GU/Acad –PG/BoS- CDT /2025-26/607                    Date: 04.12.2025

## CIRCULAR

The syllabus for the Change of Discipline Test (CDT) of **Master of Science in Biotechnology** Programme, approved by the Academic Council in its meeting held on 7th November 2025 is attached.

The Dean/Vice-Dean (Academic) of the School of Biological Sciences and Biotechnology and the Principals of all the affiliated Colleges are requested to take note of the above and bring the contents of this Circular to the notice of all concerned, including students aspiring to pursue the Master's Programmes.

(Ashwin V. Lawande)
Deputy Registrar – Academic

To,
1. The Dean, School of Biological Sciences and Biotechnology, Goa University.
2. The Vice-Dean (Academic), School of Biological Sciences and Biotechnology, Goa University.
3. Principals of all the affiliated Colleges.

Copy to:
1. Controller of Examinations, Goa University.
2. Assistant Registrar (Admissions), Goa University.
3. Assistant Registrar Examinations (UG/PG), Goa University.
4. Director, Directorate of Internal Quality Assurance, Goa University for uploading the Syllabus on the University website.

**SYLLABUS FOR CHANGE OF DISCIPLINE TEST (CDT)**
**FOR MASTER OF SCIENCE IN BIOTECHNOLOGY PROGRAMME**

**Effective from AY: 2026-27**

| Modules | Content |
|---|---|
| | **Foundations of Life Sciences (Basic Biology)** |
| **Module 1:** | • The chemistry of life: biomolecules (carbohydrates, proteins, lipids, nucleic acids)<br>• Cell structure and function: prokaryotic vs. eukaryotic cells, organelles, membranes<br>• Basic metabolism: glycolysis, photosynthesis, and respiration (overview only)<br>• Concept of enzymes: properties, catalysis, and kinetics (qualitative understanding)<br>• Overview of microorganisms: bacteria, fungi, viruses – structure and significance<br>• Central Dogma of Molecular Biology<br>• Cell cycle and cell division (mitosis, meiosis – basic concepts)<br>• Transport mechanisms: diffusion, osmosis, active transport (simple explanation)<br>• Basic plant and animal physiology: photosynthesis overview, respiration, and hormone roles |
| | **Essentials of Genetics and Molecular Biology** |
| **Module 2:** | • DNA and RNA structure, replication, transcription, and translation (conceptual overview)<br>• Mendelian genetics: laws of inheritance, genetic variation<br>• Introduction to genetic code and mutations<br>• Basic tools of molecular biology: restriction enzymes, plasmids, PCR, electrophoresis<br>• Introduction to recombinant DNA and genetic engineering concepts<br>• Overview of microbial genetics: transformation, conjugation, transduction (conceptual)<br>• Gene regulation and operon concept<br>• Genetic disorders (simplified introduction) |
| **Module 3:** | **Introduction to Biochemistry and Cell Function** |

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| | • Basic chemistry refresher: atoms, bonding, solutions, pH, and buffer systems<br>• Structure and function of amino acids, proteins, and enzymes<br>• Overview of vitamins, hormones, and signaling molecules<br>• Bioenergetics: ATP, redox reactions in metabolism<br>• Techniques: spectrophotometry, centrifugation, chromatography (conceptual)<br>• Metabolic overview: glycolysis, Krebs cycle, lipid and amino acid metabolism<br>• Concept of feedback regulation and enzyme inhibition (non-quantitative) |
| **Module 4:** | **Biotechnology and Its Applications**<br><br>• Definition, scope, and interdisciplinary nature of biotechnology<br>• Major areas: agricultural, medical, industrial, and environmental biotechnology<br>• Introduction to genomics, proteomics, and bioinformatics (basic concepts)<br>• Ethical, legal, and social implications of biotechnology<br>• Indian contributions to biotechnology: Green Revolution, GM crops, biofertilizers<br>• Emerging trends: Bioremediation, biofuels, nanobiotechnology (overview)<br>• Entrepreneurship in biotechnology: idea to innovation, bioincubation and start-ups (introductory) |
| **References/ Readings:** | 1. Campbell Biology, 12th Edition – Lisa A. Urry, Michael L. Cain, Steven A. Wasserman, Peter V. Minorsky, Jane B. Reece (Pearson, 2021).<br>2. Biology, 11th Edition – Neil A. Campbell and Jane B. Reece (Pearson, 2018).<br>3. Cell and Molecular Biology: Concepts and Experiments, 9th Edition – Gerald Karp (Wiley, 2020).<br>4. Lehninger Principles of Biochemistry, 8th Edition – David L. Nelson and Michael M. Cox (W.H. Freeman, 2021).<br>5. Microbiology: An Introduction, 13th Edition – Gerard J. Tortora, Berdell R. Funke, Christine L. Case (Pearson, 2021).<br>6. Molecular Biology of the Gene, 8th Edition – James D. Watson, Tania A. Baker, Stephen P. Bell (Pearson, 2022).<br>7. Molecular Biology of the Cell, 7th Edition – Bruce Alberts et al. (Garland Science, 2022).<br>8. Principles of Genetics, 7th Edition – D. Peter Snustad and Michael J. Simmons (Wiley, 2021).<br>9. Gene Cloning and DNA Analysis: An Introduction, 8th Edition – T.A. Brown (Wiley-Blackwell, 2020).<br>10. Genetics: From Genes to Genomes, 7th Edition – Leland Hartwell et al. (McGraw-Hill, 2022).<br>11. Biochemistry, 9th Edition – Jeremy M. Berg, John L. Tymoczko, Gregory J. Gatto Jr., and Lubert Stryer (W.H. Freeman, 2019).<br>12. Principles of Biochemistry, 6th Edition – H. Robert Horton, Laurence A. Moran et al. (Pearson, 2017). |

| | 13. Biochemical Calculations, 2nd Edition – Irwin H. Segel (Wiley, 2004). |
| | 14. Cell Biology, 4th Edition – Thomas D. Pollard, William C. Earnshaw, Jennifer Lippincott-Schwartz (Elsevier, 2017). |
| | 15. Introduction to Protein Structure, 2nd Edition – Carl Branden and John Tooze (Garland Science, 1999). |
| | 16. Biotechnology, 2nd Edition – David P. Clark and Nanette J. Pazdernik (Academic Press, 2016). |
| | 17. Principles of Gene Manipulation and Genomics, 8th Edition – Sandy B. Primrose and Richard Twyman (Wiley-Blackwell, 2020). |
| | 18. Biotechnology: Applying the Genetic Revolution, 3rd Edition – David P. Clark and Michael R. Karp (Academic Press, 2020). |
| | 19. Environmental Biotechnology: Principles and Applications, 2nd Edition – Bruce E. Rittmann and Perry L. McCarty (McGraw-Hill, 2020). |
| | 20. Introduction to Biotechnology, 4th Edition – William J. Thieman and Michael A. Palladino (Pearson, 2019). |

**Approved by: Academic Council on 7ᵗʰ November 2025**