

THE LIST OF TOPICS IN BIOLOGY

CELL BIOLOGY

PROKARYOTIC AND EUKARYOTIC CELL

- Differences between prokaryotes and eukaryotes

CELL MEMBRANE

- Structure and functions of plasma membrane
- Transport across a cell membrane (passive, active, vesicular transports)

CYTOPLASM

- Cytoplasm structure and functions
- Organelles (Rough endoplasmic reticulum, Smooth endoplasmic reticulum, Golgi apparatus, Mitochondria, Lysosomes, Nonmembranous organelles – ribosomes, centrosomes)
- Cytoskeleton

NUCLEUS

- Nucleus structure and functions (Nuclear envelope, Nucleoplasm, Chromatin, Nucleolus)

CELL DIVISION AND CELL CYCLE

- Interphase: G1, S, G2
- Mitosis: prophase, metaphase, anaphase, telophase, cytokinesis

VIRUSES

BACTERIA

ANIMAL PHYSIOLOGY

NERVOUS SYSTEM

SENSES

BODY FLUIDS. CIRCULATORY SYSTEM

RESPIRATORY SYSTEM

DIGESTIVE SYSTEM

EXCRETORY SYSTEM. OSMOREGULATION

ENDOCRINE GLANDS. HUMORAL REGULATION
THERMOREGULATION

DEVELOPMENTAL BIOLOGY

REPRODUCTION OF ANIMALS

- Asexual and sexual reproduction

GAMETOGENESIS

- Meiosis - meiosis I, meiosis II
- Oogenesis - general pattern of eggs formation
- Types of eggs
- Spermatogenesis - general pattern of spermatozoa formation

FERTILIZATION

- Stages of fertilization

EARLY STAGES OF EMBRYOGENESIS AND ORGANOGENESIS

- Cleavage: Patterns of cleavage, Blastula
- Gastrulation: Types of cell movements, Gastrula
- Neurulation and development of axial organs (neural tube, notochord, gut tube)
- Cell differentiation
- Fate mapping
- Embryonic induction

EXTRAEMBRYONIC MEMBRANES

- Yolk sac, amnion, chorion, allantois
- Placenta and types of placenta

AGING

HUMAN DEVELOPMENT AND PREGNANCY

MOLECULAR BIOLOGY

NUCLEIC ACIDS AND PROTEINS

- DNA
- RNA
- Molecular organization of eukaryotic chromosomes
- Proteins

DNA REPLICATION

TRANSCRIPTION

TRANSLATION

REGULATION OF GENE EXPRESSION

RECOMBINANT DNA TECHNOLOGY

GENETICS

BASIC PRINCIPLES OF GENETICS

- Basic genetic concepts and terms: Heredity, chromosome, genes and chromosomes, homologous chromosomes, karyotype, gene/allele, homozygous/heterozygous, dominant/recessive allele, genotype, phenotype
- Monohybrid cross: Mendel's first law (principle of segregation), test cross
- Dihybrid cross: Mendel's second law (principle of independent assortment)
- Non-Mendelian inheritance: incomplete dominance, codominance, polygenic inheritance, epistasis, linked genes

INHERITANCE OF BLOOD GROUPS

- ABO blood group system, multiple alleles
- Rh blood group system

GENETIC CONTROL OF DEVELOPMENT

- Genetic control of developmental processes

SOURCES OF GENETIC VARIABILITY

RECOMBINATIONS

- Recombination of genes and chromosome mapping

MUTATIONS

- Definition and types of mutations: germinal/somatic mutation, spontaneous/induced mutation, point mutation, gene mutation, chromosomal mutations (aberrations)
- Gene mutations: base substitutions, missense/nonsense/neutral/silent mutations, frameshift mutations
- Numerical chromosomal aberrations: Polyploidy, Aneuploidy (primary and secondary nondisjunction)
- Structural chromosomal aberrations: Unbalanced/Balanced aberrations - Deletion, Duplication, Inversion, Translocation
- Mutagenic factors: environmental mutagens

POPULATION GENETICS

- Genetic structure of population
- Hardy–Weinberg principle: Factors that alter genetic (Hardy-Weinberg) equilibrium

HUMAN GENETICS

- Research methods in human genetics. Human genome research.
- Human chromosomes and human karyotype
- Chromosomopathies - hereditary diseases as a consequence of changes in chromosome number and structure (Down sy, Patau sy, Edwards sy, Turner sy, Klinefelter sy, Cri du chat sy)
- Patterns of inheritance in humans: Autosomal dominant inheritance - Human autosomal dominant diseases, Autosomal recessive inheritance - Human autosomal recessive diseases, X-linked recessive inheritance - Human X-linked recessive diseases, X-linked dominant inheritance, Y-linked (holandric) inheritance
- Human behavioral genetics: Genes and behavior, Genes and mental disorders,
- Genetic counselling: early detection of hereditary diseases, prenatal diagnosis, genetic testing and counseling