

Course contents submitted for Structural Biology

1. Faculty: FLSB

2. Course Code:

3. Course Title: Structural Biology

4. Number of Credits: Two

5. Course objective:

To provide an understanding of modern approaches to the study of biological macromolecules. Particular emphasis will be given to how structural techniques have been used to elucidate fundamental aspects and problems in biology.

6. Minimum prerequisites for taking this course, if any: Bachelors degree in life sciences or allied areas.

7. Course structure with units, if applicable:

- a. **Biology/Chemistry of Protein Structure:** Protein Assembly, Folding, Packing and Interaction; Primary, Secondary, Tertiary and Quaternary structures; Class, Fold, Topology
- b. **Characterization of Proteins:** Gel electrophoresis, Dynamic light scattering, Mass-spec, and Circular Dichroism spectroscopy
- c. **The relationship between protein structure and function**
- d. **Methods in Molecular Biophysics**
 - X-ray Crystallography: Crystallization principle, Crystallization techniques and Crystal Systems
 - NMR spectroscopy: Principle of NMR spectroscopy and Sample preparation for NMR
 - Small angle X-ray diffraction
- e. **Structural Bioinformatics (theory and workshop)**
- f. **Lab experiments:** Protein purification and crystallization

8. Reading suggestions:

- a. Arakawa, T. and Timasheff, S. N. Theory of protein solubility. Methods in Enz. 114:49-77, 1985.
- b. Stura, E. A., Nemerow, G. R., and Wilson, I. A. Strategies in protein crystallization. J. Cryst. Growth. 110:1-12, 1991.
- c. C. Branden, J. Tooze. "Introduction to Protein Structure." Garland Science Publishing, 1999.
- d. Crystal Structure Determination by: Werner Massa (March 31, 2004)
- e. Fundamentals of Crystallography edited by C. Giacovazzo (July 15, 2002)
- f. Crystallography Made Crystal Clear by: Gale Rhodes (February 16, 2006)
- g. "Spin Dynamics: Basics of Nuclear Magnetic Resonance" by Malcolm H Levitt
- h. "Nuclear Magnetic Resonance Spectroscopy in Molecular Biology" by A Pullman

9. Evaluation:

Theory:	Mid-semester Written Examination	: 40% Marks
	End-semester Written Examination	: 40% Marks
	Quiz / Assignment/Presentation (oral / poster)/other	: 20% Marks