

COURSE OUTCOMES - ZOOLOGY

FYBSc Zoology Semester I

Course I: **Wonders of Animal world (USZO101)**

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Wonders of Animal World	CO1	To describe uniqueness of mimicry, Bird migration and Brood parasitism.
		CO2	To explain Breeding and Parental and Adaptation of desert animals.
		CO3	To describe Echolocation, pearl formation, Bioluminescence, Regeneration and Coral formation.
Unit 2	Biodiversity and its Conservation	CO1	To explain significance of biodiversity and conservation.
		CO2	To interpret and discuss role & importance of biodiversity in daily life.
		CO3	To evaluate, discuss biodiversity conservation and management at local and international level.
Unit 3	Footsteps to follow	CO1	To summarise the work of scientists /philosophers/ entrepreneurs in biology.
		CO2	To delineate and sketch biographies of Dr. Hargobind Khorana, Dr. Salim Ali
		CO3	To critique and analyse White revolution, Water conservation, Biocon, Gadre fisheries, Anandvan.

FYBSc Zoology Semester I

Course II: Instrumentation and Biotechnology (USZO102)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Laboratory Safety, Units and Measurements	CO1	To recognize hazard symbols and risks in Laboratory
		CO2	To practice safety measures in Laboratory
		CO3	To calculate concentrations e.g., molarity, normality, percentage etc
		CO4	To convert SI system units, e.g., μg to g
		CO5	To evaluate and compare sampling methods
		CO6	To calculate measures of central tendency (mean, median, mode)
Unit 2	Animal Biotechnology	CO1	To describe applications of BT in various fields
		CO2	To draw flowcharts and describe some applications
		CO3	To debate ethical issues in use of GM products
Unit 3	Instrumentation	CO1	To identify instruments used in Biology
		CO2	To draw diagrams for and explain principles of instruments
		CO3	To delineate applications of instruments

Practical based on above two courses USZOP1

	COURSE OUTCOMES
Practical-I	To mount and identify Foraminiferan shells from sand
	To identify and describe examples of animal interactions, breeding, parental care
	To identify and describe adaptations of reptiles
	To identify and differentiate venomous and non-venomous snakes
	To mount and identify fish scales
	To identify types of feathers, beaks and feet in birds
	To identify common birds
Field Report	To choose project of interest
	To observe and record data (Blood group, Fish, Height etc)
	To analyse and represent data
	To write report of the project
Practical -II	To identify and describe hazard symbols
	To calculate mean, median, mode
	To identify transgenic and cloned animals
	To extract fruit juice using enzyme pectinase
	To determine pH using pH meter, pH paper and Red Cabbage indicator
	To learn to use colorimeter and pH meter
	To estimate concentrations using colorimeter
	To learn technique of paper, adsorption and TL-Chromatography
	To resolve and calculate Rf values of amino acids, lipids and pigments by chromatography
	To analyse chromatogram
	To study parts of microscope
To focus slide under low and high power (45X)	

FYBSc Zoology Semester II

Course I: Biodiversity and Population Ecology (USZO201)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Population Ecology	CO1	To define and describe factors affecting population, e.g., density, natality, mortality etc
		CO2	To draw and describe Age structure and survivorship curves
		CO3	To interpret and explain growth curves
		CO4	To discuss mechanisms regulating growth
		CO5	To define and learn significance of life table
		CO6	To describe procedure for census
Unit 2	Ecosystem	CO1	To describe components of ecosystem
		CO2	To explain effect of temperature on biota
		CO3	To draw and explain biogeochemical cycles
		CO4	To explain fresh water ecosystems
		CO5	To define terms lentic and lotic ecosystems
		CO6	To describe ecological pyramids
		CO7	To differentiate erect and inverted pyramids
		CO8	To explain animal interactions with examples
		CO9	To define and explain various types of food chains and food webs
		CO10	To differentiate food chains and food webs
Unit 3	National Parks, Sanctuaries of India	CO1	To illustrate endangered, threatened and critically endangered animals
		CO2	To analyse and describe reasons for threat to wildlife
		CO3	To describe unique features (flora and fauna) of some national parks
		CO4	To summarise role of wildlife
		CO5	To describe Projects Tiger and Rhinoceros
		CO6	To describe ecotourism with reference to conservation
		CO7	To explain Biopiracy with reference to biological resources in India

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Semester II

Course IV: NUTRITION, PUBLIC HEALTH AND HYGIENE (USZO202)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Nutrition and Health	CO1	To define and describe balanced diet and essential nutrients of food.
		CO2	To differentiate and describe healthy and unhealthy eating habits and lifestyles.
		CO3	To interpret and calculate BMI.
Unit 2	Public Health and Hygiene	CO1	To question and discuss depleting water resource. To evaluate measurement of water footprint.
		CO2	To define and explain sanitation and Hygiene
		CO3	To describe WHO and its programs in India.
		CO4	To explain and interpret effects of radiation
		CO5	To describe and list methods to prevent addiction
		CO6	To define and explain First Aid and Blood bank.
Unit 3	Common Human Diseases and Disorders	CO1	To discuss causes, symptoms and impact of stress related disorders.
		CO2	To identify describe relevant solutions for positive attitude.
		CO3	To describe cause, symptoms and precautions of infectious diseases.
		CO4	To differentiate Communicable and Non – communicable diseases.

