

CH482: BIOCHEMICAL ENGINEERING FUNDAMENTALS

CREDITS = 4 (L = 4, T=0, P = 0)

1. **LIFE PROCESSES:** unit of living system, microbiology, reaction in living systems, biocatalysts, model reactions. 4 Hours
2. **ENZYME CATALYSIS:** mechanistic models for simple enzyme kinetics, M-M equation, various inhibitions of enzymes, models for more complex enzyme kinetics. Immobilization. 10 Hours
3. **STOICHIOMETRY:** Stoichiometry of microbial growth and product formation: stoichiometric calculation, elemental balances, degree of reduction, theoretical prediction of yield coefficient. 5 Hours
4. **FERMENTATION:** Fermentation mechanisms and kinetics: kinetic models of microbial growth and product formation. Sterilization of media and air, sterilization equipment, batch and continuous sterilize design. 6 Hours
5. **SELECTION, SCALE UP, OPERATION AND CONTROL OF BIOREACTORS:** overview of reactor types, some consideration of aeration, agitation and heat transfer, scale up and its difficulties. Transport Processes, Rheological models, Measurement of rheological parameters, gas liquid mass transfer, mass balances for two phase bioreactor. 5 Hours
6. **INTRODUCTION TO BIOCHEMICAL PROCESS INDUSTRIES:** Industrial alcohols, antibiotics, acids, alcoholic beverages, enzymes, vitamins, single cell protein. Food processing and biological waste treatment. Interaction of chemical engineering principles with biological sciences. 6 Hours
7. **WASTE WATER TREATMENT:** activated sludge process, anaerobic digestion, trickling filter. 4 Hours

REFERENCE BOOKS

Title: Bioprocess Engineering
Author: Shuler L M and Kargi F
Publisher: Pearson Education

Title: Bioprocess Engineering
Author: Blanch, W H and Clark, D S
Publisher: Marcel Dekker Inc

Title: Biochemical Engineering Fundamentals
Author: Bailey and Oillis
Publisher: McGraw Hill.