# STRUCTURE OF THE PROGRAM

# Department of Biotechnology

**Syllabus as per NEP-2020 (w.e.f. 2024-2025)**

**M.Sc. Biotechnology**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **First Year (First Semester)** | | | | | | | | | | | | |
| **VII** | **S.No.** | **Components of the Course** | **Title** | **Credits** | **L** | **T** | **P** | **Credit hrs** | **WEIGHTAGE EVALUATION** | | | **Total** |
| | | | | | | | | | **Internal Assessment** | | **External Assessment** | |
| | | | | | | | | | **CIE** | **MSE** | **ESE** | |
| | 1. | Core | Biophysical Chemistry | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 2. | Core | Tools and Techniques in Biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 3. | Core | Bioinformatics | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 4. | Core | Molecular Biology and Prokaryotes | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 5. | Core | Biochemistry and Enzymology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 6. | Elective (Select any one) | Biostatistical Methods or Structural Biology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 7. | SEC | Laboratory Techniques-I | 6 | 0 | 0 | 6 | 12 | - | 30 | 70 | 100 |
| | | **Total** | | **24** | | | | **30** | | | | **700** |
| **First Year (Second Semester)** | | | | | | | | | | | | |
| **VIII** | 8. | Core | Cell Biology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 9. | Core | Microbiology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 10. | Core | Eukaryotic Molecular Biology and Genetics | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 11. | Core | Immunology & Immunotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 12. | Core | Genetic Engineering and Its Applications | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 13. | Elective (Select any one) | Research Methodology or AI in Biotechnology/Advance Bioinformatics | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 14. | SEC | Laboratory Techniques-II | 6 | 0 | 0 | 6 | 12 | - | 30 | 70 | 100 |
| | | | Project | 4 | | | | | | | | 100 |
| | | **Total** | | **28** | | | | **30** | | | | **800** |
| | | | | **Total Credits After PG First Year = 24 + 24+4 Internal Project = 52** | | | | | | | | |

**Exit-1 with PG Diploma in Biotechnology (Total Credits = 48 + 4*)**

*For exit with one year **PG Diploma in Biotechnology**, 4 additional credits of Vocational Course/Internship/Apprenticeship/Project/Community Outreach/Workshop is mandatory and such students have to inform at least three months prior to exit-1.

**Exit-1 and Re-entry:** Postgraduate Diploma in Major Discipline after securing at least **44 credits** in two semesters of a PG (Diploma) program with single major and in addition 4 credits of Vocational Course/ Internship/ Apprenticeship/ Project/ Community Outreach/ Workshop (VIAPCW)*. With these credits a student may take re-entry in the PG Second Year. *Students having UG Hons. With Research Degree are eligible for direct entry in the PG Second Year.

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Second Year (Third Semester)** | | | | | | | | | | | | |
| | **S.No.** | **Components of the Course** | **Title** | **Credits** | **L** | **T** | **P** | **Credit hrs** | **CIE** | **MSE** | **ESE** | **Total** |
| | | **(i) Coursework (all students can opt) or (ii) Coursework + Six Month Research Project (all students can opt) or (iii) Full Year Research Project @ min. 30 hrs/ week (Only students having UG Hons. with Research Degree can opt)** | | **(i) 24 + 24 (ii) 24 + 24 (iii) 48** | | | | | | | | **(i) 700 + 700 (ii) 700 +700 (iii) 1400** |
| | 15. | Core | Food Biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 16. | Core | Genomics and Proteomics | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 17. | Core | Plant Biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 18. | Core | Animal Biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 19. | Core | Industrial Biotechnology & Bio entrepreneurship | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 20. | Elective (Select any one) | Plant Genetic Resources: - Conservation and Their Sustainable Use or Biotechnology of Human Welfare | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 21. | SEC | Laboratory Techniques-III | 6 | 0 | 0 | 6 | 12 | - | 30 | 70 | 100 |
| | | **Total** | | **24** | | | | **30** | | | | **700** |
| **Second Year (Fourth Semester)** | | | | | | | | | | | | |
| **X** | | **(i) Coursework or (ii) Six Month Research Project @ min. 30 hrs/ week** | | **(i) 24 (ii) 24** | | | | | | | | **(i) 700 (ii) 700** |
| | 22. | Core | Environmental Biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 23. | Core | Nano-biotechnology | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 24. | Core | Biosafety, Bioethics and Intellectual Property Rights | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 25. | Core | Bioprocess Engineering & Downstream Processing | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 26. | Core | Forensic Science | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 27. | Elective (Select any one) | Microbiome Biotechnology/Biology of Infectious Diseases | 3 | 3 | 0 | 0 | 3 | 15 | 15 | 70 | 100 |
| | 28. | SEC | Laboratory Techniques-IV | 6 | 0 | 0 | 6 | 12 | - | 30 | 70 | 100 |
| | | **Total** | | **24** | | | | **30** | | | | **700** |
| | | | | **Total Credits After PG Second Year = 24 + 24 = 48** | | | | | | | | |
| | | | | **Exit with PG Degree in Biotechnology (Total Credits = 52 + 48 = 100)** | | | | | | | | |

