



BIOCHEMISTRY - IITM

PROF. K. SUBRAMANIAM

Department of Biotechnology
IIT Madras

PRE-REQUISITES : Introductory-level organic chemistry and biology

INTENDED AUDIENCE : Lifesciences undergraduate students

COURSE OUTLINE :

The immense diversity of life is, surprisingly, formed using fewer than ten elements! Biochemistry is the study of how the complex molecules of life are assembled using these few elements and disassembled back; how these two processes are interconnected in a complex network and regulated; and how sun's energy drives all these molecular dances that we call life. The proposed biochemistry course aims to provide a thorough grounding on the fundamental concepts of biochemistry, and enables the student learn more advanced topics of biology such as structural biology, biotechnology, genomics and proteomics.

ABOUT INSTRUCTOR :

Prof K. Subramaniam received his Ph.D. from the Indian Institute of Science in 1994. His postdoctoral training was at the Johns Hopkins University School of Medicine. Prof Subramaniam joined the faculty of IIT-Kanpur in the Department Biological Sciences & Bioengineering in 2002. He was an International Senior Research Fellow of the Wellcome Trust during 2003-09, and is a Fellow of the Indian Academy of Sciences. He is at the Department of Biotechnology, IIT Madras since 2014. His laboratory investigates the self-renewal and differentiation decisions in adult stem cell systems using the *C. elegans* germline stem cells as a paradigm.

COURSE PLAN :

Week 1: Introduction to biomolecules; stereochemistry

Week 2: Water; Acids and bases; pH; Buffer; Proteins

Week 3: Enzymes

Week 4: Enzyme inhibitors; Carbohydrates

Week 5: Lipids; Introduction to metabolism; Bioenergetics

Week 6: Biological oxidation-reduction reactions; Glycolysis

Week 7: Citric acid cycle; oxidative phosphorylation; ATP synthesis

Week 8: Photosynthesis

Week 9: Nitrogen fixation and amino acid biosynthesis; Catabolism of amino acids

Week 10: Catabolism of lipids

Week 11: Lipid biosynthesis

Week 12: Hormonal regulation and integration of metabolism