

COURSES OFFERED IN THE FIRST SEMESTER 4YR UGP BSC BIOTECHNOLOGY PROGRAM
KU 1DSC BTC 101: WORLD OF BIOTECHNOLOGY

Semester	Course Type	Course Level	Course Code	Credits	Total Hours / week
I	DSC	Foundation	KU 1 DSC BTC 101	4	4

Learning Approach (Hours/ Week)			Marks Distribution (%) Ratio			Duration of ESE (Hours)
Lecture	Practical	Tutorial	CE	ESE	Total	
4	0	0	30	70	100	2

Course Description:

The World of Biotechnology course introduces the fundamental principles and applications of biotechnology. Students will be able to explore the core concepts underlying the manipulation of living organisms for various purposes, including healthcare, agriculture, environment, and industry. The course covers basic tools in biotechnology, offering a foundation for further studies in this rapidly evolving field.

Course Prerequisite: NIL

Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the basics of biotechnology	U
2	Understand agricultural and aquatic biotechnology	U
3	Apply Biotechnology in medicine and forensics	A
4	Understand the concept of fermentation, food biotechnology and bio entrepreneurship	U

**Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

	PSO1	PSO2	PSO3	PSO4	PSO 5	PSO 6	PSO 7
CO1	√						
CO2			√				
CO3			√				
CO4				√			

COURSE CONTENTS:

Contents for Classroom Transaction:

MO D U L E	U N I T	DESCRIPTION	HOURS
1		BIOTECHNOLOGY FOUNDATION	
	1	The Biotechnology century and its workforce	3
	2	An introduction to genes and genomes	4
	3	Recombinant DNA technology and genomics	5
	4	Proteins as products	3
2		GREEN AND BLUE BIOTECHNOLOGY (Brief Overview)	
	1	Plant Biotechnology	4
	2	Animal Biotechnology	4
	3	Bioremediation	4
	4	Aquatic Biotechnology	3

3		RED AND GOLD BIOTECHNOLOGY (Brief Overview)	
	1	Medical Biotechnology	4
	2	Pharmaceutical Biotechnology	4
	3	Nano Biotechnology	4
	4	DNA fingerprinting and forensic analysis	3

		WHITE AND YELLOW BIOTECHNOLOGY (Brief Overview)	
4	1	Bioprocess Technology	5
	2	Food Biotechnology	4
	3	Microbial Biotechnology	4
	4	Bio entrepreneurship	2

	Teacher Specific Module	5
5	<i>Directions</i>	

Essential Readings:

1. T.A Brown (2020) Gene Cloning and DNA analysis (8th edition) Wiley-Blackwell publishing.
2. Bernard R Glick (2017) Molecular Biotechnology (5th edition)-ASM press.
3. Benjamin A Pierce (2012) Genetics: A conceptual approach (4th edition). W.H Freeman and Company.
4. Holger Patzelt and Thomas Brenner (2008). "Handbook of Bio entrepreneurship," Springer publications.
5. A.H Emrey and S Malcolm (1995). Recombinant DNA (2nd edition)- John Wiley & Sons.
6. David E Burns, Edward R. Ashwood, Carl A Burtis (2013). Fundamental of Molecular Diagnostics (5th edition)- Saunders Group.
7. V Sreekrishna (2011). Comprehensive nanobiotechnology- Ist edition - New Age international (P) Ltd; ISBN 978-81-224- 3082-0.

JOURNALS

8. "Cell" - A peer-reviewed scientific journal.
9. "Nature Biotechnology" - A leading journal in the field.
10. "Journal of Biotechnology"
11. "Trends in Biotechnology"

WEBSITES

12. Genetic Science Learning Center (GSLC) - <https://learn.genetics.utah.edu/>
13. World Health Organization (WHO) - <https://www.who.int/> -
14. National Center for Biotechnology Information (NCBI) - <https://www.ncbi.nlm.nih.gov/>

Reference Distribution:

Module	Unit	Reference No.
1	1	2
	2	1
	3	1
	4	1
2	1	15
	2	17
	3	21
	4	21

3	1	5
	2	20
	3	7
	4	16
4	1	18
	2	19
	3	18
	4	4

Suggested Readings:

1. Kalyan Kumar De (1997)-Plant cell and tissue culture-New Central Book Agency
2. Lincoln P.J and Thomson. J (1998). Forensic DNA profiling protocols- 1st edition, Humana Press.
3. R Ian Freshney (2021). Culture of Animal Cells-John Wiley & Sons
4. Stanbury PF, A Whitaker and S J Hall (2013). Principles of fermentation technology- Elsevier
5. S. N Tripathy (2004). Food Biotechnology- Dominant publications
6. Patrick, Graham L (2017). Introduction to Medicinal Chemistry - Oxford University Press
7. Agarwal S.K (1999). Environmental Biotechnology- APH Publishing corporation

JOURNALS

1. Biotechnology Advances
2. Biotechnology Journal

WEBSITES

1. Biotechnology Innovation Organization (BIO) - <https://www.bio.org/>
2. National Institute of General Medical Sciences (NIGMS) - Biomedical Beat - <https://biobeat.nigms.nih.gov/>

Assessment Rubrics:

Evaluation Type		Marks (%)
End Semester Evaluation		70
Continuous Evaluation		
a)	Test Paper	10
b)	Assignment	5
c)	Quiz	5
d)	Book review/Debate	5
e)	Viva	5
Total		100

○ Employability for the Course:

- Biopharmaceutical Industry: Bioprocess engineer, research scientist, regulatory affairs specialist.
- Biotechnology Research Institutions: Research assistant, research associate, laboratory technician.
- Agri-Biotech Companies: Genetic engineer, crop scientist, research associate in plant biotechnology.