Spring 2020

Drug Delivery Fundamentals and Applications

16:125:590:01

Pharmaceutical Organic Nanotechnology

16:155:544:01

**CBE MS/ME/PhD students and MBS PharmE/ChemE students should register for 155:544. BME and all other students should register for 125:590.*

Course Instructor: Professor Charlie Roth, cmroth@rutgers.edu

Time and Location: Mon. 5:00-8:00, BME-126.

Office hours: Wednesdays 4:00-5:00 PM in BME-205

LMS: Canvas

Textbook: Saltzman, W. Mark. Drug Delivery: Engineering Principles for Drug Therapy, ISBN 0-19-508589-2 (strongly recommended).

Synopsis: This course will discuss the engineering of novel pharmaceutical delivery systems with enhanced efficacy and safety profiles, with an emphasis on the design and application of materials that overcome drug delivery barriers or challenges. Topics will include drug delivery fundamentals and transport mechanisms, materials and formulations for drug delivery, and applications.

Modes of instruction and assessment: A set of online materials (video lecture, voice over Power Point, and readings) will be available on Canvas each week for initial presentation of core material. In class, we will typically spend 60-80 minutes highlighting key or difficult conceptual points and going over review and example problems. The remainder of class time (30-80 minutes) will be spent on class discussions, often associated with journal articles that you will read before class. In other instances, we will have a guest lecturer/discussant. You will be expected to review the online materials, attempt example problems, and in some cases engage in online discussions **before each class meeting**.

Assessment will be based on weekly assignments, class and online discussions, two exams, and a term project where you will individually write a white paper recommending a drug delivery formulation and design plan for a new drug. The primary objectives of the course are to make students knowledgeable about the design, formulation and evaluation of drug delivery systems; to provide them with sufficient background to be able to read and understand the scientific literature in this area; and to foster creative, yet scientifically-based, thinking regarding novel approaches or fundamental advances to be made in drug delivery.

Grading: Homework assignments – 15%, Discussion – 10%, Exams – 2x25% each, Term project – 25%.

Academic Integrity: This course requires students to summarize the work of others and to create original work. It is critical that work submitted is the student's own work and that due credit is given to others whose work is cited or otherwise utilized. Please review the Academy Integrity policy of the Graduate School at http://gsnb.rutgers.edu/publications/academic_integrity.pdf.

Note: I reserve the right to amend course policies, including the grading rubric, due to changing circumstances at my discretion.

Syllabus (subject to slight alterations)

Week	*Topic*
	Drug Delivery Barriers and Formulations
1	Introduction and Overview
2	Pharmacokinetics
3	Transport in Tissues
4	Cellular and Intracellular Transport of Drugs
5	Drug Conjugates and Nanoparticles
6	Pharmaceutical Dosage Forms
8	Review and Exam 1
	Engineered Drug Delivery Systems
7	Controlled Release Drug Delivery Systems
9	Physiologically Targeted Drug Delivery
10	Precision Targeted Drug Delivery
	Applications
11	Transdermal Drug Delivery
12	GI and Pulmonary Delivery
13	Gene and Oligonucleotide Delivery
14	Review and Exam 2
15	Term Project Submission and Peer Review