

BIOPHARMACEUTICS & PHARMACOKINETICS

Practical Lab Revision & Lecture Schedule

LECTURE 1: Dissolution Studies & BCS

Practicals 1 – 6

EXPERIMENTS INCLUDED

- **Prac 1:** BCS Class Assignment
- **Prac 2:** UV Calibration Curves (Paracetamol, Diclofenac, Ibuprofen)
- **Prac 3:** Effect of Media pH on Paracetamol Dissolution
- **Prac 4:** Effect of Surface Area on Paracetamol Dissolution
- **Prac 5:** Comparative Dissolution Profiling (Test vs. Reference)
- **Prac 6:** Formulation Factors (Immediate vs. Sustained Release)

CORE DELIVERABLES & VIVA PREP

- Procedure write-ups & apparatus setup (USP Type I & II)
- Dissolution kinetics & medium pH impact
- BCS Class rules (Class I–IV parameters)
- Beer-Lambert Law & UV spectrophotometry
- Sink conditions & release profiles

LECTURE 2: PK Calculations & Clinical Dosing

Practicals 7 – 14

EXPERIMENTS INCLUDED

- **Prac 7:** Zero-Order PK Data Plotting & Parameter Determination
- **Prac 8:** First-Order PK Data Plotting & Parameter Determination
- **Prac 9:** AUC Calculation via Trapezoidal Rule
- **Prac 10–12:** Special Population Dosing (Obese, Pediatric, Elderly)
- **Prac 13–14:** Dose Adjustments in Renal & Hepatic Impairment

FORMULAS & CLINICAL LOGIC

- Zero vs. 1st order: $C = C_0 - k_0 t$ vs. $\ln C = \ln C_0 - kt$
- Elimination half-life ($t_{1/2}$) determinations
- AUC calculation via Trapezoidal Rule
- Cockcroft-Gault CrCl equation for renal dosing
- Weight-based dosing (Lean vs. Total Body Weight)

LECTURE 3: Permeation, Binding & Animal Handling

Prac 15–18 & 20–22

EXPERIMENTS INCLUDED

- **Prac 15:** Membrane Permeability Assessment
- **Prac 16:** Permeation Enhancers across Dialysis Membrane
- **Prac 17:** Intestinal Permeation Study (Ex-Vivo)
- **Prac 18:** Ibuprofen Protein Binding Efficiency
- **Prac 20:** Animal Handling & Dose Administration
- **Prac 21:** Blood Sampling & Plasma Harvesting
- **Prac 22:** Drug Extraction (Paracetamol) from Plasma

DATA TABLES & TECHNIQUES

- Tabulation of donor/receiver concentrations & flux (J)
- Protein binding efficiency percentage tables
- In-vivo routes (oral gavage, IV, IP)
- Centrifugation parameters for plasma separation
- Biological sample drug extraction methods

Note: Practical 19 excluded

LECTURE 4: Compartmental Modeling & Bioavailability

Practicals 23 – 29

EXPERIMENTS INCLUDED

- **Prac 23–25:** 1-Compartment PK (IV Bolus, Infusion, Oral)
- **Prac 26:** 2-Compartment Model (IV Bolus)
- **Prac 27:** Bioavailability Computing (AUC , C_{max} , T_{max})
- **Prac 28:** Absolute & Relative Bioavailability / Bioequivalence
- **Prac 29:** Absorption Rate Constant (k_a) Determination

CRITICAL GRAPH & PARAMETER ANALYSIS

- Linear & semi-log C_p vs. time graph plotting
- Method of Residuals (Feathering) for 2-compartment
- Wagner-Nelson method for oral k_a
- Extraction of C_p , V_d , CL , α , β
- Notebook verification: unit checks & axis labels

