



BIOCHEMISTRY

PROF. SWAGATA DASGUPTA

Department of Chemistry

IIT Kharagpur

PRE-REQUISITES : Basic concepts in Chemistry and Biology

INTENDED AUDIENCE : Core course BSc/MSc/MS/PhD

COURSE OUTLINE :

This course is an introductory course that will focus on basic concepts in biochemistry. The course deals with an understanding of biological macromolecules: proteins, carbohydrates, lipids, and nucleic acids. The structure and functional roles of the macromolecules will be studied in addition to fundamentals of enzyme chemistry: kinetics, mechanisms, inhibition, structure and mechanism. The course will also touch upon the basics of membrane transport and bioenergetic principles. After completion of the course, the students should be able to understand the chemical properties and three-dimensional structure of these biological macromolecules in relationship to their biological function.

ABOUT INSTRUCTOR :

Professor Swagata Dasgupta completed her B.Sc. (Hons) in Chemistry from Presidency College, Kolkata and her M.Sc. from IIT Kanpur. After a Post M.Sc. in Bioscience she obtained her Ph.D. from Rensselaer Polytechnic Institute, USA. She then joined IIT Kharagpur and initiated research in Protein Chemistry in the Department of Chemistry at IIT Kharagpur. Her areas of interest are protein-protein and protein-small molecule interactions and protein structure analyses. Professor Swagata Dasgupta has contributed to teaching and research at IIT Kharagpur for the past 25 years. She has over 150 publications in peer reviewed journals with over 3800 citations. Her interdisciplinary research activities in biophysical chemistry have led to several ongoing research collaborations. Over the years her laboratory has become an active center of research with generous support from funding agencies. Graduate students from her laboratory are well-placed both in India and abroad. Her teaching contributions range from classroom teaching, web-course development, introduction of new courses and teaching laboratories, development of curriculum, and initiation of research in a new area in the department. A video course in Biochemistry under the aegis of the National Program on Technology Enhanced Learning funded by the Ministry of Human Resource Development has received overwhelming response worldwide by both students and educators. She has given many popular lectures to young scholars and students and has been invited to inspire young women to science. She has served on many Interview boards and is also actively involved as a reviewer in many journals. Her contributions have been recognized by the award of the Bronze medal by the Chemical Research Society of India (CRSI) for 2016. She also received the Darshan Ranganathan Memorial Lecture Award of CRSI in 2013. She was inducted as a Fellow of the West Bengal Academy of Science and Technology, India in 2014. She is an elected Member of the National Academy of Science, Allahabad since 2013 and a Fellow of the Indian Academy of Sciences, Bangalore since 2018.

COURSE PLAN :

Week 1: Amino Acids

Week 2: Protein Structure

Week 3: Protein Structure (continued)

Week 4: Enzymes

Week 5: Enzymes(continued)

Week 6: Enzyme mechanisms

Week 7: Lipids and Membranes

Week 8: Nucleic acids

Week 9: Vitamins and Coenzymes

Week 10: Carbohydrates

Week 11: Bioenergetics

Week 12: Metabolism