

Drug and Gene Delivery in Biomedicine (3 Credits)

生物学中的药物和基因传递

Instructor	Jeoung Soo LEE, Bioengineering Department, Clemson University (ljspia@clemson.edu)		
Synopsis	This course will introduce drug design, development, and delivery in the context of creating biomaterial-based delivery systems and applying pharmaceutical therapies in regenerative medicine. An interdisciplinary mix of ideas will be introduced that emphasizes the intersection of engineering and chemistry/biochemistry applied to pharmaceuticals and biopharmaceuticals including DNA, RNA, peptides and proteins. The course will cover the relationship between drug physicochemical properties and fate in our body such as absorption, metabolism, distribution and elimination (ADME) and the mechanism of drug action. Methods will be described to improve the therapeutic efficacy and reduce the toxicity of drugs for the efficient treatment of diseases and regeneration of tissue/organs. The course will also provide students with an understanding of the principles, strategies, and biomaterials used in drug delivery systems, gene therapy, RNA interference (RNAi) and tissue engineering.		
Offering	2018 July Semester (Julmester)		
Audience	Undergraduate and Graduate Students (all majors and all levels) with no prerequisites		
Classroom	Room TBA, Teaching Bldg. No. TBA, Peking University		
Schedule	Class: 1-4 PM, M-F, July 2–20, 2018	Final Exam: 1-4 PM, Sat, July 21, 2018	Total Contact Hours: 45
Objective	To understand the principles, strategies, and biomaterials used in drug and gene delivery systems and to integrate and apply critical considerations in developing advanced drug and gene delivery systems for the treatment of various pathophysiological conditions and repair the injured tissues or organs.		
Topics	<ol style="list-style-type: none"> 1. Introduction, core concepts of drug delivery: dose, delivery route, biodistribution 2. Biomaterials in drug delivery 3. Nanotechnology in drug delivery 4. Gene therapy 5. RNA interference (RNAi) 6. Gene delivery vectors and design (viral and non-viral vectors) 7. Controlled drug and gene delivery 8. Targeted drug and gene delivery 		
References	<ol style="list-style-type: none"> 1. Drug Delivery: Engineering principles for drug therapy by M. Saltzman, Oxford University Press, New York, 2001 2. Biomaterials for delivery and targeting of proteins and nucleic acids by Ram I Mahato, CRC Press 3. Advanced Drug Delivery Reviews: Journal , 1993~present 4. Controlled Drug Delivery by Kinam Park, ACS 		
Grading	Midterm exam	30%	
	Final exam	35%	
	Journal club/Presentation	20%	
	Homework/Assignment	10%	
	Attendance	5%	
	Total	100%	