Academic Council Meeting No. and Date : 9/ July 02, 2024

Agenda Number: 3 **Resolution Number: 41/3.8A**

Vidya Prasarak Mandal's B. N. Bandodkar College of Science (Autonomous), Thane

Certificate Course in

Techniques in Molecular Biology (Advanced)

With effect from

2024-2025

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Preamble:

The Certificate Course on Techniques in Molecular Biology (Level 2: Advanced – Demo) offers students structured exposure to essential molecular biology techniques through demonstrations and conceptual tutorials. Designed for learners who aim to strengthen their understanding without hands-on laboratory practice, the course focuses on key workflows such as nucleic acid extraction, hybridization, bacterial transformation, screening systems, and microbial gene-based identification.

Students will observe total RNA extraction from *E. coli*, Southern hybridization, competent cell preparation, and bacterial transformation procedures. Blue-White selection will be demonstrated conceptually and visually. In addition, the course includes a theoretical and tutorial-based introduction to 16S rRNA gene analysis, enabling students to understand microbial identification and phylogenetic analysis in a non-lab setting. The course builds strong conceptual foundations, preparing learners for future practical work, research exposure, or advanced studies.

OBJECTIVES OF THE COURSE:

The course aims to:

1. To provide students with demonstration-based understanding of advanced molecular biology techniques, including RNA extraction, Southern hybridization, competent cell preparation, transformation, and Blue-White selection.
2. To strengthen theoretical knowledge of molecular workflows, reagents, instrumentation, and biosafety practices relevant to these techniques.
3. To explain the concepts and applications of 16S rRNA gene sequencing through theory and tutorial sessions, enabling understanding of microbial identification.
4. To develop students' ability to conceptually interpret demonstrated results and understand key troubleshooting points in molecular biology experiments.

LEARNING OUTCOMES:

1. Explain the principles and steps involved in total RNA extraction and Southern hybridization based on demonstrations.
2. Describe the workflow of competent cell preparation, *E. coli* DH5α transformation, and Blue-White selection.
3. Interpret the theoretical basis of 16S rRNA gene sequencing, including its application in microbial identification (tutorial-based).
4. Identify key equipment, reagents, and biosafety considerations, and conceptually troubleshoot common issues observed in the demonstrated techniques.

Eligibility: Students of Biological Sciences

Mode of Conduct: Offline /Online

VPM's B. N. Bandodkar College of Science (Autonomous), Thane

Structure of Programme

Course Code	Course Title	No. of lectures	Credits
BCCTM039	Techniques in Molecular Biology (Advanced)	30	2

Syllabus

Course Code BCCTM039	**Course Title** Techniques in Molecular Biology (Advanced)	**Credits 2**	**No. of lectures**
1	Extraction of total RNA		30
2	Electrophoresis of RNA		
3	Southern hybridization		

Evaluation Scheme:

At the end of the course , learners need to pass Final examination worth 50 Marks to earn 2 credits