# STRUCTURE OF THE PROGRAM

## Department of Biotechnology
## Ch. Charan Singh University, Meerut

### Syllabus as per NEP-2020 (w.e.f. 2024-2025)

### M.Sc. Biotechnology

| First Year (First Semester) | | | | |
|---|---|---|---|---|
| **S.No.** | **Components of the Course** | **Title** | **Credits** | **Credit hrs** |
| 1. | Core | Biophysical Chemistry | 3 | 3 |
| 2. | Core | Tools and Techniques in Biotechnology | 3 | 3 |
| 3. | Core | Bioinformatics | 3 | 3 |
| 4. | Core | Molecular Biology and Prokaryotes | 3 | 3 |
| 5. | Core | Biochemistry and Enzymology | 3 | 3 |
| 6. | Elective (Select any one) | Biostatistical Methods orStructural Biology | 3 | 3 |
| 7. | SEC | Laboratory Techniques-I | 6 | 12 |
| | | **Total** | **24** | **30** |
| **First Year (Second Semester)** | | | | |
| 8. | Core | Cell Biology | 3 | 3 |
| 9. | Core | Microbiology | 3 | 3 |
| 10. | Core | Eukaryotic Molecular Biology and Genetics | 3 | 3 |
| 11. | Core | Immunology & Immunotechnology | 3 | 3 |
| 12. | Core | GeneticEngineering and Its Applications | 3 | 3 |
| 13. | Elective (Select any one) | Research Methodology or AI in Biotechnology/Advance Bioinformatics | 3 | 3 |
| 14. | SEC | Laboratory Techniques-II | 6 | 12 |
| | | Project | 4 | |
| | | **Total** | 28 | 30 |
| **Exit with PG Diploma in Biotechnology (Total Credits = 48+4) = 52** | | | | |

| Second Year (Third Semester) | | | | |
|---|---|---|---|---|
| **S.No.** | **Components of the Course** | **Title** | **Credits** | **Credit hrs** |
| | **(i) Coursework or<br>(ii) Coursework + Six Month Research Project or<br>(iii) Full Year Research Project @ min. 30 hrs/ week** | | 48<br>24 + 24<br>48 | |
| 15. | Core | Food Biotechnology | 3 | 3 |
| 16. | Core | Genomics and Proteomics | 3 | 3 |
| 17. | Core | Plant Biotechnology | 3 | 3 |
| 18. | Core | Animal Biotechnology | 3 | 3 |
| 19. | Core | Industrial Biotechnology & Bio entrepreneurship | 3 | 3 |
| 20. | Elective (Select any one) | Plant Genetic Resources: - Conservation and Their Sustainable Use or Biotechnology of Human Welfare | 3 | 3 |
| 21. | SEC | Laboratory Techniques-III | 6 | 12 |
| | **Total** | | **24** | 30 |
| **Second Year (Fouth Semester)** | | | | |
| | **Coursework or<br>Six Month Research Project @ min. 30 hrs/ week** | | 24<br>24 | |
| 22. | Core | Environmental Biotechnology | 3 | 3 |
| 23. | Core | Nano-biotechnology | 3 | 3 |
| 24. | Core | Biosafety, Bioethics and Intellectual Property Rights | 3 | 3 |
| 25. | Core | Bioprocess Engineering & Downstream Processing | 3 | 3 |
| 26. | Core | Forensic Science | 3 | 3 |
| 27. | Elective (Select any one) | Microbiome Biotechnology/Biology of Infectious Diseases | 3 | 3 |
| 28. | SEC | Laboratory Techniques-IV | 6 | 12 |
| | | | | |
| **Exit with PG Degree in Biotechnology (Total Credits = 52+ 48 = 100)** | | | | |