DISCIPLINE SPECIFIC ELECTIVE COURSE –DSE-11

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Pharmacology and Toxicology (BS-DSE-11)	**4**	**2**		**2**	Class XII pass with Biology and chemistry, as one of the papers in Class XII	**NA**

Learning Objectives:

This is an introductory course to lay the foundation for understanding basic concepts in Pharmacology and thepharmacological basis of therapeutics. The objective of the course is to introduce students to the core principles of drug action in terms of bioavailability, pharmacokinetics, pharmacodynamics, and mechanism of action of drugs in the treatment of diseases. The course will also provide basic principles of toxicology, toxic substancesand their effects on body systems.

Learning Outcomes:

On successful completion of the course, a student will:

- Understand the basic scientific concepts and principles that serve as the foundational underpinnings of the pharmacological sciences including pharmacokinetics; pharmacodynamics; drug metabolism; and drug-drug interactions.
- Learn an introduction to the processes by which new drugs are discovered.
- Understand the specific pharmacology of the major drugs and drug classes currently used in medical practice including their indications, clinical use and mechanisms of action,
- Discuss the basic principles of toxicology; the mechanisms by which excess exposure to certain drugs,toxins, chemicals, heavy metals and poisons can lead to adverse toxicological effects

SYLLABUS FOR DSE-11
Course Contents -Theory

Unit 1: Introduction to Pharmacology **No. of hours: 5**

History and Scope of Pharmacology, Nature and source of drugs, Routes of drug administration, Drugreceptors and receptor subtypes, Drug Discovery and Development, Computer Aided Drug Design

Unit 2: Pharmacokinetics and Pharmacodynamics **No. of hours 8**

Absorption, Distribution, Metabolism, and Excretion (ADME) of drugs. Bioavailability, First Passmetabolism, Biological half-life of drug and its significance, Drug-drug interactions.

Unit 3: Drug Classification and their mechanism of action **No. of hours: 10**

Drugs of Inflammation: Analgesics and Anti-inflammatory Drugs, NSAIDs; Drugs of autonomic and central nervous system -Adrenergics: Isoprenaline, Propranolol; Dopaminergics, Dopamine, Syndopa; General Anesthetics: Halothane; Sedatives and Hypnotics: Diazepam; Cholinergics: Bethanechol, Rivastigmine; Anticonvulsant, Drugs of Cardiovascular system*:* Anticoagulant (Heparin, Warfarin) Blood Pressure LoweringDrugs (Diuretics, Reserpine), Lipid Lowering Drugs (Statin); Drugs of Gastro-Intestinal tract*:* Antacid(Cimetidine), Acid Blocker and Laxative ;Drugs of Renal functions: Diuretics; and Anticancer Drugs (Cistatin,Methotrexate, 5-fluorouracil).

Unit 4: Toxicology **No. of hours:7**

Classification of toxic substances, Drugs, Toxins and Heavy metal poisoning, Xenobiotics, Mechanism of toxicity, Tolerance to toxicants, Dose-response relationship, Therapeutic Index, Bioaccumulation and Antidotes.

3.1 PRACTICALS

CREDITS: 2 **TOTAL HOURS: 60**

1. To study the presence of paracetamol (acetaminophen) in given sample by spectroscopic method
2. Determination of LD50/LC50 of antibiotic/drug
3. Model Systems to study Dose-Response
4. Drug Binding assay to Albumin by Spectroscopic Analysis
5. Effect of heavy metal/toxin on enzyme activity
6. Colchicin effect on cell division.
7. Case Studies in Toxicology
8. Small Molecule Databases mining and Protein-ligand Docking
9. Visit to Pharmaceutical or Toxicology laboratory

3.2 Essential Readings

1. Tripathi, K.D. (2010). 7th Edition. Essentials of medical pharmacology. Delhi, India: Jaypee Brothers.ISBN-13:9788184480856.
2. Katzung, Bertram G. , Basic &Clinical Pharmacology, 14th Edition, McGraw Hill Education, 2017
3. Klaassen, C. D. and Watkins J. B. (2021), 4th Edition, Casarett & Doull's Essentials of Toxicology NewYork, USA: McGraw Hill.ISBN: 978-1-26-045229-7.

4 Kulkarni, S.K. (2012). 4th Edition. Handbook of experimental pharmacology. Delhi, India: VallabhPrakashan, ISBN-13: 97881857311.