**UG Program (B.Tech. Biotechnology and Bioengineering): Course Outline**

**Year 1**

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| **Semester I** | **Semester II** |
| Physics | Chemistry |
| Engineering science electives | Engineering science electives |
| Linear Algebra | Probability |
| Engineering Economics | Indian culture and Heritage |
| HSS Electives | HSS Electives |
| Introductory Biology | Bioinformatics |
| Constitution of India and Professional ethics | Environmental Studies |

**Year 2**

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| **Semester III** | **Semester IV** |
| Biochemistry & Structural Biology | Molecular Biology and Genetic Engineering |
| Techniques in Biochemistry | Techniques in Molecular Biology and Genetic Engineering |
| Programming for Biologists | Basics of synthetic biology |
| Professional Elective 1 | Professional Electives 2 and 3 |
| Open electives 1 and 2 | Open elective 3 and 4 |
| NSS/Yoga/Sports | Personality development and communication skills |

**Year 3**

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| **Semester V** | **Semester VI** |
| Cell Biology and Signalling | Microbiology and Immunology |
| Techniques in Cell Biology | Techniques in Microbiology |
| Professional Elective 4 | Advanced Bioinformatics |
| Genetics | Professional Electives 5 and 6 |
| Introduction to Bioengineering | Fermentation and Downstream Processing |
| Anatomy and Physiology | Project work 1 |
| Open elective 5 |  |

**Year 3**

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| **Semester V** | **Semester VI** |
| Genomic and Transcriptomic data analysis | Project work 2 |
| Introduction to cell and tissue engineering | Internship |
| Professional electives 7 and 8 |  |
| Open Electives 6 and 7 |  |

**Putative Professional Elective Choices**

1. Marine biotechnology
2. Medical Biotechnology
3. Plant biotechnology
4. Environmental biotechnology
5. Bioprospecting
6. Biomanufacturing
7. Forensic Law and Science
8. Biomechanics
9. Biomaterials
10. Bioelectronics
11. Biosensors and IoT
12. Robotics
13. Molecular engineering
14. Biomedical instrumentation
15. Nanobiotechnology
16. Computational drug design
17. Introduction to AI/ML and their applications in biology
18. Clinical trial data analysis
19. Systems biology and modelling
20. Medicinal Chemistry
21. Pharmacokinetics and pharmacodynamics
22. Pharmacology and toxicology
23. Regulatory affairs
24. Research methodologies, scientific writing and presentation
25. Biosafety, Bioethics and IPR
26. Advanced Techniques in Biology
27. Essentials of Biophysics