIOLOGY

Unit	Topics Covered	No. of Lectures	Subtopics/Lectures	Pedagogical aid
I	1. Mendalian Genetics, Linkage, Linkage Maps and Crossing over	07	Introduction Laws of Inheritance Linkage (Basic Definition and Crosses, deviation from Dihybrid cross ratio) Crossing Over – definition, mechanism and contribution to genetic variation	
	2. Nature of Heterochromatin	02	Heterochromatin-constitutive and facultative heterochromatin, functional role	
	3. Organisation of Genetic Material in Prokaryotes and Eukaryotes	04	Nucleosome model, Histone proteins, Higher level organisation in eukaryotes (30nm, 700nm chromatin fibres)	
	4. Multiple Alleles, Lethality, Epistasis, Sex linked Inheritance, Extra chromosomal inheritance	07	ABO/MN Blood group as an Example of Multiple alleles, Effect of lethal genes on survival and mendalian ratio (examples) X/Y linked inheritance	

			Hemophilia/Color blindness as examples Extra chromosomal inheritance -Mirabilis jalapa	
II	5. Structural and Numerical Changes in Chromosomes, Gene Mutations	05	Deletion, Inversion, Insertion Fragmentation of chromosomes Aneuploidy, Euploidy Point Mutation (Explained with examples)	
	6. Replication Replication in prokaryotes and eukaryotes	06	Enzymes, semi-conservative nature, Leading and lagging strands, mechanism of replication	
	7. Transcription and translation Transcription and post transcriptional modifications, translation	07	Enzymes, mechanism, Initiation, elongation and termination. Sense and antisense strands Ribosomes, alternative splicing, Capping	
	8. Sex determination Chromosomal mechanisms, Dosage compensation	06	XX-XY, Haploidy-diploidy, WW, ZZ .. Environmental/genic (reference) DNA methylation as mechanism of gene inactivation	
III	9. Introduction to evolutionary Theories Lamarckism, Darwinism, Neo - Darwinism	07	Concept of evolution, Pre-darwinian concepts (special creation) Use – disuse examples Formulation of Darwins theory Natural selection Importance of Mutation, variation, natural selection...in evolution	
	10. Evidences of Evolution	06	Anatomical/Physiological/Embryological/Homologous/Analogous	

	Types of fossils, dating of fossils, phylogeny of horse		Petrified, Molds, Casts, Preserved Trace fossils, Evolutionary changes from eiohipus to modern horse	
	11. Processes of evolutionary change Organic variation, isolating mechanisms; natural selection, industrial mechanism	04	pre- and post-zygotic isolation Variation-sources of genetic variation Industrial Melanism – peppered moth	
	12. Natural selection Directional, stabilising and disruptive selection, artificial selection	05	Definition and explanation with suitable examples Artificial selection – Breeding Methods for quality improvement in agriculture/dairy	
IV	13. Species concept Biological species concept; modes of speciation (Allopatric, sympatric)	04	Characteristics of species , Allopatric, sympatric,	
	14. Macro – evolution Macro-evolution principles (example: darwin’s finches)	04	Darwins finches – species, variation/similarities	
	15. Extinction Mass extinction, causes and role of extinction in evolution	05	Ordovician-silurian, Devonian, Permian-triassic, Triassic-jurassic, Cretaceous-tertiary	
	16. Major extinctions K – t extinction	02	Cretaceous-tertiary (K –t Extinction) – causes, impact	

Teaching Plan Year 2020

Name of the faculty member: Prof Nayeem Khan

Designation: Associate Professor

Department: Zoology

Subject: Zoology

Semester: 5th

Subject /Title Code: Animal Biotechnology

S. no.	Unit	Topics Covered	No. of Lectures	Subtopics/Lectures	Pedagogical aid
1	I	1. Concept and Scope of Biotechnology	03	Introduction Concept Scope and Importance	
		2. Cloning Vectors	05	Concept of Vectors Cloning vectors Plasmid Phagemid Cosmid Vectors Bacteriophage	
		3. Expression Vectors	02	Expression vectors Characteristics	
		4. Restriction Enzymes	04	Concept of Restriction enzymes Types of RE Nomenclature of RE Type II RE in Detail	
		5. Transformation Techniques	03	Concept of Transformation and Methods Calcium Chloride Method Electroporation	
2	II	6. DNA Libraries	05	Concept of DNA libraries Construction of Genomic Libraries Construction of cDNA libraries Screening of DNA libraries by Colony hybridization Screening by plaque hybridization	

