

(M.Phil./ PhD. Syllabus)

Dept. of Life Science and Bioinformatics
Assam University, Silchar

Departmental level- Paper I (LS-502)

Credit- 4

Unit-I

1. Speciation; Identification, naming and classification of organisms; Nomenclature and Code, Taxonomic databases.
2. Molecular taxonomy and phylogeny.
3. Environmental Risk assessment: Hazard identification, exposure assessment, risk characterization and risk management with reference to aquatic environments.
4. Application of genomics tools in Ecotoxicology to predict species variation in sensitivity to pollutants.

Unit-II

1. Computer aided drug designing QSAR, Molecular modeling.
2. Concept of Pharmacodynamic and Pharmacokinetics.
3. Physiochemical principles and basis of drug design.
4. Patents and drug laws.

Unit-III

1. Concept of Pharmacogenetics and Toxicogenomics; Xenobiotic metabolizing enzymes and their role in pharmacology.
2. Concept of Metabolomics and personalized medicine; Biomarkers.
3. Separation of bioactive molecules- TLC, HPLC, GC; ICP-MS, GFAAS and EDX based techniques for element detection and analysis.
4. Structure elucidation- X-ray, NMR and Mass spectrometry.

Unit IV

1. Structure and function of neurons and glial cells; Neurotransmitters- acetylcholine, dopamine, serotonin, glutamate, GABA.
2. Cellular mechanisms of learning and memory.
3. Study of ion channels- Patch clamp; Hodking and Huxley's experiment with squid axon.
4. Induced pluripotent stem cells in Parkinson's disease: a ray of hope.

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Departmental level- Paper II (LS- 503)

Credit- 4

Unit-I

1. Introduction to Stem Cells: Embryonic Stem Cells; Adult Stem Cells, Pleuripotency, Haemopoietic, Muscle and Cardiac stem Cells, Stem Cells and Diabetes.
2. Cancer Stem cells, Therapeutic prospect and Tissue Engineering, The Stem Cell Debate: Politics and Ethics.
3. Evolutionary basis of reproduction; male and female factor infertility.
4. Assisted reproductive techniques; application of stem cell technology in assisted reproduction; surrogacy.

Unit-II

1. Genetic Engineering and Genome Editing.
2. Crop Biotechnology and Molecular Breeding.
3. Genomics and Post genomics.
4. Biosafety and its relevances in biological science research.

Unit-III

1. Microbial Cell factories for biomolecule production: Methods, Tools & techniques.
2. Concepts of microbial systematics: Recent trends & Techniques.
3. Gut microbiota and probiotics in health and disease.
4. Immunotechniques- immunoblotting, immunohistology, ELISA and flow cytometry

Unit-IV

1. Water bodies- their physico chemical characteristics.
2. Understanding the Fate of Chemicals in the aquatic environment: Bioaccumulation, Biotransformation and Biomagnification.
3. Ecological implications of Endocrine disrupting chemicals in the aquatic environment
4. Arsenic remediation strategies from soil and water- optimization and application; Molecular basis of Arsenite and Arsenate transport, hyperaccumulation.

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