UCH604 BIOCHEMICAL ENGINEERING

L	T	P	Cr
3	1	2	4.5

Introduction to Biochemical Engineering: Comparative study of chemical and biochemical processes, Basic concepts of microbiology.

Biochemical Kinetics: Enzyme Kinetics with one or two substrates, Modulation and regulation of enzyme activity, Enzyme reactions in heterogeneous systems, Immobilized enzyme technology, Industrial application of enzymes.

Microbial Fermentation Kinetics: Fermentation and its classification, Growth-cycle phases (for batch cultivation), Continuous culture, Biomass production in cell culture, Mathematical modeling of batch growth, Product synthesis kinetics, Overall kinetics and thermal death kinetics of cells and spores, Analysis of multiple interacting microbial population.

Bioreactors: Classification and characterization of different bioreactors e.g. Batch and continuous, Mechanically and non-mechanically agitated, CSTR type, Tower, Continuous, Rotating, Anaerobic etc., Design and Analysis of Bioreactors- C.S.T.R. and Air Lift Reactor, Scale up considerations of bioprocesses.

Transport Phenomena in Bioprocess Systems: Agitation and aeration-gas-liquid mass transfer, Oxygen transfer rates, Determination of k_La, Heat balance and heat transfer correlations, Sterilization.

Commercial production of bioproducts: Concept of primary and secondary metabolites, Production processes for yeast biomass, antibiotics, alcoholic beverages and other products.

Instrumentation and control in bioprocess: Various control parameters for bioprocesses: pH, DO foam/level controller, etc.

Text Books:

1. Shuler Michael, Kargi Fikret, Bioprocess Engineering: Basic Concepts, Prentice Hall, Englewood Cliffs (2002).
2. Bailey, J.E. and Ollis, D.F, Biochemical Engineering Fundamentals, McGraw Hill (1986).

Reference Books:

1. Aiba, S., Humphrey, A.E and Millis, N.F., Biochemical Engineering, Academic Press (1973).
2. Weith, John W.F., Biochemical Engineering – Kinetics, Mass Transport, Reactors and Gene Expression, Wiley and Sons Inc. (1994).
3. Stanbury P. F., Whittaker, A. and Hall, S. J., Principles of Fermentation Technology, Butterworth-Heinemann (2007).