

EXPERIMENTAL BIOCHEMISTRY



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PRE-REQUISITES : Biochemistry desirable

INTENDED AUDIENCE : CHEMISTRY, BIOCHEMISTRY & BIOTECHNOLOGY (Any student with a course in Biochemistry in their curriculum)

INDUSTRIES APPLICABLE TO : Biotech & Pharma companies

COURSE OUTLINE :

For undergraduate students in the discipline of biochemistry, molecular biology, chemistry and other related biological sciences, the biochemistry laboratory course has become an integral part. It is necessary for students to acquire skills in working with biomolecules in the laboratory. This course is designed to train students with the basic biochemistry laboratory techniques and also introduce some higher level concepts that will prepare them for future research and development projects. The course outline is given for each week. We will introduce each topic and give an overview of the topic and underlying theory. This will be followed by actual demonstration of the experiment. Weekly assignments will be provided and graded.

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.

Prof. Soumya De did his BSc. (Hons) and MSc from IIT Kharagpur. He completed his PhD from Cornell University, USA followed by postdoctoral research at University of British Columbia, Canada. He joined IIT Kharagpur as Assistant Professor in 2015. His research interest include biophysics, biochemistry, enzymology, signal transduction and regulation of gene expression, and protein engineering. The overarching research goal of Dr. Soumya De's laboratory is to decipher the structural and dynamic principles that govern protein functions and their regulation. This is achieved using solution NMR spectroscopy and other biophysical methods that characterize the structure and dynamics of proteins.

COURSE PLAN :

Week 1: Basics of Experimental Biochemistry

Week 2: Amino Acid Titration and pI determination

Week 3: Spectroscopic techniques

Week 4: Protein folding and denaturation studies

Week 5: Chromatographic techniques

Week 6: Gel electrophoresis of DNA and proteins

Week 7: Isolation and characterization of proteins

Week 8: Enzyme Kinetics

Week 9: Isolation and characterization of DNA

Week 10: Basics of rDNA technology

Week 11: Protein ligand interactions

Week 12: Immunoassay techniques