

Course Code	Course Title	L	T	P	C
1151BT102	Basic Concepts Of Biotechnology	3	0	0	3

- Course Category** : *Program Core*
- a. Preamble** : *This is an introductory course that introduces the students to Biotechnology as a distinct discipline. The course begins with introduction, scope, history and proceeds to all the different aspects of Biotechnology; and emergent trends in the discipline as well.*
- b. Prerequisite Courses** : *None*
- c. Related Courses** : *Biology for Engineers*
- d. Course Outcomes** : *Upon the successful completion of the course, students will be able to:*

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	To understand basic history and importance of biotechnology as a distinct discipline	K2
CO2	To Comprehend the industrial applications of biotechnology	K3
CO3	To distinguish between different types of products and metabolites	K3
CO4	To identify pharmaceutical components correctly	K3
CO5	To demonstrate various concepts in Bioenergy and emergent areas	K3

COs		PROGRAMME OUTCOMES											
		1	2	3	4	5	6	7	8	9	10	11	12
CO1	To understand basic history and importance of biotechnology as a distinct discipline	H	L	M	L	L	H	L	L	L	L	L	H
CO2	To Comprehend the industrial applications of biotechnology	L	H	L	H	L	L	H	L	L	M	L	L
CO3	To distinguish between different types of products and metabolites	L	L	H		H	L	L	L	H	L	M	L

CO4	To identify pharmaceutical components correctly	L	L	L	L	L	L	L	L	L	L	L	L
CO5	To demonstrate various concepts in Bioenergy and emergent areas	L	H	M	H	L	L	M	H	L	L	L	M

*e. Course Content:*

**UNIT I BIOTECHNOLOGY: AN OVERVIEW**

Introduction to Biotechnology, History, scope and importance, Global scenario of Biotechnology, Major applications.

**UNIT II INDUSTRIAL & AGRICULTURAL APPLICATIONS OF BIOTECHNOLOGY**

Role of Biotechnology in Industry, Bioreactors, process development, scale up for fermentation processes, Biotechnology in food & beverage industry, production of pharmaceutical agents, Biotransformation, Biosimilars, Biotechnology in Agriculture - SCP, Plant tissue culture fundamentals, Biofertilizers.

**UNIT III BIOTECHNOLOGY SPECIFIC PRODUCTS**

Difference between Primary and Secondary metabolites, Commercially important primary metabolites such as Citric acid, Acetic acid; secondary metabolites such as beta lactams, penicillin, cephalosporin, streptomycin, erythromycin, etc, Industrial applications of enzymes in detergents, beverage and food.

**UNIT IV PHARMACEUTICAL BIOTECHNOLOGY**

Conventional vaccines, recombinant vaccines, DNA vaccines, monoclonal antibodies and their applications, interferons, drug designing, gene therapy, human and animal genetic research.

**UNIT V BIOENERGY AND EMERGENT TRENDS IN BIOTECHNOLOGY**

Bioenergy - definition and uses, Biogas, Biofuels, Biosurfactants- definition, applications; Prospects of Bioleaching, Biosensors: definition, applications in different industries, Biosafety levels, and emergent techniques in Biotechnology- Generic drugs, CRISPR, Biosimilars, and Bioprinting.

**TEXTBOOKS**

1. Sathyanarayana, U., Biotechnology, Books and Allied (P) Ltd. Kolkata, 2005.
2. H.D.Kumar, Modern Concepts of Biotechnology, Vikas Publishing House Pvt Ltd, 1998
3. P.K.Gupta, Elements of Biotechnology, Rastog Publications, 2003
4. A.H.Patel, Industrial Microbiology, Macmillan Publishers, 1984
5. Casida, L.E., Industrial Microbiology, New Age International (P) Ltd, 2005

6. Crueger, W and AnnelieseCrueger, *Biotechnology: A Textbook of Industrial Microbiology*, Panima Publishing Corporation, Edition 2, 2003

## **REFERENCES**

1. <https://ghr.nlm.nih.gov/primer/genomicresearch/genomeediting>
2. (What are genome editing and CRISPR-Cas9 ?)-US National Library of Medicine.
3. [http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/general/general\\_content\\_001832.jsp](http://www.ema.europa.eu/ema/index.jsp?curl=pages/medicines/general/general_content_001832.jsp) (Biosimilar medicines - European Medicines Agency)
4. <https://www.usda.gov/sites/default/files/.../bioenergy-science-white-paper.pdf>
5. USDA Bioenergy Science White Paper
6. <http://explainingthefuture.com/bioprinting.html>
7. Bioprinting Ratledge C and Kristiansen B. *Basic Biotechnology*, Cambridge University Press, second Edition, 2001.