PROF. HARINATH CHAKRAPANI  
Department of Chemistry  
IISER Pune

TYPE OF COURSE : Rerun | Core | UG/PG
COURSE DURATION : 12 weeks (18 Jan’ 21 - 09 Apr’ 21)
EXAM DATE : 24 Apr 2021

PRE-REQUISITES : Any student who has done basic organic chemistry and has some knowledge of biochemistry with an interest in drug discovery

INTENDED AUDIENCE : Third year undergraduates of B.Sc. Chemistry; M.Sc. Chemistry students and doctoral students

INDUSTRIES APPLICABLE TO : Companies in the pharmaceutical sector may recognize and value this course.

COURSE OUTLINE :
The main objective of this course is to familiarize students with the fundamental concepts of drug discovery and development. The course is intended for students who have a background in chemistry and interested in the process of drug discovery. The intended outcome is to train students on various aspects of new drug discovery/development, drug screening, target identification, lead discovery, optimization and the molecular basis of drug design and drug action.

ABOUT INSTRUCTOR :
Prof. Harinath Chakrapani completed his undergraduate and post-graduate studies in Chemistry from Loyola College and Indian Institute of Technology Madras, respectively. He moved to Duke University, USA to pursue his doctoral studies and after post-doctoral research stints at Wake Forest University and the National Cancer Institute, USA, he joined IISER Pune in July 2009 and is currently Associate Professor. His research interests are in organic chemistry and chemical biology. His laboratory works on developing new tools to study effects of oxidative stress responses in cells and antibiotic resistance. He has over eight years of teaching experience at IISER Pune.

COURSE PLAN :
Week 1: An overview of drugs and drug targets
Week 2: Principles of enzyme structure, catalysis and inhibition in drug discovery
Week 3: G-Protein coupled receptors, drug-receptor interaction; dose-response curves; case studies
Week 4: Receptors function and ligand binding interactions; Ion channel receptors; kinase-linked receptors
Week 5: Nucleic acids structure and function
Week 6: Synthetic methods in medicinal chemistry
Week 7: Lead discovery; Bioassays; drug targets; Lead Modification
Week 8: Structure-Activity Relationships; Quantitative-structure activity relationships (QSAR)
Week 9: Drug metabolism and pharmacology: Analytical methods in metabolism
Week 10: Prodrugs and drug delivery systems
Week 11: Drug resistance mechanisms and synergism
Week 12: circumventing drug resistance; drug synergy