

## Scopes for Qualifying Examination

Department of Biochemistry, Faculty of Science, Chulalongkorn University

---

The exam paper will cover all aspects of each topic at the advanced biochemistry level.

Recommended Textbooks: Lehninger Principles of Biochemistry and Biochemistry by Voets.

### 1. Nucleic Acids

- a. Nucleic acid structure and chemistry
- b. DNA replication
- c. Transcription
- d. Translation
- e. Genes and chromosomes
- f. Regulation of gene expression
- g. Nucleotide metabolism
- h. Recombinant DNA technology

### 2. Proteins

- a. Amino acids, peptides, and proteins (including working with proteins)
- b. 3-D structures of proteins
- c. Protein function
- d. Amino acid oxidation and biosynthesis

- e. Protein synthesis
- f. Protein targeting and degradation

### 3. Enzymes

- a. Enzyme structure and classification including coenzyme and cofactor
- b. Enzyme catalysis and substrate specificity
- c. Enzyme kinetics and inhibition (single and bisubstrate reactions)
- d. Enzyme mechanism
- e. Enzyme regulation (regulatory enzyme, post-translational control, isozyme)
- f. Applications of enzymes and inhibitors

### 4. Carbohydrates

- a. Structure and function of carbohydrates and glycoconjugates
- b. Carbohydrate metabolism (all pathways in catabolism and anabolism, including their regulations/coordinated regulations. Glycogen metabolism is also included. However, specific carbohydrate metabolism in plants e.g. photosynthesis and photorespiration are excluded from this topic.)

### 5. Lipids

- a. Storage lipids
- b. Structural lipids in membranes
- c. Biological membrane and transport
- d. Fatty acid catabolism
  - i) Digestion, mobilization and transport of fats

ii) Oxidation of fatty acids

iii) Ketone bodies

e. Lipid biosynthesis

i) Biosynthesis of fatty acids

ii) Biosynthesis of triacylglycerols

iii) Biosynthesis of membrane phospholipids

iv) Biosynthesis of cholesterol and steroids

---