



MOTHERHOOD UNIVERSITY, ROORKEE
FACULTY OF PHARMACEUTICAL SCIENCES

PhD Course Work Syllabus: Pharmaceutical Sciences
(Theory)

Max. Marks: 100 (Pharmaceutical Sciences)
Total Hours: 90
Total Credits: 06

Scope:

This subjects deals with various pharmaceutical analytical and evaluation techniques for research by various methods and research techniques.

Course Objectives:

After completion of the course students should able to know:

- Various pharmaceutical analytical and evaluation techniques
- Practical skills in research techniques and applications
- Different pharmaceutical formulations

UNIT I Pharmaceutics: (18 Hours)

1. **Dosage form Evaluation:** Rate and extent of bioavailability, assessing bioavailability, multiple dosing bioavailability, in vitro bioavailability studies (dissolution), Bioequivalence-General principles, criteria for establishing bioequivalence requirement, criteria for waiver of evidence for bioequivalence requirement and methodology. Pharmacokinetics parameters-logarithmic transformations. Multiple dosage regimens-drugs accumulation, i.v. and oral regiment, loading dosing, scheduling. Diseases-dose adjustment – hepatic disease dose adjustment, renal disease dose adjustment, therapeutic drug monitoring. Non-compartment model pharmacokinetics-statistical movement theory, pharmacokinetics parameters.
2. **Concept & Models for NDDS:** Classification of rate controlled drug delivery system (DDS), rate programmed release, activation modulated & feedback regulated DDS. Fundamentals of rate controlled drug delivery-Introduction, mechanistic analysis of controlled release drug delivery, effect of system parameters in controlled drug delivery, evaluation of controlled release drug delivery systems.

Recommended Books:

1. Biopharmaceutics and Pharmacokinetics-A Treatise by D. M. Brahmkar and Sunil B.Jaiswal.
2. Pharmaceutics, The Science & Dosage Form Design by M. E. Aulton.
3. Pharmaceutical Dosage Form and Drug Delivery System by H.C. Ansel

UNIT II Pharmaceutical Chemistry: (18 Hours)

1. **Structural Elucidation:** Structural elucidation of natural, synthetic and semi synthetic drugs by using spectroscopic data. [UV, IR, H1NMR, C13 NMR, Mass].
2. **Instrumental Methods of Analysis:**
 1. **UV-Visible spectroscopy:** Introduction, Beers law and its limitations, molar extinction coefficient, Woodward's Fiesher rules for calculating absorption maximum, instrumentation and applications.
 2. **FTIR Spectroscopy:** Principles-molecular vibrations, vibrational frequency and its influencing factors, sampling techniques, instrumentation and applications of FTIR.
 3. **NMR Spectroscopy:** Principle, chemical shifts, shielding and deshielding effects, splitting of signals, computing constants, instrumentations and applications (H- & C-NMR).


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Recommended Books:

1. Spectrometric Identification of Organic compounds by Robert M Silverstein
2. Principles of Instrumental Analysis by Douglas A Skoog, F. James Holler and Timothy A.Nieman.
3. Spectroscopy by Gary M. Lampman and Donald L. Pavia.

UNIT III Pharmacognosy: (18 Hours)

1. **Basic concepts:** General methods and Principles of extraction methods, types of extraction and their merits and demerits for crude drugs; selection and purification of solvents for extraction; screening of the plant extracts for chemicals. General methods of isolation of different classes of phytochemical.
2. Screening of plant extracts / phytochemicals.

Recommended Books:

1. Instrumental methods of Chemical analysis by B. K. Sharma.
2. Text book of Pharmacognosy by Trease and Evans.
3. A text book of Herbal cosmetics by Vimla Devi.
4. Quality control of herbal drugs and approach to evaluation of botanicals by Puloak Mukherjee.

UNIT IV Pharmacology: (18 Hours)

1. **Pharmacokinetics:** Processes involved in transportation of drug across cell membrane. Absorption, distribution, metabolism and excretion of drugs. Basic concepts of clinical pharmacokinetics: i) Bioavailability & bioequivalence ii) volume of distribution iii) half-life iv) clearance.
2. **Receptor Pharmacology:** Site and mechanisms of drug action, factors modifying drug action. Classification and families of receptors, regulation of receptors, drug receptor interaction theories, dose response curve and therapeutic Index.

Recommended Books:


1. Pharmacology by H. P. Rang and M. M. Dale.
2. Basic and Clinical Pharmacology by B. G. Katzung.
3. Essentials of Medical Pharmacology by K. D. Tripathi.
4. Principles of Pharmacology by H. L. Sharma and K. K. Sharma.

UNIT V Pharmaceutical Biotechnology: (18 Hours)

1. Proteins and nucleic acids and their structure and features, genetic Engineering, enzymes and vectors in genetic engineering, concepts of cloning, cDNA and genomic libraries, cloning for production of biopharmaceuticals, screening and detection methods for clones. Recombinant DNA products and their applications, immune System- Innate and acquired immunity, monoclonal antibodies and immunological techniques.
2. Basic techniques of mammalian cell culture in vitro; disaggregation of tissue and primary culture, maintenance of cell culture; cell separation, and applications of mammalian cell culture. Different areas and applications of plant tissue culture. Nutritional components of tissue culture media. Totipotency, Transgenic Plants and animals and their applications, Bioinformatics overview and applications.

Recommended Books:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA by B.R. Glick and J.J. Pasternak.


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