Jerash University

Faculty: *Pharmacy*

Department: *Clinical Pharmacy and Therapeutics*

Academic Year: 2016/2017

Semester : *Second*

(Course Syllabus)

Subject Title	*Credit Hours*	*Course No.*	*Prerequisite*	*Lecture times*
Pharmacokinetics	3			Sunday, Tuesday 2:00-3:30

Lecturer	*Room No.*	*Office Hours*
Eyad Qunaibi, Associate Prof.		Sunday, Tuesday 12:30-2:00

Course Description:

This course explains the basic principles of pharmacokinetics related to the absorption, distribution, metabolism, & excretion of drugs. The (Mathematical) models will be used to describe the pharmacokinetic of the drug in the body after oral administration, IV bolus dose, IV infusion, and multiple dosing. The students will learn how to design dosage regimens and modify these regimen according to patient factors and diseases.

Course Aim:

This course aims to introduce the pharmacy students to the terminology and fundamental concepts of pharmacokinetics that determine the timecourse of drug concentrations in the body, during single and multiple dosing of IV and oral drugs.

Intended Student Learning Outcomes:

Following the successful completion of this course, the student should be able to:

1. Scientifically describe the primary pharmacokinetic parameters of bioavailability, volume of distribution, and clearance.
2. Scientifically describe the physiological determinants of these parameters.
3. Differentiate between compartmental and non-compartmental analysis.
4. Calculate primary and secondary pharmacokinetic parameters from plasma concentration-time plot and urinary data.
5. Design dosage regimens.
6. Identify patient factors (like disease or concomitant drug therapy) which require a modification of normal drug dosing regimen.
7. Design a modified dosage regimen according to these factors.
8. Evaluate pharmacologic response
9. Select the most suitable route of drug administration for a particular drug in a particular patient.

Course Content:

Week	*Topic Details*	*Main Reference (chapter)*
1, 2	**Introduction and overview** Important definitions and descriptions, Sites of drug administration, Review of ADME processes, Rate processes.	1
3, 4	**One-Compartment Open Model: Intravenous Bolus Administration** The apparent volume of distribution, The elimination half life ($t_{1/2}$), The elimination rate constant (K_{el}), Plotting drug concentration versus time, Intravenous bolus administration: monitoring drug in urine, Use of urinary excretion data	3
5,6	**Clearance concepts** Clearance definitions, Organ clearance, Physiological approach to clearance, Estimation of systemic clearance, Calculating renal clearance (Cl_r) and metabolic clearance (Cl_m), Determination of the area under the plasma concentration versus time curve: application of the trapezoidal rule, Elimination mechanism, Use of creatinine clearance to determine renal function	4
	First Exam	
7,8	**One-Compartment Open Model: Continuous intravenous infusion** Monitoring drug in the body or blood, Sampling drug in body or blood during infusion, Sampling blood following cessation of infusion, Use of post-infusion plasma concentration data to obtain half life, elimination rate constant and the apparent volume of distribution	10
9,10	**Multiple dosing: intravenous bolus administration** Useful pharmacokinetic parameters in multiple dosing, Designing the dosage regimen for a drug, Concept of drug accumulation in the body (R), Determination of fluctuation (F), Number of doses required to reach a fraction of the steady-state condition, Calculation of loading and maintenance doses, Maximum and minimum drug concentration at steady state	11
	SECOND EXAM	
11, 12	**Tow-Compartment Open Model: Intravenous Bolus Administration** Determination of the post-distribution rate constant (β) and the coefficient (B), Determination of the distribution rate constant (α) and the coefficient (A), Determination of micro rate constants, Determination of volumes of distribution	13
13,14	**Extravascular routes of drug administration** Drug remaining to be absorbed, Determination of elimination half life ($t_{1/2}$) and elimination rate constant (K_{el}), Absorption rate constant (K_a), Lag time (t_0), Some important comments on the absorption rate constant, The apparent volume of distribution (V_d), Time for maximum drug concentration, Peak time (t_{max}), Maximum (peak) plasma concentration (C_{max}), Example for extravascular route of drug administration, Flip-flop kinetics	6
	FINAL EXAM	

Grade Distribution:

Your course grade will be determined by the following:

Assessment Method	*% of Final Grade*
First examination	20%
Second examination	20%
Final examination	40%
Quizzes, Answers to lecture questions, Home works	20%
Total	100%

Course Policies:

- Attendance is Mandatory. The maximum allowed number of absences is 15% of the course hours, which is equal to 3 sessions of the (1:30 hr.) lectures.
- The student will fail the subject (without warning) if he has more than 3 absences.
- Any participation or commitment of cheating will lead to applying all following penalties together:
    1. Failing the subject he/she cheated at
    2. Failing the other subjects taken in the same course
    3. Not allowed to register for the next semester. The summer semester is not considered as a semester
- **لا توجد اختبارات تكميلية إلا في حالة مبيت الطالب في مستشفى لمرض أو وفاة قريب من الدرجة الأولى مع الوثائق المثبتة لكل من الحالتين. والاختبار التكميلي في هذه الحالة ليس نفس الاختبار الأصلي.**

References:

Reference 1: Basic Pharmacokinetics. Sunil S. Jambhekar and Philip J. Breen. 2nd edition, 2012.
Reference 2: Basic Pharmacokinetics and Pharmacodynamics: An Integrated Textbook and Computer Simulations. Sara E. Rosenbaum. 2nd edition, 2017.

Course Coordinator: _____ Signature: _____ Date: _____

Head of Department: _____ Signature: _____

Dean:_____ Signature: _____