



## **SARDAR PATEL UNIVERSITY**

**NAAC 'A' Grade (10-01-2023 To 09-01-2028)**

**Vallabh Vidyanagar Gujarat**

### **Academic Program Structure & Curriculum (Aligned with NEP-2020)**

**M.Sc. Biomedical Science**

**NHEQF Level: 6.5**

|                      |   |                            |
|----------------------|---|----------------------------|
| Entry NHEQF Level    | : | 5.5/6                      |
| Duration             | : | Two Years (Four Semesters) |
| Total Courses        | : | 24                         |
| Total Learning Hours | : | 2400                       |
| Total Credits        | : | 88                         |
| Total Marks          | : | 2200                       |

**Graduate Attributes (GAs):**

Upon successful completion of the programme, graduates are expected to attain the following Graduate Attributes:

**GA1. Disciplinary Knowledge**

Graduates will possess in-depth knowledge of biomedical sciences, including microbiology, molecular biology, immunology, biotechnology, and clinical sciences.

**GA2. Analytical and Critical Thinking**

Ability to analyze complex biological data, interpret experimental results, and solve scientific and clinical problems logically.

**GA3. Research Competence**

Proficiency in designing experiments, handling laboratory techniques such as, molecular diagnostics, cell culture, and conducting independent research with scientific rigor.

**GA4. Technical and Laboratory Skills**

Hands-on expertise in biomedical instrumentation, genetic engineering, nanotechnology, and clinical diagnostic techniques.

**GA5. Data Analysis and Biostatistics**

Capability to apply statistical tools and computational methods for analyzing biological and omics data.

**GA6. Problem-Solving Ability**

Ability to apply theoretical knowledge to real-world healthcare, disease diagnosis, and biomedical research challenges.

**GA7. Ethical and Professional Responsibility**

Understanding of ethical practices in research, clinical work, and healthcare systems, including biosafety and waste management.

**GA8. Communication Skills**

Ability to effectively communicate scientific ideas through reports, presentations, and publications.

**GA9. Teamwork and Collaboration**

Ability to work efficiently in multidisciplinary teams in laboratory, clinical, and research environments.

**GA10. Lifelong Learning and Adaptability**

Readiness to continuously update knowledge in emerging fields such as molecular medicine, nanotechnology, and gene therapy.

**GA11. Healthcare and Societal Awareness**

Understanding the application of biomedical science in improving public health, disease prevention, and healthcare systems.

**GA12. Innovation and Entrepreneurial Skills**

Ability to apply scientific knowledge creatively to develop new ideas, technologies, or solutions in biomedical research, diagnostics, and healthcare industries.

**GA13. Digital and Computational Proficiency**

Competence in using bioinformatics tools, data analysis software, and modern digital technologies for research, diagnostics, and data-driven decision-making.

**Programme Educational Objectives (PEOs):**

Within 3-5 years of completing the programme the graduates will be able to:

**PEO1. Demonstrate** comprehensive knowledge of core concepts in biomedical sciences, including molecular biology, microbiology, immunology, and clinical sciences.

**PEO2. Apply** theoretical knowledge and practical skills to address challenges in biomedical research, diagnostics, and healthcare.

**PEO3. Analyse** experimental data using appropriate statistical and computational tools to derive meaningful scientific conclusions.

**PEO4. Design** and perform experiments utilizing modern laboratory techniques and biomedical instrumentation.

**PEO5. Evaluate** emerging technologies and advancements in biomedical sciences for their potential applications in research and clinical practice.

**PEO6. Conduct** independent and collaborative research with scientific rigor, critical thinking, and ethical responsibility.

**PEO7. Demonstrate** effective communication skills for presenting scientific findings through reports, presentations, and publications.

**PEO8. Apply** ethical principles, biosafety standards, and professional practices in laboratory and healthcare environments.

**Program Learning Outcomes (PLOs):**

Upon successful completion of the programme learners will be able to:

**PLO1. Demonstrate** comprehensive knowledge of biomedical science concepts, including molecular biology, microbiology, immunology, and clinical sciences.

**PLO2. Apply** theoretical knowledge and laboratory skills to perform experiments and solve problems in biomedical and healthcare settings.

**PLO3. Analyse** biological data and experimental results using appropriate statistical and computational tools.

**PLO4. Design** experiments and research methodologies to investigate scientific problems in biomedical sciences.

**PLO5. Evaluate** scientific literature, emerging technologies, and research findings for their relevance and application in healthcare and biotechnology.

