# M.Sc. Biotechnology (BT) Entrance Examination Syllabus. DTU-2019

1. **Molecules and their Interaction Relevant to Biology:**Structure and functions of biomolecules; Carbohydrates; Fatty acids; Lipids; Amino acids; Proteins; Nucleic acids – DNA, mRNA, tRNA, rRNA; Hormones; Vitamins; Enzymes; Bioenergetics; Cell metabolism; Protein-protein and protein-DNA interactions
2. **Cellular Organization:**Cell theory; Cell as basic unit of life; Hierarchy of cell organization; Structure and organization of prokaryotic and eukaryotic cells; Structure and function of cell organelles; Biomembranes; Cytoskeletal elements; Chromosome structure; Karyotype; Chromatin organization, Cell Cycle
3. **Fundamental Processes:**Photosynthesis; Cellular respiration; Movement through cell membrane; Nutrition; Blood clotting; Human physiological systems; Replication; Transcription; Translation; DNA repair mechanisms; Plant physiology; Bacterial growth; Microbial genetics, Secondary metabolites
4. **Developmental Biology and Evolution:**Stages of development;Mechanism of differentiation; Germ layers; Potency; Morphogenetic movements; Early and late development in model organisms; Cell division; Gametogenesis and fertilization in animals and flowering plants; Embryology; Seed germination; Dormancy; Evolution and natural selection; Mendel's law of heredity; Evidences of DNA as genetic information carrier; Hardy-Weinberg law; Extra-chromosomal inheritance; Sex-linked inheritance in humans; Mutations
5. **Plant andAnimal Biotechnology:**Plant tissue culture techniques; Totipotency; Organogenesis and Somatic embryogenesis; Suspension culture; Protoplast isolation and somatic hybridization; Production of secondary metabolites; Basic techniques in animal cell and organ culture; Bioreactors for large scale culture of animal cells; Stem cells; Transgenicplants and animals
6. **Immunology and Vaccines:** Immunity; Antigen; Structure of antibody; Hapten; Antigen-antibody interaction, Introduction to antigen presentation; Role of MHC; Complement system; Bacterial diseases of humans; Types of vaccines; Immunization; Recombinant vaccines
7. **Computational Biology:** Databases and tools; Nucleotide sequences; Protein Sequences; Protein Structure.
8. **Diversity of Life Forms:**General characteristics of life forms; General characteristics of bacteria, fungi, algae, Microbial growth curve; plant and animal viruses; Classification of plantand animal kingdom
9. **Ecological Principles and Environmental Biology:**Ecosystem; Ecological relationships; Habitat and niche; Ecology of ecosystems; Air, water and soil pollution; Greenhouse effect and global warming; Noise pollution; Pollution abatement; Wastewater treatment; Disposal of solid wastes; Biogeochemical cycles of elements; Bioremediation; Bioleaching; Biopesticides; Biofertilizers
10. **Applied Biology:**Basics of fermentation technology; Microbes in industry; Biosensors; Biofuels; Principles of gene cloning; Methods of gene transfer; Application of biology in agriculture, health, industry and environment sectors
11. **Methods in Biology:**Basics of Centrifugation; Electrophoresis; Chromatography; Microscopy; UV-Visible spectrophotometry; Radiotracer technique;PCR; DNA sequencing; Southern blotting;

Tests of significance; Analysis of variation; Correlation and regression; Hybridoma technology; Basic techniques in bioinformatics

12. **Inheritance Biology:** Mendelian principles, Extensions of Mendelian principles, Gene mapping methods, Extra chromosomal inheritance, Human genetics, Mutations, Structural and numerical alterations of chromosomes