

- Principles of Biochemistry; David L. Nelson and Michael M. Cox, 6th Edition, W. H. Freeman (2013).
- Biochemistry; Donald Voet, Judith G. Voet, 4th Edition, John Wiley and sons (2010). PM, Plant Biochemistry, Harborne JB (1997) Academic Press.
- Introduction to Plant Biochemistry, Goodwin TW, Mercer EI (1983)
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BCS: 554: MICROBIAL BIOCHEMISTRY: SOFT CORE

Total Credits: 03

Lecture hours: 42

Course Objectives

- To give the students an advanced level knowledge about microbial biochemistry
- To understand the genetic constituents of bacteria with special emphasis on inheritance and mutations
- To understand the mechanism of genetic transfers in microbes.

Unit I

14 hrs

Nutrient Cycles: Microbes as components of the environment – nutrient cycles carbon, nitrogen (Symbiotic and non-symbiotic nitrogen fixation), sulphur and phosphorus cycles, chemolithotrophs. **Metabolism of autotrophs; Biosynthesis of Fatty acids; Biosynthesis of Phospholipids, Degradation of Lipids, Bacterial Quorum sensing,**

Unit II

14 hrs

Metabolism and Bioprocess technology: Metabolism of aromatic compounds, Fermentation pathways in specific group of microorganisms: Lactic acid, propionic acid, butyric acid producing fermentation; Characteristics and Degradation of industrial wastes, petroleum hydrocarbons, pesticides, biofouling and corrosion. **Fermentation - alcohol, propionic acid, butyric acid fermentation.**

Unit III

14 hrs

Microbial Genetics and Overexpression of recombinant proteins: Para sexual process in bacteria and its significance: Transformation, transfection, transduction and conjugation. Endospore formation (differentiation). Genetic analysis of bacteria: Importance and uses of mutation analysis. Isolating mutants, selecting mutants, mutant enrichment. Reversions versus suppression. Complementation tests, recombination tests and gene replacements. Overexpression and tagging of recombinant proteins in E.coli, driven by lac, T7 and Tet-regulatable promoters. Overexpression systems in S.cerevisiae, P.pastoris. Baculovirus over expression system.

Course Outcome

- Student capable of explaining role of microbes in ecological balance.
- Use of microbes in synthesis of commercially important compounds and over expression of proteins

References

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2. Roberts, K., Lewis J., Alberts B., Walter P., Johnson A., and Raff. M., Molecular Biology of the Cell, 5th Edition, Garland Publishing Inc., 2008.
3. Lodish, H., Berk A., Kaiser C. A., Krieger M., Scott M.P., Bretscher A., Ploegh H., and Matsudaira P., Molecular Cell Biology, 6th Edition, Freeman, W. H. and Co., 2008.
4. Molecular Genetics of Bacteria by Larry Snyder and Wendy Champness, 3rd edition; ASM press; 2007.
5. Fundamental Bacterial Genetics by Nancy Trun and Janine Trempy, 1st edition; Blackwell Science Publishers; 2004.
6. Stanbury PF, Hall SJ, Whitaker A (1999). Principles of Fermentation Technology, Butterworth Heinemann, 2nd edition.
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BCS 555: BIOINFORMATICS, BIOSTATISTICS & NANOBIO TECHNOLOGY: SOFTCORE

Lecture Hours: 42

Total Credits: 03