DRUG DELIVERY: PRINCIPLES AND ENGINEERING

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INTENDED AUDIENCE : Anyone in bachelors having completed two year

PREREQUISITES : A course in biochemistry, molecular biology, anatomy is recommended

INDUSTRY SUPPORT : All pharmaceuticals, hospitals and biotechnology industries

COURSE OUTLINE :

This course introduces concepts of drug delivery to meet medical challenges. The course is designed to be modular, with each module focusing on the various aspects of drug delivery.

ABOT INSTRUCTOR :

Rachit Agarwal is an associate professor at the Indian Institute of Science, Bangalore, India. He did his undergraduate studies at the Indian Institute of Technology, Kharagpur, India in Biotechnology. Rachit then worked in the field of biomaterial-based drug delivery for his PhD. at the University of Texas at Austin, Texas, USA. His post-doctoral fellowship was in regenerative medicine at the Georgia Institute of Technology, Atlanta, USA. His scientific interests are in developing biomaterial-based delivery vehicles for the treatment of inflammatory and infectious diseases. He is a recipient of the prestigious Ramanujan fellowship, Har-Gobind Khorana Young Biotechnologist award, and DBT/Wellcome Trust India Alliance Intermediate Fellowship. He is also the early career editorial board member for the Journal of Biomedical Materials Research Part A (JBMR-A). Two major areas of interest are in the treatment of Osteoarthritis and using inhalable biomaterials for the prevention and treatment of lung infections to translate science into technologies that can be used in the clinic. More information at https://be.iisc.ac.in/~rachit/

COURSE PLAN :

Week 1 :Pharmacokinetics: Bioavailability, Elimination, Therapeutic index

Week 2 :Prodrugs, Controlled release

Week 3 :Polymers: Synthesis, properties, characterization, crystallinity and amorphousness

Week 4 :Biopolymers: Natural and Synthetic, biocompatibility, Biodegradation, commonly used biopolymers

Week 5 :Polymer-Drug conjugates, PEGylation

Week 6 :Diffusion controlled systems, Ficks laws, Reservoir systems, Non-erodible matrix systems, Bio-erodible Systems

Week 7 :Hydrogels: Physical or chemical, pore-size calculation, in-situ crosslinking

Week 8 :Nano and Micro-particles: Dendrimers, Liposomes, Micelles

Week 9 :Metal and polymeric particles, effect of particle shape, charge and elasticity

Week 10:Protein Adsorption and tissue engineering, Drug delivery in tissue engineering

Week 11:Implant associated infections, Route specific delivery: Oral, Subcutaneous, Intramuscular, transdermal, inhalation, intravenous

Week 12:Vaccines, Cancer vaccines, Cell and gene delivery, Smart responsive drug delivery, Targeted drug delivery, Nanotoxicology and market translation