

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
