NS/401: CLINICAL NEUROCHEMISTRY AND NEUROPATHOLOGY

Note: Research in neuropathology/neurological disorders involves specific biochemical changes. This paper will aim at introducing the students to the biochemical bases of brain disorders and principles and applications of important diagnostic tools.

Unit-I
Neurochemical and molecular mechanisms of peripheral Neuropathy; Diseases involving myelin; Multiple sclerosis and other demyelinated disorders; Genetic disorders of Lipid, glycoprotein, and Mucopolysaccharide metabolism; Duchenne Muscular dystrophy; Molecular, genetic aspects and diagnostic characteristics

Unit-II
Nutritional and metabolic Diseases: Disorders of amino acid metabolism
Wernicke-Korsakoff syndrome; Pellagra; Alcoholic Cerebellar Degeneration; Metabolic Encephalopathies and Coma

Unit-III
Neurotransmitters and disorders of basal ganglia; Molecular targets of abused drugs; ischemia and hypoxia; Epileptic seizures; Genetics and diagnosis of Huntington disease and other triplet repeat disorders; Alzheimer’s disease; Molecular, genetic, immunological aspects and diagnostics

Unit-IV
Theories of aging; Neurobiology of aging: cellular and molecular aspects of neuronal aging; Aging and neurodegeneration; Parkinson’s disease

Unit-V
Motor Neuron Diseases; Prion’s Disease; Biochemical aspects of the psychotic disorders; Biochemical basis of mental illness; Anxiety disorders; Mood disorders; Attention disorders; Schizophrenia

Suggested Books:

NS/402: NANO TECHNOLOGY AND BIOINFORMATICS FOR NEUROSCIENCE

Note: This paper aims at illustrating the basics and possible applications of nanotechnology as well as bioinformatics in neuroscience. Both the aspects shall be just introduced to the students who are expected to make use of these tools in future. However, extensive details with wide range of examples shall be avoided.

NANO TECHNOLOGY

Unit-I
Introduction to nanotechnology; Molecular nanotechnology; Atoms by inference
Atomic force microscope; Nanopowders and nanomaterials: Sol-gels and their use; Use of natural nanoparticles

Unit-II
Nanobiotics; Lipids as nano-bricks; Proteins as nanomolecules; DNA in nanotechnology;
Present and future of nanotechnology applications in:
Molecular biology and Medicine

Unit-III
Neuroscience nanotechnology; Progress, opportunities and challenges; Nanotechnology tools for
probing neurons and glia: Nanoengineered materials for neuroregeneration; Nanoparticles for
effective drug delivery to the CNS; Ethical issues in nanotechnology

BIOINFORMATICS

Unit-IV
Bioinformatics: History, scope and importance; Computers, internet, WWW, and NCBi;
Neuroinformatics: Concept and applications; DNA sequencing and analysis; Protein sequencing and
analysis

Unit-V
Databases, tools and their uses; Sequence alignment; Predictive methods using DNA sequences;
Predictive methods using protein sequences; Pharmainformatics and drug discovery
Suggested Text Books


LABORATORY COURSE-VII: NS/403: RESEARCH METHODS, BIOSTATISTICS AND COMPUTER APPLICATIONS

1. Collection of data for statistical analysis
2. Chi square test
3. Student 't' test
4. ANOVA
5. Designing of an experiment for a hypothesis
6. Case studies at a neurology ward
7. Case studies of biological populations
8. Basics of animal handling and maintenance
9. Computer applications: Word, Excel and Power point
10. Image analysis
11. Stereology

NS/404: DISSERTATION

The students are required to take up a study in an aspect of neuroscience. A dissertation/report has to be submitted at the time of examination. The work may be initiated at any point of time depending upon the capability of a student from earlier semesters as well. This is to provide a student real exposure to planning, execution and reporting of a research proposal.

NS/405: VIVA-VOCE ON THE DISSERTATION