		7. Blotting techniques	08	Concept and importance of Blotting Southern Blotting Concept and principle Procedure of SB Application of SB Northern Blotting Concept and principle Procedure of NB and Application of NB Western Blotting Concept and principle Procedure of WB and Application of WB	
		8. DNA Sequencing	02	Concept of Sequencing Sangers Method of Sequencing	
		9. Polymerase Chain Reaction	03	Concept and Mechanism Principle and Procedure Applications of PCR	
		10. DNA Finger Printing	02	Concept, Principle and Procedure Applications	
		11. DNA Micro array	02	Concept and procedure Applications	
3.	III	12. Production of Cloned and transgenic animals	05	Concept of cloning Concept of transgenic animals Formation of transgenic animals by nuclear transplantation Formation of transgenic animals by nuclear transplantation Retroviral method	

				DNA microinjection	
		13. Transgenic Animals	06	Mice Cattle Sheep Goat Birds fish	
		14. Applications of transgenic Animals	02	Common applications of transgenic animals	
		15. Production of pharmaceuticals	02	Targeted Production of Pharmaceutical Proteins Insulin and Growth hormone Drugs or Molecular Pharming	
		16. Production of Donar organs	02	Donar organs Production of Organs for Xenotransplantation	
		17. Knockout mice	02	Concept and uses of Knockout mice Procedure for creating Knockout mice	
4.	IV	18. Preparation of Growth Media	03	Growth media and Types of Growth media Natural Media Synthetic media	
		19. Microbial Culture and management	06	Culture Initiation Preparation and Sterilization of Culture media Sterilization of substrates and glassware Isolation of explants Disaggregation of explants Culture and subculture Prevention of Mangement	

		20. Molecular diagnosis of genetic diseases	03	Genetic disease Methods of molecular diagnosis of genetic diseases	
		21. Recombinant DNA in medicine	02	Recombinant Insulin Human growth hormone	
		22. Gene Therapy	03	Concept of Gene therapy Types of gene therapy Somatic Gene Therapy Germline gene therapy	

Teaching Plan Year 2020

Name of the faculty member: Prof Nayeem Khan Designation: Associate Professor

Department: **Zoology**

Subject: **Zoology**

Semester: **1st**

Subject /Title Code: **Animal Diversity**

S. no.	Unit	Topics Covered	No. of Lectures	Subtopics/Lectures	Pedagogical aid
1	I	1. Protista	05	General characters. Classification up to classes. Locomotion in Protozoa	
		2. Phylum Porifera	03	General characters. Classification up to classes. Canal system in sponges	
		3. Phylum Cnidaria	03	General characters. Classification up to classes. Polymorphism in Hydrozoa	
		4. Phylum Helminths	07	General characters. Classification up to classes. Life history of Taenia solium. General characters and classification of Nematelminths up to classes. Life history of Ascaris lumbricoides. Parasitic adaptations	
2	II	5. Phylum Annelida	04	General characters classification up to classes Metamerism in Annelida	
		6. Phylum Arthropoda	07	General characters Classification up to classes Vision in Insects. Metamorphosis in Insects.	
		7. Phylum Mollusca:	03	General characters. classification up to classes. Torsion in Gastropods.	
		8. Phylum Echinodermata:	04	General characters classification up to classes; Water-vascular system in Asteroidea	
3.	III	9. Protochordates	04	General features Phylogeny of Protochordates.	