Practical based on above two courses USZOP2

	COURSE OUTCOMES
Practical-I	To interpret survivorship curve, life table
	To draw diagram representing age structure
	To calculate sex ratio
	To estimate population density by capture recapture method
	To calculate natality, mortality from data
	To draw and interpret sigmoid growth curve
	To construct food chains and food webs
	To distinguish erect and inverted pyramids
	To estimate free CO ₂ and hardness from water samples
	To identify endangered and critically endangered animals
	To locate national parks and sanctuaries on India map
Field trip	To locate and observe and photograph marine fauna
	To record unique features
	To write report of the field trip
Practical -II	To estimate semi-quantitatively Vitamin C by iodometric method
	To identify and distinguish some human parasites
	To estimate protein content in two varieties of eggs
	To estimate moisture content in biscuits
	To estimate maltose content in two varieties of bread
	To screen level of hemoglobin using CuSO ₄ method
	To separate and locate starch granules from cereals
Project	To measure and do demographic survey for BMI

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Semester III

Course V: **Genetics** (USZO301)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Fundamentals of Genetics	CO1	To define and explain basic terms in genetics.
		CO2	To discuss and analyse Mendelian principles of inheritance
		CO3	To solve problems in Inheritance patterns
		CO4	To describe multiple alleles, multiple genes, linkage and crossing over.
Unit 2	Chromosomes and Heredity	CO1	To draw and describe types and classification of chromosomes.
		CO2	To analyse and interpret sex determination, sex influenced and sex limited genes.
		CO3	To analyse inheritance of sex linked disorders.
Unit 3	Nucleic acids	CO1	To describe experiments proving DNA as the genetic material.
		CO2	To explain the structure of nucleic acid and central dogma of molecular biology.
		CO3	To describe regulation of gene expression.

jCourse VI: Animal Physiology (USZO302)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Nutrition and Excretion	CO1	To compare, draw and explain nutritional apparatus in Amoeba, Hydra, Cockroach, Amphioxus, Pigeon, Ruminants
		CO2	To define and explain physiology of digestion in humans
		CO3	To classify animals on basis of excretory products
		CO4	To compare and draw excretory apparatus of Amoeba, Planaria, Cockroach
		CO5	To describe and explain physiology of human digestion and excretion
Unit 2	Respiration and Circulation	CO1	To describe and compare respiratory structures of Earthworm, Spider, Fish, Frog; describe significance of air sacs of birds
		CO2	To compare single and double circulation; open and closed circulation
		CO3	To describe and compare circulatory fluids-lymph, blood, coelomic fluid
		CO4	To compare, draw and describe hearts of Cockroach, Earthworm, Shark, Frog, Crocodile and Pigeon
		CO5	To describe and explain physiology of human respiration and heart
Unit 3	Control & Coordination	CO1	To draw and describe nervous systems in Paramecium, Hydra and Earthworm
	Locomotion & Reproduction	CO2	To explain with diagram physiology of conduction of nerve impulse across axon and synapse
		CO3	To describe and explain locomotion and organs with reference to Amoeba, Cilia, Cockroach, starfish
		CO3	To draw and explain physiology of muscle contraction
		CO4	To describe and compare different types of asexual reproduction
		CO5	To describe and explain with diagrams-gametogenesis, structures of gametes
		CO6	To describe types of fertilization and delivery

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Semester III

Course VII-A: Ethology, Parasitology, Economic Zoology (USZO303)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Ethology	CO1	To define behavior; to differentiate innate and learned behaviors. To explain classical conditioning and instrumental learning.
		CO2	To describe communication, mimicry, displacement, schooling and territoriality in animals with respect to behaviour
		CO3	To explain significance of social behaviours in primates
Unit 2	Parasitology	CO1	To define and describe parasitism and its relationship in the environment.
		CO2	To explain modes of transmission of parasites.
		CO3	To discuss epidemiology of parasites that effect humans.
		CO4	To describe with reasons preventive measures against parasites.
		CO5	To explain the life cycles of parasites, symptoms and treatment of diseases.
Unit 3	Economic Zoology	CO1	To describe rearing methods, economic significance of Apiculture, Vermiculture and dairy science.
		CO2	To describe modern techniques in animal husbandry.
		CO3	To explain dairy processing and to describe milk products

