

# Topics covered in this course

## 1. Principles of Biochemistry

The foundations of Biochemistry.

Energy and principles of bioenergetics.

## 2. Water

Non-covalent interactions.

Properties of water.

Acid/base properties, pH buffering capacity.

## 3. Protein Composition, Structure, and Stability

Amino acids – structures, nomenclature, chemistry.

Primary structure – the peptide bond, sequence homology, and evolution, synthesis.

Working with proteins – methods for protein purification and analysis.

Secondary structure –  $\alpha$ -helices,  $\beta$ -sheets, turns, Ramachandran plot.

Tertiary structure, protein motifs & structure classification.

Quaternary structure.

Protein folding and dynamics.

Methods for protein structure determination.

## 4. Protein Function

Protein-ligand interactions. Oxygen-binding proteins.

Quantitative analysis of protein-ligand interactions.

Cooperativity, allostery.

Enzymes – how they work.

Enzyme kinetics – Michaelis-Menten equation, Lineweaver-Burke plots etc.

Enzyme inhibition – mechanisms.

Examples of enzymatic reactions.