**PLO6. Conduct** independent and collaborative research with scientific rigor, accuracy, and ethical responsibility.

**PLO7. Demonstrate** proficiency in modern laboratory techniques, including molecular diagnostics, cell culture, and biomedical instrumentation.

**PLO8. Apply** principles of biostatistics and bioinformatics for data interpretation and decision-making in research.

**PLO9. Analyse** clinical and biomedical problems to develop effective and evidence-based solutions.

**PLO10. Demonstrate** effective communication skills for presenting scientific information through written reports, presentations, and discussions.

**PLO11. Apply** ethical, biosafety, and professional standards in laboratory, clinical, and research environments.

**PLO12. Demonstrate** lifelong learning skills and adaptability to advancements in biomedical science and related interdisciplinary fields.

**Program Specific Outcomes (PSOs):**

**PSO1. Apply** advanced biomedical techniques, including molecular diagnostics, cell culture, and genetic engineering, to investigate and address clinical and research problems in biomedical science.

**PSO2. Analyse** clinical, microbiological, and omics data using biostatistical and bioinformatics tools to support disease diagnosis, research, and therapeutic development.

**PSO3. Conduct** specialized research in areas such as molecular medicine, immunology, and biotechnology while adhering to ethical, biosafety, and professional standards.



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NEP-2020 aligned Curriculum with effect from Academic Year 2026-27

## M.Sc. Biomedical Science

### Semester-I

| Course Type | Course Code  | Course Title                                                                           | Teaching-Learning Scheme |                      | Credits | Assessment Scheme & Marks |    |       |                     |             |
|-------------|--------------|----------------------------------------------------------------------------------------|--------------------------|----------------------|---------|---------------------------|----|-------|---------------------|-------------|
|             |              |                                                                                        | L-P-T                    | Total Notional Hours |         | Internal Assessment       |    |       | External Assessment | Total Marks |
|             |              |                                                                                        |                          |                      |         | FA                        | SA | Total |                     |             |
| DSC         | P2T01NCBMS01 | Developmental Biology                                                                  | 4-0-1                    | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T01NCBMS02 | Principles of Biomedical Instrumentation                                               | 4-0-1                    | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T01NCBMS03 | Microbial Pathogenesis                                                                 | 4-0-1                    | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T01NCBMS04 | Practicals Based on Developmental Biology and Principles of Biomedical Instrumentation | 0-8-0                    | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T01NCBMS05 | Practicals Based on Microbial Pathogenesis and Toxicology                              | 0-8-0                    | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T01NCBMS06 | Toxicology                                                                             | 2-0-1                    | 60                   | 2       | 10                        | 15 | 25    | 25                  | 50          |
|             |              |                                                                                        |                          | 660                  | 22      |                           |    |       |                     | 550         |

**DSC:** Discipline Specific Core      **DSE:** Discipline Specific Elective      **L:** Lecture      **P:** Practical      **T:** Tutorial

**FA:** Formative Assessment      **SA:** Summative Assessment



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### M.Sc. Biomedical Science

#### Semester-II

| Course Type | Course Code  | Course Title                                                                             | Teaching- Learning Scheme |                      | Credits | Assessment Scheme & Marks |    |       |                     |             |
|-------------|--------------|------------------------------------------------------------------------------------------|---------------------------|----------------------|---------|---------------------------|----|-------|---------------------|-------------|
|             |              |                                                                                          | L-P-T                     | Total Notional Hours |         | Internal Assessment       |    |       | External Assessment | Total Marks |
|             |              |                                                                                          |                           |                      |         | FA                        | SA | Total |                     |             |
| DSC         | P2T02NCBMS01 | Biomaterials & Tissue Engineering                                                        | 4-0-1                     | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T02NCBMS02 | Animal and Medical Biotechnology                                                         | 4-0-1                     | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T02NCBMS03 | Genetic Engineering                                                                      | 4-0-1                     | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T02NCBMS04 | Practicals Based on Biomaterials & Tissue Engineering and Animal & Medical Biotechnology | 0-8-0                     | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T02NCBMS05 | Practicals Based on Genetic Engineering and Biostatistics                                | 0-8-0                     | 120                  | 4       | 20                        | 30 | 50    | 50                  | 100         |
| DSC         | P2T02NCBMS06 | Biostatistics                                                                            | 2-0-1                     | 60                   | 2       | 10                        | 15 | 25    | 25                  | 50          |
|             |              |                                                                                          |                           | 660                  | 22      |                           |    |       |                     | 550         |

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