

## **Protein Structures and Functions: FS-512**

- **Protein structure and function I:** amino acids structures and properties, standard versus nonstandard and essential versus nonessential amino acids, peptides, proteins, interaction of proteins with water (polyelectrolytes, micelles properties), protein folding, definition and examples of primary, secondary, tertiary and quaternary structures of proteins, posttranslational proteins modifications, cytoplasmic versus membrane proteins

- **Protein structure and function II:** structure and properties of the peptide bond, structural hierarchy in proteins, structure and function of fibrous proteins, structure analysis of globular proteins, protein folding and denaturation. With particular emphasis on a protein important in human nutrition, albumins, caseins, gluten, fibrous proteins: (collagen, myosin, actin, keratin)

- **Protein structure and function III:** methods of peptide and proteins characterization, include protein purification methods, example of method used to investigate of protein structure; crystallography, mass spectrometry and 1D and 2D NMR

- **Basic enzyme kinetic I:** What is enzyme kinetics? physiological and biotechnological significance of enzymes, origin of catalytic power of enzymes, chemical mechanisms of catalysis, six classes of enzymes, mechanisms of chymotrypsin and lysozyme or other enzymes of interest, kinetics and enzyme inhibition

- **Basic enzyme kinetic II:** Enzyme activity can be regulated; regulation can be by: noncovalent modification, covalent modification, irreversible, reversible, allosteric enzymes examples

- **Basic enzyme kinetic III:** enzyme inhibition (competitive, uncompetitive, mixed inhibition), irreversible versus reversible inhibitors, reversible inhibitor can bind to the free enzyme and prevent the binding of the substrate or to the enzyme-substrate complex and prevent the reaction

- **Basic enzyme kinetic IV:** Michaelis-Menten kinetics, product inhibition, cooperative kinetics, Hill equation and multiple substrate enzymes, single- and two-substrate enzymatic reactions, design of an enzyme kinetic experiment and data processing

-**Biotechnology of enzymes:** examples of large scale enzymes production and purification using plants, animals or microorganism