



**SHARDA**  
UNIVERSITY  
*Beyond Boundaries*



**SHARDA SCHOOL OF  
ENGINEERING &  
SCIENCES**

Department of Chemistry and Biochemistry



## COURSE

# **Molecular Diagnostic Techniques in Biochemistry (NV33008)**

**VALUE ADDED  
COURSE BROCHURE**

**2025-26**

## **SHARDA UNIVERSITY**

Sharda University envisions to serve the society by being a global University of higher learning in pursuit of academic excellence, innovation and nurturing entrepreneurship. It has 13,000+ students from 95+ countries, 29 states, and Union Territories, providing cultural diversity and global exposure to students. It has 26000+ alumni who are today leaders in their realms. Sharda University is NA AC A+ University with Overall NIRF Rank of 87. Teaching Learning Center at Sharda University is to equip the faculty members with the expertise, skills and knowledge they need for capacity building of students. Teaching as a profession requires highly specialized skills and knowledge to impact significantly on student learning and therefore teachers must refine their conceptual and pedagogical skills.

### **ABOUT THE SCHOOL**

Sharda School of Engineering & Sciences (SSES) boasts of the strengths of engineering and basic sciences to foster innovation and technical excellence. The school provides exposure to different disciplines in science including Chemistry, Biochemistry, Physics, Mathematics, Mechanical Engineering, Civil Engineering, Electronics/Electrical Engineering and Environmental Sciences. The school is unique from other institutions of higher learning as it is committed to imparting knowledge in pure and applied sciences, which not only forms the foundation for further academic pursuits in science and technology but also acts as the foundation for students to pursue a career in multi facet directions. The academic programs are designed to meet the requirement of the latest technological developments and envisages to become a state-of-the-art department that cater the students at Graduate, Post- Graduate and Research level along with providing high- quality education and cutting-edge interdisciplinary research in engineering & sciences.

### **DEPARTMENT OF CHEMISTRY & BIOCHEMISTRY**

The Department of Chemistry & Biochemistry endeavors to be nationally recognized model for nurturing students who can contribute to the ever changing technology of 21st century. The Department is committed to provide an excellent teaching & learning atmosphere for Undergraduate as well as post graduate students.

## RESOURCE PERSON

**Dr. Vivek Srivastava** - Vivek Srivastava holds a PhD degree in Biotechnology from National Institute of Immunology, Delhi, an autonomous Institute of Department of Biotechnology, where he worked on Functional implication of BLM helicase phosphorylation by Check Point Kinase-2. He was a Postdoctoral Fellow at CSIR-Institute of Genomics & Integrative Biology, Delhi, under DBT- Wellcome Trust Funded Project, where he worked mainly on telomere biology and telomerase ribo-nucleo-protein whose expression is high in cancer and stem cells and cancer cells need this enzyme for proliferation and cell division. Currently, Dr. Vivek is working as an Associate Professor of Biochemistry in Département of Chemistry & Biochemistry at Sharda University, Greater Noida. His areas of research are in telomere biology, epigenetics, DNA damage response pathways, Protein Biochemistry, cancer biology and post-translational modifications of protein.

Schedule		
Week 1	16 July - 20 July	2 lectures
Week 2	21 July - 27 July	2 lectures
Week 3	28 July - 03 August	2 lectures
Week 4	04 August - 10 August	2 lectures
Week 5	11 August - 17 August	2 lectures
Week 6	18 August - 24 August	2 lectures
Week 7	25 August - 02 September	2 lectures
Week 8	03 September - 07 September	2 lectures
Week 9	08 September - 14 September	2 lectures
Week 10	15 September - 21 September	2 lectures
Week 11	22 September - 28 September	2 lectures
Week 12	29 September - 5 October	2 lectures
Week 13	6 October - 12 October	2 lectures
Week 14	13 October - 19 October	2 lectures
Week 15	20 October - 26 October	2 lectures
Week 16	27 October - 2 November	2 lectures
Week 17	3 November - 9 November	2 lectures
Week 18	10 November - 16 November	2 lectures
Week 19	12 November - 18 November	2 lectures

# MODULE

School: SSES		Batch : 2025-28	
Program: Bachelor of Science(UG)		Current Academic Year: 2025-26	
Branch: Chemistry/Biochemistry		Term : Odd(2501), Semester : V	
1. Course Code	NV33008		
2. Course Title	Molecular Diagnostic Techniques in Biochemistry		
3. Credits	0		
4. LTPC	2-0-0-0		
5. Course Type	Value added course		
6. Course Objective	Student will have the knowledge of: 1. To provide conceptual and practical knowledge of PCR and gel electrophoresis techniques. 2. To develop students’ hands-on skills in molecular biology methods used in research and diagnostics. 3. To integrate interdisciplinary learning through applications in medicine, agriculture, and forensics.		
7. Course Outcomes	CO1: Explain the fundamental principles and components involved in PCR and gel electrophoresis. CO2: Design and set up basic PCR experiments, including selection of primers and reaction conditions. CO3: Perform agarose gel electrophoresis for DNA analysis and interpret experimental results accurately. CO4: Troubleshoot common issues in PCR and gel electrophoresis experiments. CO5: Demonstrate awareness of real-world applications of molecular diagnostic techniques in health and forensics. CO6: Practice safe laboratory procedures and maintain accurate experimental records and reports.		
8. Course Description	This value-added course is designed to equip undergraduate students with theoretical knowledge and practical skills in key molecular biology techniques—Polymerase Chain Reaction (PCR) and Gel Electrophoresis. It covers the basic principles, methodology, troubleshooting strategies, and real-world applications of these techniques in diagnostics, biotechnology, forensic science, and research.		
9. Outline syllabus			CO Mapping
Unit 1	Introduction to Molecular Biology Tools		
A	DNA, RNA, and proteins		CO1/CO6
B	Primer Designing Tools		CO1/CO6
C	Overview of PCR and Gel Electrophoresis		CO1/CO6
Unit 2	Polymerase Chain Reaction (PCR) – Theory and Types		
A	Principle and mechanism of PCR		CO2/CO6
B	Components of a PCR reaction		CO2/CO6
C	Types: Conventional PCR, qPCR, RT-PCR, multiplex PCR, Troubleshooting PCR reactions		CO2/CO6
Unit 3	Gel Electrophoresis – Theory and Applications		
A	Principle of agarose gel electrophoresis		CO3/CO6
B	DNA ladder, loading dye, and visualization (Ethidium bromide, SYBR Safe)		CO3/CO6
C	Analysis and documentation of gel results, Native vs SDS-PAGE		CO3/CO6
Unit 4	Laboratory Practical Sessions-I		
A	DNA extraction		CO4/CO6
B	Preparation of PCR reaction		CO4/CO6
C	Running a PCR using thermal cycler		CO4/CO6
Unit 5	Laboratory Practical Sessions-II		
A	Gel preparation, loading samples, running gel electrophoresis		CO5/CO6
B	Visualization of results using gel documentation system		CO5/CO6
C	PCR in disease diagnostics (COVID-19, genetic disorders)		CO5/CO6
Mode of examination	Assignments, Quizzes & Viva		