

Programme	BS Biochemistry	Course Code	BT. 101	Credit Hours	3-0
Course Title	Elements of Biotechnology				
Course Introduction					
This course offers a detailed exploration of biotechnology, tracing its definition and historical foundations, and highlighting its interdisciplinary nature and wide-ranging applications in fields such as medicine, agriculture, food production, and environmental management.					
Learning Outcomes					
On the completion of the course, the students will: <ul style="list-style-type: none">• To understand concepts in the field of Biotechnology.• Able to effectively interact and work with other interdisciplinary professionals.• Have an awareness of the global significance and application of biotechnology in different industries.					
Course Contents					
<ul style="list-style-type: none">• Introduction to Biotechnology• History• Foundation of Biotechnology and Inter-disciplinary purist• Application of Biotechnology in medicine• Application of Biotechnology in Agriculture• Application of Biotechnology in Agriculture• Plant growth promoting bacteria• Nitrogen Fixation• Growth promotion by free living bacteria• Phosphate solubilizing bacteria and Siderophores• Biocontrol of pathogens• Biocontrol agents vs pesticides• Microbial insecticides: Insecticidal toxins of <i>Bacillus thuringiensis</i>• Microbial Insecticides and Insecticidal toxins (BT)• Biocontrol of Pathogens• Baculovirus as biocontrol agents• Protein toxin, diuretic hormone and juvenile hormone esterase genes• Large scale production of proteins from recombinant microorganisms• Microbial therapeutics agents and pharmaceutical Enzymes• Microbial therapeutics agents• Antibodies and Vaccines• Synthesis of commercial products (antibiotics and biopolymers)• Bioremediation and biomass utilization: microbial degradation of xenobiotics• Biosensors• Production of biofuels by using different biotechnological strategies• Transgenic organisms: GMOs• Applications of GMOs• Human gene therapy• Introduction and classification of Stem cells					

Textbooks and Reading Material

Textbooks.

- Kumar, N. (Ed.). (2022). *Biotechnology and crop improvement: tissue culture and transgenic approaches*. 1st Edition. CRC Press.
- Sibi, G. (2022). *Environmental Biotechnology: Fundamentals to Modern Techniques*. 1st Edition. CRC Press.
- Acquaaah, G. (2020). *Principles of Plant Genetics and Breeding*. 3rd Edition. Wiley.
- Baltz, R. H., Demain, A. L. and Davies, J. E. (2010). *Manual of Industrial Microbiology and Biotechnology*. 3rd Edition. American Society for Microbiology (ASM) Press, Washington, DC, USA. Hou C.
- T. and Shaw, J-F. (2008). *Biocatalysis and Bioenergy*. Published by John Wiley & Sons, Inc., New Jersey, USA. Smith J. E., *Biotechnology*, 3rd Edition, Cambridge University Press (2006)
- Dominic, W.S.W. (2018). *The ABCs of Gene Cloning*. 3rd Edition. Springer International Publishing.

Teaching Learning Strategies

- Class lecture
- Class Discussions
- Class Tutorials

Assignments: Types and Number with Calendar

- 1st Quiz in 4th Week of 5 marks
- 2nd Quiz in 10th Week of 5 marks
- 3rd Quiz in 14th Week of 5 marks
- 1st Assignment in 8th Week of 10 marks

Assessment

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.