ONLINE CERTIFICATE COURSE ON
ENZYME SCIENCES AND TECHNOLOGY
14-20 April 2025

INTRODUCTION TO ENZYMES

a. **General Properties of Enzymes:**
   i. Definition, characteristics, and biological importance.
b. **Enzyme Nomenclature and Classification:**
   i. IUBMB system of enzyme classification (EC numbers).
   ii. Examples of each class (oxidoreductases, transferases, hydrolases, etc.).

ENZYME SPECIFICITY AND CATALYTIC MECHANISMS

a. **Enzyme Specificity:**
   i. Lock-and-key model vs. induced-fit model.
b. **Catalytic Mechanisms:**
   i. Acid-base catalysis (e.g., chymotrypsin).
   ii. Covalent catalysis (e.g., serine proteases).
   iii. Transition metal catalysis (e.g., carbonic anhydrase).
c. **Role of Cofactors and Coenzymes:**
   i. Examples: NAD^+, FAD, metal ions (Zn^{2+}, Mg^{2+}).

ENZYME KINETICS

a. **Michaelis-Menten Kinetics:**
   i. Derivation of the Michaelis-Menten equation.
   ii. Significance of Km and Vmax.
b. **Briggs-Haldane Steady-State Assumption:**
   i. Comparison with the equilibrium assumption.
c. **Determination of Km and Vmax:**
   i. Lineweaver-Burk plot.
   ii. Eadie-Hofstee plot.
   iii. Hanes plot.

ENZYME INHIBITION

a. **Types of Enzyme Inhibition:**
   i. Competitive inhibition (e.g., statins inhibiting HMG-CoA reductase).
   ii. Uncompetitive inhibition.
   iii. Non-competitive inhibition.
   iv. Mixed inhibition.
b. **Kinetics of Inhibition:**
   i. Effect on Km and Vmax.
   ii. Graphical analysis using Lineweaver-Burk plots.

MULTI-SUBSTRATE ENZYMATIC REACTIONS

a. **Types of Multi-Substrate Reactions:**
   i. Sequential reactions (ordered vs. random).
   ii. Ping-pong (double-displacement) reactions.
b. **Steady-State Kinetics:**
   i. General rate equation of Alberty.
c. **Kinetics in the Presence of Inhibitors:**
   i. How inhibitors affect multi-substrate reactions.