

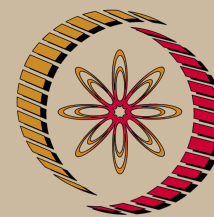
# Fundamentals of Biotechnology - Web course

## COURSE OUTLINE

Introduction, Water properties and its role in controlling biochemical reactions. Cellular structure: prokaryotic and eukaryotic cells, Fermentation, anaerobic oxidation and other metabolic reactions. Growth media for different expression system, microbial growth kinetics. Isolation of gene of interest, Primer designing, Polymerase chain reaction, cDNA synthesis, Restriction-digestion system, cloning strategies in bacterial, yeast and mammalian system. Different type of vector and plasmids, over-expression strategies in different host system; Bacteria, yeast, insect and mammalian cells. Analytical techniques in purifying and analysis of biomolecules; Column chromatography, HPLC, TLC, Electrophoresis; SDS-PAGE, Agarose, Sequencing techniques; DNA sequencing, Protein sequencing. Vaccine, Development of transgenic plant and animals, Disease resistant plant, Chimeric antibodies, Production of therapeutic proteins.

## COURSE DETAIL

Sl. No.	Module/ Lecture Topics	No. of (Total) Hours`
1.	<b>Introduction</b> Introduction, Water properties and its role in controlling biochemical reactions.	2
2.	<b>Basics of Expression System</b> Cellular structure: prokaryotic and eukaryotic cells, Fermentation, anaerobic oxidation and other metabolic reactions. Growth media for different expression system, microbial growth kinetics.	6
3.	<b>Genetic Manipulations</b> Isolation of gene of interest, Primer designing, Polymerase chain reaction, cDNA synthesis, Restriction-digestion system, cloning strategies in bacterial, yeast and mammalian system.	12
4.	<b>Genetic Manipulations-</b> Different type of vector and plasmids, over-expression strategies in different host system; Bacteria, yeast, insect and mammalian cells.	7
5.	<b>Analysis of Biomolecules</b> Analytical techniques in purifying and analysis of biomolecules; Column chromatography, HPLC, TLC, Electrophoresis; SDS-PAGE, Agarose, Sequencing techniques; DNA sequencing, Protein sequencing,	10



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## Biotechnology

### Coordinators:

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Department of  
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Guwahati

6.	<b>Biotechnology in social welfare</b> Vaccine, Development of transgenic plant and animals, Disease resistant plant, Chimeric antibodies, Production of therapeutic proteins.	3
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\*Mid course examination after module 3 and finals after the completion of module 6.

\*\*Numbers of lectures are tentatively fixed.

**References:**

1. J. M. Berg, J. L. Tymoczko and L. Stryer, *Biochemistry*, W. H. Freeman and Company (New York), 2006.
2. D. L. Nelson and M. M. Cox, *Lehninger Principles of Biochemistry*, 5th Ed Macmillan Worth, 2007.
3. B. Alberts, A. Johnson, J. Lewis, M. Raff, K. Roberts, P. Walters, *Molecular Biology of Cell*, 5th Ed, Garland Publishing, 2007.
4. L. M. Prescott, J. P. Harley and D. A. Klein, *Microbiology*, 6th Ed, McGraw Hill, 2005.
5. S. B. Primrose and R. M. Twyman, *Principles of Gene Manipulation*, Blackwell Science, 2006.
6. B. Lewin, *Genes IX*, International Edition, Pearson education, 2008.