Nirmala College of Pharmacy Muvattupuzha							
Curriculum Planning							
Program	**Pharm D**						
Course	**Biopharmaceutics**				**Course Code**	**PD 4.5**	
Year/ Semester	**IV Year**						
CO Code	**Course Outcomes**					**Bloom level**	
CO 1	Describe the concept behind the biopharmaceutics, pharmacokinetics and design of dose and dosage regimen					Understand	
CO 2	Use plasma data and derive the pharmacokinetic parameters to describe the process of drug absorption, distribution, metabolism and elimination.					Apply	
CO 3	Design and evaluate dosage regimens of the drugs using pharmacokinetic and biopharmaceutic parameters.					Evaluate	
CO 4	Critically evaluate biopharmaceutic studies involving drug product equivalency and Assess the reason for poor bioavailablity of drug and methods to overome the poor bioavilability					Evaluate	
CO 5	Detect potential clinical pharmacokinetic problems and apply basic pharmacokinetic principles to solve them					Evaluate	
Topic Number	**Topic**	**Hours required**	**Topic Outcome**	**Teaching Aid**	**Teaching Pedagogy**	**Assessment Method**	**Bloom level**
Unit I Introduction to Biopharmaceutics							
Up on completion of the topic the student must able to 1) Describe the various factors that affecting the process of ADME. 2) Analyze or assess the bioavailabilty of drug based on the factors, and reason for the actual bioavailabilty of drugs							
1.01	Mechanism of absorption	2	Up on completion of the topic the student must able to 1) Explain the various mechanism of absorption	https://www.youtube.com/watch?v=y5Gq136538U	Teacher centric Method	Test	Understand
1.02	Factors affecting absorption - Physiochemical factors	3	Up on completion of the topic the student must able to 1) Describe the various physico chemical factors affecting absorption, 2) Apply the knowledge to assess the absorption of a given drug	weak acid and base principle. https://www.youtube.com/watch?v=5sb3SLwwUSw, ph , pka, - https://www.youtube.com/watch?v=yiw4bE8pOgg https://www.youtube.com/watch?v=5BIgSGFPoaM	Teacher centric Method, Case study	Test	1) Understand 2)Apply
1.3	Factors affecting absorption - Pharmacotechnical factors	2	Up on completion of the topic the student must able to 1) Describe the various technical factors affecting absorption 2) Apply the knowledge to assess the absorption of a given drug	Images and graphical representation	Participative learning Case study	Test	1) Understand 2)Apply
1.4	Factors affecting absorption - Patient related factors	2	Up on completion of the topic the student must able to 1) Describe the various Patient related factors affecting absorption 2) Apply the knowledge to assess the absorption of a given drug	NA	Seminar	Test	1) Understand 2)Apply
1.5	Distribution Introduction, Factors affecting Distribution	3	Up on completion of the topic the student must able to 1) Describe the various factors affecting distribution 2) Apply the knowledge to assess the distribution of a given drug	steps in distribution, Barriers to distribution images BBB: https://www.youtube.com/watch?v=noWwbvmdhL0 CSF: https://www.youtube.com/watch?v=D4gq8MILGns	Teacher centric Method, Case study	Test	1) Understand 2)Apply
1.6	Protein binding	4	Up on completion of the topic the student must able to 1) Describe the process of protein binding factors and its significance 2) Apply the knowledge to assess the distribution of a given drug	Images, https://www.youtube.com/watch?v=mQPY1WrkNDE	Teacher centric Method, Case study	Test	1) Understand 2)Apply

