

Course code: JNC304

Credits: 3:0

Course Name: Bioorganic and Medicinal Chemistry

Instructor: Jayanta Haldar

Introduction to the chemistry of biological molecules (lipids, carbohydrates, amino acids and nucleic acids). Fatty acid, Essential fatty acids, Energy-storage lipids (triacylglycerols), Chemical reactions of triacylglycerols, Membrane lipids (phospholipids, spingoglycolipids, and cholesterol), Cell membrane, Lipid aggregates (Liposome, Vesicle, micelle), Membrane dynamics, Transport across cell membranes, Emulsification lipids (bile acids), Protective-coating lipids (biological waxes), Messenger lipids (steroid hormones and eicosanoids), Cationic synthetic lipids and use in gene delivery, membrane (lipids) as drug target (Antifungal drug, Antimicrobial peptides), lipids (liposome) use as drug delivery system; Carbohydrates, Classification of carbohydrates, Nomenclature of carbohydrates, Reaction of monosaccharide, Glucose testing and diabetes, Disaccharide (maltose, cellobiose, lactose, and sucrose), Lactose intolerance, Galactosemia, Artificial sweeteners, oligosaccharide, polysaccharide (starch, glycogen, cellulose, chitin, hyaluronic acid and heparin), Glycogen, Glycogenesis, Glycogenolysis, Carbohydrate digestion, Glycolipids and Glycoprotein, Cell recognition, Viral entry into host cells (Influenza virus, Herpes simplex virus), Bacterial cell wall, Sugar based drugs and their mechanism. Nucleic acids, Primary and secondary structure of DNA, Replication of DNA, Transcription: RNA synthesis, Genetic code, Translation: protein synthesis, Recombinant DNA and genetic engineering, Polymerase chain reaction (PCR), Nucleic acids as drug targets specially for cancer and infectious diseases, Mechanism of action and resistance, DNA-DNA crosslinker, Alkylating agents, DNA intercalator, Topoisomerase inhibitors, Chain cutters, Chain terminators, Telomere and telomerase inhibitors, Antisense therapy, RNA interference (micro-RNA or Si-RNA therapy).

Reference Books:

1. Voet, D.; Voet, J. G. Biochemistry 2nd edition, Wiley (1995).
2. Nelson, D L; Cox, M.M, Lehninger Principles of Biochemistry, 4th edition, FreeMan and Co, NY, (2007).
3. Patrick, G. L. An Introduction to Medicinal Chemistry, 4th edition, Oxford (2009)
4. Lemke, T. L. Williams, D. A. Roche, V. F. and Zito, S. W. Foyes's Principles of Medicinal Chemistry, 6th Edition, (2008).