DRUG DELIVERY: PRINCIPLES AND ENGINEERING

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TYPE OF COURSE : Rerun I Elective UG/PG
COURSE DURATION : 12 weeks (20 Jul'20 - 09 Oct'20)
EXAM DATE : 17 Oct 2020

PRE-REQUISITES : A course in biochemistry, Molecular biology, Anatomy is recommended
INTENDED AUDIENCE : Anyone in bachelors having completed two years
INDUSTRIES APPLICABLE TO : 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

ABOUT INSTRUCTOR : Prof. Rachit Agarwal is working as an Assistant Professor in IISc Bangalore. He completed post-doctoral fellow from Georgia Institute of Technology, Atlanta, Georgia, USA. He had done his PhD in Biomedical Engineering May 2013 University of Texas at Austin, Texas, USA Dissertation title: Effect of shape on cell internalization of polymeric hydrogel nanoparticles.

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, Biocoatibility, 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