

**Department of Pharmaceutical Chemistry  
Faculty of Pharmacy  
University of Dhaka  
Dhaka-1000, Bangladesh**

**Syllabus for Ph.D Course Works**

2006-2007 onwards

**COURSES**

<b>Subject No.</b>	<b>Title</b>	<b>Marks</b>
Paper-I	Advanced Pharmaceutical Analysis	100
Paper-II	Advanced Medicinal Chemistry	100

# Ph.D. Course Works

## Paper-I: Advanced Pharmaceutical Analysis

100 Marks

### Course contents

- 1. Biophysics:** Introduction, quantum mechanics and its applications in explaining the structure of the atoms, LCMO bond formation of some simple molecules, potential energy diagrams of simple molecules crystal field theory and ligand field theory in understanding interactions between molecules, ESR spectroscopy in studying molecular complexes, electron microscopy (including election scanning microscopy), autoradiography.
- 2. Advanced topics in NMR techniques:** Proton NMR, 2D and 3D NMR spectroscopy (principles and applications). Drug design based on target 3D structures using NMR.
- 3.** Structural studies of some known compounds by X-ray crystallography. Drug design based on X-ray crystallography studies.
- 4.** Homology and polymorphism studies in gene sequences, screening of cDNA and Genomic DNA libraries, gene bank analysis, primer and DNA probe designing, analysis of open reading frame (ORF).
- 5.** Application of mass spectroscopy, GC-MS and LC-MS in pharmaceutical analysis.
- 6.** Application of 2D-electrophoresis techniques in DNA, RNA and protein separation and analysis. Separation and analysis of proteins using liquid chromatography-Mass spectrometry (LC-MS).
- 7. Biochemical techniques:** Separation, purification and characterization of proteins, nucleic acids and phospholipids, sequencing and synthesis of nucleic acids and peptides, study of drugs metabolism and relevant enzyme, radio-immunoassay, radiolabelling, flourescent spectroscopy and immunodetection.

**Course contents**

**1. Genomics and Proteomics**

Introductions, importance of genome and genomics. Human genomics and genomic diseases. Proteins as workhorse molecules of life, protein synthesis, classification of proteins. The 20 amino acids, structure of amino acids, proteins and polypeptides, Backbone flexibility,  $\Phi$  and  $\psi$ -Properties of amino acids, Hydrophobicity, EIIP, Molecular weight,  $\alpha$  and  $\beta$  propensities etc.

**2. Biochemical Pharmacology**

Transcription and Translation of Genes, Neurohumoral Transmission and Signal Transduction, Eicosanoids (Histamine, Serotonin, Bradykinins & Other mediators of inflammation), Antihistamines, Anti-gout, cardioactive drugs. Corticosteroids and Immunomodulators

**3. Cell Biotechnology**

Introduction, animal and plant cells culture, development in plant cell cultures and recent approaches for high production of secondary metabolites (Drugs). Elucidation and regulation of biosynthesis in cell cultures of plant species of strategic importance from both scientific and economic point of view. Plant tissue cultures for the production of natural drugs.

**4. Biosynthesis of Natural Products**

Introduction, mechanism and biosynthetic formations of amino acids, carotenoids and vitamin A, water soluble vitamins, phenolic plant products, terpenes, steroids, alkaloids and glycosides. Pharmacological approaches to natural products, screening and evaluation, problems and prospects of discovering new drugs from higher plants. Flavonoids, alkaloids, saponins with biological and pharmacological activity.

**5. Drug Development**

Development anti-infective drugs by direct and biosynthetic pathways. Development of anti-TB, anti-HIV and anti-cancer drugs. Drug development using human genome system. Role of bioinformatics in advanced medicinal chemistry, anti-sense therapy.