**Principles of Pharmacokinetics**
**SHENANDOAH UNIVERSITY**
**Bernard J. Dunn School of Pharmacy**
**REMEDIATION COURSE SYLLABUS**

**600: Principles of Pharmacokinetics**

**COURSE DESCRIPTION:**
This course is primarily lecture format with three recitations and presents the theoretical mathematical and functionally dependent physiologic relationships that comprise the quantitative basis for determining patient specific and drug dosage regimens. This course emphasizes interpreting the (1) rate or time course of drug absorption and elimination, and (2) extent of in vivo distribution from data, graphs, and equations to calculate, identify, and monitor safe and therapeutically effective drug in plasma concentrations, especially for narrow therapeutic range drugs. This course is 3 credit hours for Shenandoah University visiting students.

**COURSE FORMAT:**
The lectures are devoted to explanations of theoretical and functional principles. The recitations are for practice only and intended for students to apply the information from the lectures to assigned problems that are similar to those found on the exams. Three exams will be given during the course, which are equally weighted to determine the course grade for Shenandoah University visiting students. Question types will vary, and include patient cases with calculations to assess application of the material. *Note: The number of exams may vary based on the academic year in which the course is offered.*

**COURSE OBJECTIVES:**
At the completion of this course, the student will be able to:

1. Define, explain and differentiate fundamental principles and functional relationships of primary parameters of pharmacokinetics.
2. Calculate values of primary pharmacokinetic parameters from (a) drug in plasma concentration and post-dosing time data expressed in graphs, tables, and equations, and (b) other relevant pharmacokinetic information.
3. Identify and evaluate the potential of the following factors to either not change, or significantly decrease or increase the rate and extent of drug absorption and elimination, and the extent of drug distribution:
    a. route of administration
    b. characteristics of drug dosage form or delivery system
    c. functional status of elimination organs and tissues, gastrointestinal tract, and cardiovascular system
    d. biosocial practices, including eating, alcohol consumption, and smoking
4. Calculate the amount and frequency of drug dosage, or dosage regimen, using patient-specific and drug-specific information regarding bioavailability, elimination half-life, clearance, and apparent volume of distribution.

**REQUIRED TEXTS AND MATERIALS:**
- Spruill WJ, et al. Concepts in Clinical Pharmacokinetics, 6th edition. American Society of Health-System Pharmacists; 2014. ISBN: 978-1-58528-3873

Note: Editions may vary depending on availability. Course content may be subject to copyright.

**GRADING SCALE** *(for students completing the course as a Shenandoah University visiting student)*

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|---|---|
| A | 90-100% |
| B | 80-89% |
| C | 70-79% |
| D | 60-69% |
| F | < 60% |

**TOPICS:**

- Basic Pharmacodynamic Concepts
- Therapeutic Drug Monitoring
- Pharmacokinetic Models
- Compartmental Models
- Plasma Drug Concentration versus Time Curves
- Volume of Distribution and Body Fluids
- Clearance
- First-Order and Zero-Order Elimination
- Elimination Rates
- Elimination Rate Constant
- Half-life
- Relationship among Pharmacokinetic Parameters
- Intravenous Bolus Dose Model
- Intravenous Bolus Dose at Steady State
- Accumulation Factor
- Average Steady-State Concentrations with Intravenous Bolus Dosing
- Predicting Steady-State Concentration
- Relationship of Pharmacokinetic Parameters
- Continuous Infusions
- Loading Dose
- Multiple Intravenous Infusions (Intermittent Infusions)
- Two-Compartment Models
- Calculating Two-Compartment Parameters
- Biexponential Equation and Volumes of Distribution
- Introduction to Biopharmaceutics
- Bioavailability
- Oral Absorption Model
- Controlled-Release Products
- Drug Distribution
- Body Tissue Characteristics
- Disease States Affecting Distribution
- Lipid Solubility of the Drug
- Regional Differences in Physiologic pH
- Physiologic Model
- Protein Binding
- Drug Elimination
- Biotransformation
- Hepatic Clearance
- First-Pass Effect
- Renal Elimination
- Relationship Between Renal Clearance and Glomerular Filtration Rate

*Note: Topics may vary based on the academic year in which the course is offered.*