

UT PGT Biology Syllabus

Unit Name	Topics
The Living World	Biodiversity; Need for classification; three domains of life; taxonomy and systematics; the concept of species and taxonomical hierarchy; binomial nomenclature
Biological Classification	Five kingdom classification; Salient features and classification of Monera, Protista and Fungi into major groups; Lichens, Viruses and Viroids.
Plant Kingdom	Classification of plants into major groups; Salient and distinguishing features and a few examples of Algae, Bryophyta, Pteridophyta, Gymnospermae (Topics excluded - Angiosperms, Plant Life Cycle and Alternation of Generations)
animal Kingdom	Salient features and classification of animals, non-chordates up to phyla level and chordates up to class level (salient features and at a few examples of each category).
Morphology of Flowering Plants:	Morphology of different parts of flowering plants: root, stem, leaf, inflorescence, flower, fruit and seed. Description of families: Solanaceae.
Anatomy of Flowering Plants:	Anatomy and functions of tissue systems in dicots and monocots.
Structural Organisation in Animals:	Morphology, Anatomy and functions of different systems (digestive, circulatory, respiratory, nervous and reproductive) of frog
Cell -The Unit of Life	Cell theory and cell as the basic unit of life, structure of prokaryotic and eukaryotic cells; Plant cell and animal cell; cell envelope; cell membrane, cell wall; cell organelles - structure and function; endomembrane system- endoplasmic reticulum, ribosomes, golgi bodies, lysosomes, vacuoles; mitochondria, plastids, microbodies; cytoskeleton, cilia, flagella, centrioles (ultrastructure and function); nucleus.
Biomolecules	Chemical constituents of living cells: biomolecules, structure and function of proteins, carbohydrates, lipids, nucleic acids; Enzymes - properties, enzyme action. Activators and Inhibitors of Enzyme factors effecting activity of enzyme.
Cell Cycle and Cell Division:	Cell cycle, cell death mitosis, meiosis and their significance
Photosynthesis in Higher Plants:	Photosynthesis as a means of autotrophic nutrition; site of photosynthesis, pigments involved in photosynthesis (elementary idea); photochemical and biosynthetic phases of photosynthesis; cyclic and non-cyclic photophosphorylation; chemiosmotic hypothesis; photorespiration; C3 and C4 pathways, CAM; factors affecting photosynthesis.
Respiration in Plants	Exchange of gases; cellular respiration - glycolysis, fermentation (anaerobic), TCA cycle and electron transport system (aerobic); energy relations - number of ATP molecules generated; amphibolic pathways; respiratory quotient.
Plant – Growth and Development:	Seed germination; phases of plant growth and plant growth rate; conditions for growth; differentiation, dedifferentiation and redifferentiation; sequence of developmental processes in a plant cell; growth regulators - auxin, gibberellin, cytokinin, ethylene, ABA. Photo periodism and its significance and vernalisation.

Breathing and Exchange of Gases: Introduction to respiratory organs in animals; Respiratory system in humans; mechanism of breathing and its regulation in humans - exchange of gases, transport of gases and regulation of respiration, respiratory volumes; disorders related to respiration - asthma, emphysema, occupational respiratory disorders.

Body Fluids and Circulation: Composition of blood, blood groups, coagulation of blood; composition of lymph and its function; human circulatory system - Structure of human heart and blood vessels; cardiac cycle, cardiac output, ECG; double circulation; regulation of cardiac activity; disorders of circulatory system - hypertension, coronary artery disease, angina pectoris, heart failure.

Excretory Products and their Elimination: Modes of excretion - ammonotelism, ureotelism, uricotelism; human excretory system - structure and function; urine formation, osmoregulation; regulation of kidney function - renin-angiotensin, atrial natriuretic factor, ADH, diabetes insipidus; micturition; role of other organs in excretion; disorders - uremia, renal failure, renal calculi, nephritis; dialysis and artificial kidney, kidney transplant.

Locomotion and Movement: Types of movement - amoeboid, ciliary, flagellar, muscular; skeletal muscle, contractile proteins and muscle contraction; skeletal system and its functions; joints; disorders of muscular and skeletal systems - myasthenia gravis, tetany, muscular dystrophy, arthritis, osteoporosis, gout.

