



Structural Biochemistry I

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Summary:

This course introduces students to the principles of modern structural biology. The objective is to convey the importance of understanding fundamental biological processes in terms of the atomic properties of the macromolecules that participate in them. In the first part of the course we identify recurring structural principles and motifs and show how proteins with unrelated functions are built up from combinations of these. The course introduces methods of structure determination by X-ray crystallography and NMR.

In the second part of the course we use specific examples from the current literature to illustrate general structural principles. The principles of protein-nucleic acid recognition essential for understanding the regulation of DNA transcription are derived from case studies of eukaryotic transcription factors. We demonstrate how enzymatic reaction mechanisms can be deduced from structural information combined with biochemical experiments through published studies of serine proteases, and polymerases. Other topics often covered include immunoglobulins and proteins involved in signal transduction. Structural biology of large macromolecular assemblies, such as the ribosome, are also discussed.

A series of problem sets has been developed to reinforce the application of the principles developed in formal lectures. Because of the uniquely visual aspects of the subject matter we have incorporated molecular graphics tutorials so that students can study at their leisure using personal computers. Additionally, we instruct the student in the use of the Internet to view structures to address problems that may arise in their own research.