Practical based on above three courses USZOP3

	COURSE OUTCOMES
Practical-I	To extract and identify DNA and RNA.
	To mounting, identify and observe Barr bodies.
	To study polytene chromosomes
	To make temporary mounting of onion root tips to observe and study stages of mitosis.
	To detect blood groups and Rh factor.
	To solve problems in Genetics related to Monohybrid/Dihybrid cross, X-linked inheritance, and Multiple alleles.
	To study chromosome morphology using photographs.
	To analyse and identify Pedigree.
	To solve problems in Molecular biology.
Field trip and project	To observe and set-up vermiculture project
	To diagnose and solve practical difficulties with vermiculture
	To observe bee hives, bees in natural condition
	To write project and field report detailing steps involved
Practical -II	To test and confirm normal and abnormal constituents of urine
	To detect presence of ammonia from pond water
	To detect presence of uric acid from bird excreta
	To observe & differentiate striated and non-striated muscles
	To identify and describe nutritional apparatus in different animals
	To identify and describe locomotory organs from different animals
	To identify and describe hearts of different animals
To identify and describe slides of reproduction	
Practical -III	To extract and qualitatively identify casein from Milk.
	To prepare and weigh paneer from Milk.
	To measure density of milk samples using Lactometer.
	To draw and describe honey bee with respect to Mouthparts, legs, sting apparatus, life cycle.
	To identify, describe parasites - Protozoan and Helminths.
	To identify and describe parasitic adaptations in Tapeworm
	To identify and describe ectoparasites - Leech, Tick, Mite.

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Semester IV

Course VIII: **Origin and Evolution of Life** (USZO401)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Origin and Evolution of Life	CO1	To describe origin of life
		CO2	To explain and analyse Miller- Urey experiments and Oparin theory
		CO3	To describe origin of pro and eukaryotic cell
		CO4	To interpret evidences for evolution
		CO5	To discuss theories of evolution
Unit 2	Population Genetics	CO1	To interpret Hardy Weinberg equilibrium with respect to non-random mating
		CO2	To discuss and interpret genetic drift with examples
		CO3	To discuss natural selection
		CO4	To explain genetic basis of evolution – recombination and mutation
		CO5	To explain types of variations
		CO6	To define and discuss speciation and isolating mechanisms
Unit 3	Scientific Method, Writing Ethics in Scientific Research	CO1	To discuss role of thinking and reasoning as scientific method
		CO2	To identify and describe components in scientific method
		CO3	To differentiate methods of disseminating research
		CO4	To describe method of scientific writing
		CO5	To discuss ethics in scientific research
		CO6	To define and discuss plagiarism

Course IX: Cell Biology (USZO402)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Cell Biology	CO1	To differentiate prokaryotic and eukaryotic cell
		CO2	To draw, describe and explain organization and functions of nucleus, membrane
		CO3	To draw and explain components and functions of cytoskeleton
Unit 2	Endomembrane system	CO1	To draw, describe and explain organization and functions of Endoplasmic reticulum,
		CO2	To draw, describe and explain organization and functions of Golgi complex, Lysosomes and Mitochondria
Unit 3	Biomolecules	CO1	To classify, explain molecular structures of carbohydrates, proteins and lipids
		CO2	To describe biological roles and functions of carbohydrates, lipids and proteins
		CO3	To describe biological roles and clinical significance of vitamins A, C, D and B12

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Semester IV

Course X-A: Comparative Embryology, Aspects of Human Reproduction, Pollution
(USZO403)

UNIT	TITLE		COURSE OUTCOMES
Unit 1	Comparative Embryology	CO1	To classify and describe types of eggs, sperm, developmental stages
		CO2	To discuss types and formation of coelom
Unit 2	Aspects of Human Reproduction	CO1	To draw and describe human reproductive systems and their hormonal regulation
		CO2	To discuss types, merits and demerits of contraception
		CO3	To interpret causes of infertility and describe disorders related to infertility
		CO4	To describe role of endocrine disruptors
		CO5	To discuss and explain different methods of infertility
Unit 3	Pollution	CO1	To describe sources, types and effects of air, water, soil and sound pollution
		CO2	To describe methods of control measures
		CO3	To analyse relationship of global warming and climate change

Practical based on above three courses USZOP4

	COURSE OUTCOMES
Practical-I	To estimate population density by line transect and Quadrant method
	To differentiate gram +ve and –ve cells by Gram staining
	To identify different cells in blood by differential staining
	To identify and describe fossils
	To identify and describe types of speciation
	To write an abstract of the given paper
	To make a PPT from the given scientific paper
Practical -II	To identify and explain osmotic process in blood cells
	To measure cell diameter using oculometer
	To identify and classify carbohydrates, proteins and lipids using biochemical tests
	To estimate rancidity of lipids
	To identify and describe micrographs of cell organelles
Practical -III	To identify and describe clinical disorders
	To identify and describe air microflora
	To estimate dissolved Oxygen, salinity and conductivity from the given samples
	To measure soil parameters-pH, temperature and organic content
	To identify and describe stages of reproduction
Field trip and project	To write a review of media program/film
	To locate and observe and photograph marine fauna
	To record unique features
	To write report of the field trip