1.7	Introduction to Biotransformation PhaseI and Phase II	1	Up on completion of the topic the student must able to 1) Describe the mechanism of metabolism and and oxidation reduction cycle	Images	Teacher centric Method, Case study	Test	1) Understand
1.8	Phase I	8	Up on completion of the topic the student must able to 1) Illustrate various metabolic pathways of drugs	Images	Seminar	Test	Remember
1.09	Phase II	3	Up on completion of the topic the student must able to 1) Illustrate various metabolic pathways of drugs	Images	Seminar	Test	1) Understand
1.1	introduction to excretion, renal excretion, concept of clearence	3	explain the mechanism of renal route of excretion, describe factors affecting renal excretion, describe the consept of clearence	https://www.youtube.com/watch?v=pv5-GwJ90ZM	personolized learning(group discussion)	viva	understand
1.2	non renal route of excretion: biliary, salivary, pulmonary, mammary, skin, GI	3	explain mechanism of nonrenal exretion, describe factors affecting each route of excretion	https://www.youtube.com/watch?v=zKj1qFm2BIM	direct instruction	test paper	understand
Unit 2 Introduction to Pharmacokinetics.							
Up on completion of the topic the student must able to 1) draw and describe various models							
2.1	Various mathematical models	2	Up on completion of the topic the student must able to 1) demonstrate the various mathamatical models and its concepts	Demonstration	Teacher centric Method	Test	Understand
Unit 3 One compartment open model							
Up on completion of the topic the student must able to 1) determine the kinetic parameters of a drug from its plasma drug concentration which follows one compartment model							
3.1	One compartment Iv bolus	3	Up on completion of the topic the student must able to 1) Derive the equation for iv bolus, 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.) Understand 2) Apply
3.2	One compartment Iv Infusion	2	Up on completion of the topic the student must able to 1) Derive the equation for iv infusion, 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.) Understand 2) Apply
3.3	One compartment Extra vascular	4	Up on completion of the topic the student must able to 1) Derive the equation for extra vascular , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.) Understand 2) Apply
3.4	Wagner nelson method	1	Up on completion of the topic the student must able to 1) Derive the equation and to 2) determine the value of Ka	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.) Understand 2) Apply
Unit 4 Multicompartment models							
Up on completion of the topic the student must able to 1) determine the kinetic parameters of a drug from its plasma drug concentration which follows multi compartment model							
4.1	Two compartment open model Introduction	1	The student able to diffferentiate a two compartment from one compartment	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	Analyse
4.2	IV bolus, IV infusion and oral administration	3	Up on completion of the topic the student must able to 1) Derive the equation , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.)Understand 2)Apply
Unit 5 Multiple – Dosage Regimens							
Up on completion of the topic the student must able to 1) determine the kinetic parameters of a drug from its plasma drug concentration afetr multiple dosing of a drug							

5.1	Introduction	1	Up on completion of the topic the student must able to describe the principle of super position or drug acumulation	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.)Underst and
5.2	Repititive Intravenous injections – One Compartment Open Model	2	Up on completion of the topic the student must able to 1) Derive the equation , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.)Underst and 2)Apply
5.3	Repititive Extravascular dosing – One Compartment Open model	1	Up on completion of the topic the student must able to 1) Derive the equation , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.)Underst and 2)Apply
5.4	Multiple Dose Regimen – Two Compartment Open Model	1	Up on completion of the topic the student must able to 1) Derive the equation , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method/ Experientia l learning	Test	1.)Underst and 2)Apply
Unit 6 Nonlinear Pharmacokinetics							
Up on completion of the topic the student must able to 1) determine the kinetic parameters of a drug from its plasma drug concentration of it follows non linear kinetics							
6.1	Factors causing Non-linearity	2	Up on completion of the topic the student must able to 1)Explain the possible reson for non linear pharmakokinetics	NA	Teacher centric Method	Test	Understan d
6.2	Michaelis-menton method of estimating parameters.	2	Up on completion of the topic the student must able to 1) Derive the equation ,	Graphical representaions	Seminar	Test	Understan d
Unit 7 Noncompartmental Pharmacokinetics							
Up on completion of the topic the student must able to 1) determine the kinetic parameters of a drug from its plasma drug concentration by non compartment method							
7.1	Statistical Moment Theory	1	Up on completion of the topic the student WILL ABLE TO descirbe the theory	NA	Teacher centric Method	Test	Remember
7.2	MRT for various compartment models	1	Up on completion of the topic the student must able to 1) Derive the equation , 2)Apply the knowledge to determine the compartment model it follows and varios pharmacokinetic parameters of drug	Graphical representaions	Teacher centric Method	Test	Understan d
7.3	Physiological Pharmacokine tic model	1	Up on completion of the topic the studentable TO descirbe the model	Demonstartion	Teacher centric Method	Test	Understan d
Unit 8 Bioavailability and Bioequivalence							
unit outcome: at he end of this topic student has to describe the types of bioavailability and its objectives and different methods used to determine bioavailability							
8.1	bioavailability , introduction, objectives, advantages, disadvantages	1	at the end of this topic student has to describe bioavailabity and its objectives	https://www.youtube.com/watch?v=SbI5Meo8dKw	direct instruction	viva	understand
8.2	bioavailabity determination methods	2	at the end of this topic student has able to describe the pharmacokinetic and pharmacodynamic methods used to determine bioavailability	graph and image	direct instruction	testpaper	understand

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