		10. Urochordates and Cephalochordates.	06	General characters classification	
		11. Phylum Agnatha	02	General features. Classification	
		12. Phylum Pisces	06	General characters of Pisces Classification of Chondrichthyes and Osteichthyes up to orders. Economic importance of Fishes.	
4.	IV	13. Phylum Amphibia:	04	General characters Classification up to orders; Parental care in Amphibians.	
		14. Phylum Reptiles:	06	General characters Classification up to orders; Poisonous and Non-poisonous snakes, Biting mechanism in snakes	
		15. Phylum Aves	04	General characters Classification up to orders; Flight adaptations in birds	
		16. Phylum: Mammals	02	General characters Classification up to orders; Origin and Adaptive Radiation in Mammals.	

Teaching Plan Year 2020

Name of the faculty member: Prof Nayeem Khan

Designation: Associate Professor

Department: Zoology

Subject: Zoology

Semester: 3rd

Subject/Title Code: Physiology and Biochemistry

Unit	Topics Covered	No. of Lectures	Subtopics/Lectures	Pedagogical aid
I	1. Digestion Physiology of digestion, absorption of carbohydrates, proteins and lipids	07	Organs/Enzymes of digestion, Absorption of Glucose, Amino acids, Emulsification and Absorption of fats - Chylomicrons	
	2. Respiration Pulmonary respiration, Respiratory volumes and capacities, Transport of oxygen and carbon dioxide in blood, types of respiratory pigments, Oxygen Dissociation curve	05	Introduction to respiratory system Partial Pressure, diffusion of O ₂ and CO ₂ Transport in blood – role of RBC/plasma Hemoglobin/Myoglobin/Chlorocruorin/Hemocyanin Oxygen dissociation Curve – effect of pH, CO ₂ (Bohr Effect), Temperature, Acidity	

	3. Excretion Types of nitrogenous wastes, Structure of nephron, Urine formation	05	Ammonotelic. Ureotelic and Uricotelic Renal Corpuscle/PCT/Henl's Loop/DCT Role of nephron in urine formation – counter current mechanism	
	4. Circulatory system Conducting system of heart, Origin and conduction of cardiac impulse	04	Structure of heart/blood vessels/blood SA Node/Av Node/Purkinje fibres	
II	5. Structure of a typical motor neuron, Different types of potentials, Action Potential and its Propagation in different nerve fibres	05	Structure of neuron – Dendrites, axon, neurolemma Role of Sodium/potassium pump Resting/action potential, various ion channels Action potential propagation - saltatory	
	6. Molecular and chemical basis of muscle contraction	06	Structure of muscle fibre, role of calcium-actin-myosin-troponin-tropomyosin Sliding-filament theory	
	7. Physiology of vision	05	Structure of eye –brief idea Reception of light and production and propagation of action potential through optic nerve	
	8. Physiology of hearing	06	Structure of ear – brief idea Mechanism of hearing	

III	9. Hormonal control of gametogenesis	07	<p>Basic concept of signaling through hormones</p> <p>Spermatogenesis/oogenesis –basic description</p> <p>Role of LH/FSH/Estrogen/progesterone/testosterone in gametogenesis</p>	
	10. Hormonal control of menstrual cycle	03	Menstrual cycle – role of hormones/different stages of menstrual cycle	
	11. Hormones of pituitary, thyroid and parathyroid	04	<p>Structure/location –brief idea</p> <p>Various hormones secreted by pituitary/thyroid/parathyroid glands, their importance in regulation, various disorders</p>	
	12. Hormones of pancreas, adrenal	05	<p>Structure/location</p> <p>Hormones – their role in metabolism and associated disorders</p>	
IV	13. Carbohydrate metabolism Glycolysis, Krebs cycle, Pentose phosphate pathway, Gluconeogenesis, Glycogen metabolism	04	Location, enzymes, substrates and Complete sequence of reactions, regulation	
	14. Lipid Metabolism Biosynthesis and Beta oxidation of palmitic acid	04	Lipid synthesis, beta oxidation of saturated and unsaturated lipids	

	15. Protein Metabolism Transamination, Deamination and urea cycle	05	Location, enzymes, substrates and regulation	
	16. Enzymes Introduction and classification of enzymes, Mechanism of action, enzyme Inhibition and regulation	02	Enzymes – characteristics Role of co-enzymes/cofactors Holoenzymes/apoenzymes Michaelis Menton equation Allosteric inhibition	