Neural Control and Coordination: Neuron and nerves; Nervous system in humans - central nervous system and peripheral nervous system; generation and conduction of nerve impulse; visceral nervous system.

Chemical Coordination and Integration: Endocrine glands and hormones; human endocrine system - hypothalamus, pituitary, pineal, thyroid, parathyroid, thymus, adrenal, pancreas, gonads; hormones of heart, kidney and gastrointestinal tract; mechanism of hormone action (elementary idea); role of hormones as messengers and regulators, hypo- and hyperactivity and related disorders; dwarfism, acromegaly, cretinism, goiter, exophthalmic goiter, diabetes, Addison's disease.

Sexual Reproduction in Flowering Plants: Flower structure; development of male and female gametophytes; pollination - types, agencies and examples, cryopreservation; outbreeding devices; pollen-pistil interaction; double fertilization; post fertilization events - development of endosperm and embryo, artificial hybridization, emasculation and bagging, structural and biochemical aspects of self incompatibility development of seed and formation of fruit; special modes - apomixis, parthenocarpy, polyembryony; Significance of seed dispersal and fruit formation.

Human Reproduction: Male and female reproductive systems; microscopic anatomy of testis and ovary; gametogenesis - spermatogenesis and oogenesis; menstrual cycle; fertilisation, embryo development upto blastocyst formation, implantation; neuro endocrine control pregnancy and placenta formation; parturition; lactation.

Reproductive Health: Need for reproductive health and prevention of Sexually Transmitted Diseases (STDs); birth control - need and methods; medical termination of pregnancy (MTP); amniocentesis; infertility and assisted reproductive technologies - IVF, ZIFT, GIFT

Principles of Inheritance and Variation: Heredity and variation, Mendelian inheritance; deviations from Mendelism - incomplete dominance, co-dominance, multiple alleles and inheritance of blood groups, pleiotropy; complementary genes, supplementary genes, epistasis, elementary idea of polygenic inheritance; chromosome theory of inheritance; chromosomes and genes; linkage

and crossing over; Sex determination in human being, birds and honey bee; sex linked inheritance - haemophilia, colour blindness; Mendelian disorders in humans -thalassemia; chromosomal disorders in humans; Down's syndrome, Turner's and Klinefelter's syndromes.

Molecular Basis of Inheritance: Structure of DNA and RNA; DNA packaging; Search for genetic material and DNA as genetic material; DNA replication; Central Dogma; transcription, genetic code, translation; Gene mapping, gene expression and regulation - lac operon; Human genome project; Rice Genome Project, DNA fingerprinting.

Evolution Origin of life; biological evolution and evidences for biological evolution (paleontology, comparative anatomy, embryology and molecular evidences); adaptive radiation; Darwin's theory of evolution; mechanism of evolution variation (mutation and recombination) and natural selection, Polymorphism; types of natural selection; Gene flow and genetic drift; Hardy - Weinberg's principle; human evolution

Human Health and Diseases: Pathogens; parasites causing human diseases (malaria, dengue, chikungunya, filariasis, ascariasis, typhoid, pneumonia, common cold, amoebiasis, ring worm) and their control; Basic concepts of immunology - vaccines; cancer, HIV and AIDS; Adolescence - drug and alcohol abuse.

Biotechnology - Principles and Processes

Genetic Engineering (Recombinant DNA Technology).

Biotechnology and its Application: Application of biotechnology in health and agriculture: genetically modified organisms - Bt crops; Human insulin, gene therapy; molecular diagnosis; transgenic animals; biosafety issues, biopiracy and patents.

Organisms and Populations: Population interactions - mutualism, competition, predation, parasitism, commensalism; amensalism population attributes - growth, birth rate and death rate, age distribution.

Ecosystem Ecosystem, productivity and decomposition; energy flow; pyramids of number, biomass, energy. Biodiversity and Conservation Biodiversity - Concept, levels, patterns, importance; loss of biodiversity; biodiversity conservation; nutrient cycles, hotspots, endangered organisms, extinction, Red Data Book, Sacred Groves, biosphere reserves, national parks, wildlife, sanctuaries and Ramsar sites.