Swami Rama Himalayan University

REPORT

2024-25

Centre of Excellence
Advance Molecular Biology
(OMICS Laboratory)

Swami Rama Himalayan University

ABOUT
SWAMI RAMA HIMALAYAN UNIVERSITY

Swami Rama Himalayan University (SRHU), established in 2012 and located near Jolly Grant Airport in Dehradun, Uttarakhand, is a premier private institution named after the renowned yogi Swami Rama. Spread over a 200+ acre eco-friendly campus, SRHU offers a diverse range of undergraduate, postgraduate, and doctoral programs through its key schools—Himalayan Institute of Medical Sciences (HIMS), Himalayan College of Nursing (HCN), School of Science & Technology (SST), School of Bioscience (SBS), School of Yoga Science (SYS), School of Pharmacy(SPS) and School of Management Studies (SMS). Recognized by the UGC, NMC, and Indian Nursing Council, and accredited with an NAAC A+ grade, the university is known for its academic excellence, state-of-the-art infrastructure, and strong focus on holistic development.

Swami Rama Himalayan University

Centre of Excellence
Advance Molecular Biology Laboratory

Swami Rama Himalayan University

AIM & OBJECTIVES

To investigate biological structures and processes at the molecular level using cutting-edge techniques from fields like genetics, biochemistry, biophysics, and computational biology, molecular biology, Nanotechnology and ultimately apply that knowledge toward understanding and alleviating human disease.

- To create a state-of-the-art platform for genomic, proteomic, metabolomic, and bioinformatics-based studies.
- To advance research in medicinal plants, microbial biotechnology, and molecular diagnostics.
- To provide hands-on training for students, scholars, and faculty in advanced molecular biology techniques.
- To collaborate with national and international institutions for capacity building and translational research.
- Equip students and researchers with hands-on mastery of lab protocols and instruments—gel electrophoresis, plasmid DNA prep, nucleic acid quantification, RT-PCR, sequencing, etc.—and the critical reasoning to plan, execute, and interpret experiments

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FACILITIES/INSTRUMENTATION AVAILABLE

Name of the Instrument	Image of the Facility
Real-Time PCR (qPCR) Real-Time PCR is a technique that monitors the amplification of DNA during the PCR process in real-time. It allows for quantitative analysis of gene expression, detection of specific DNA sequences, and assessment of viral loads, among other applications.	
Gradient PCR Gradient PCR is a technique that allows for the simultaneous testing of multiple annealing temperatures in a single PCR experiment. This is particularly useful for optimizing PCR conditions and ensuring the amplification of specific DNA sequences.	

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Name of the Instrument	Image of the Facility
Bio-Spectrophotometer with Nanodrop and Fluorescence This instrument is used to measure the concentration and purity of nucleic acids and proteins. The Nanodrop feature allows for small-volume measurements, while fluorescence capabilities enable the detection of specific molecules using fluorescent dyes.	
Gel Documentation System (Gel Doc) These systems typically include a camera, transilluminator, and software for capturing images and quantifying band intensities. They are essential for visualizing and documenting electrophoresis results.	

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Name of the Instrument	Image of the Facility
Automated DNA Extractor Automated extractors streamline the process of isolating nucleic acids or proteins from biological samples. These systems increase throughput, reduce human error, and ensure consistency in extraction protocols, making them invaluable in high-throughput laboratories.	
DNA Concentrator A DNA concentrator is used to concentrate DNA samples by removing excess solvents or buffers. This process is essential when preparing samples for downstream applications like sequencing or PCR, where higher DNA concentrations are often required.	

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Name of the Instrument	Image of the Facility
Temperature-Controlled Centrifuge A centrifuge with temperature control capabilities allows for the separation of components in a sample based on their density while maintaining a specific temperature.	
Deep Freezer (-80°C) An ultra-low temperature freezer maintains temperatures between -80°C and -86°C, providing long-term storage for biological samples like DNA, RNA, proteins, and cell extracts. This storage is crucial to prevent degradation and maintain sample integrity over extended periods.	

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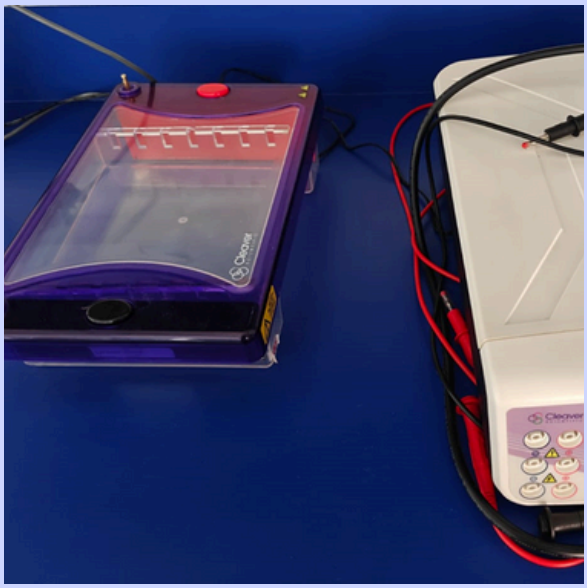
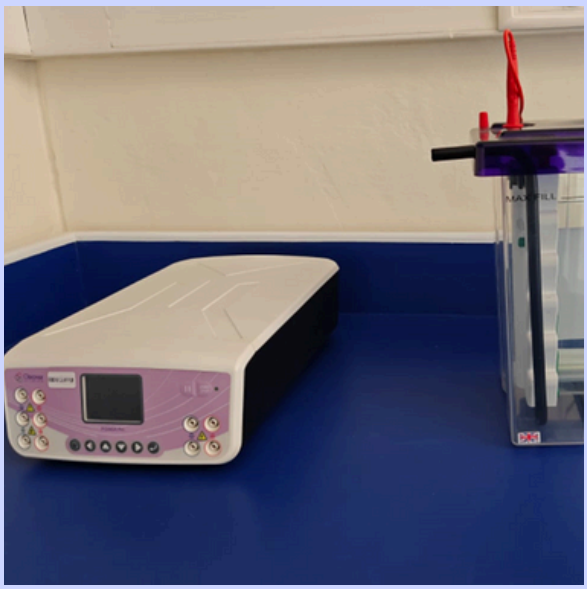
Name of the Instrument	Image of the Facility
Horizontal Electrophoresis Unit This system is commonly used for DNA and RNA analysis. Agarose gels are typically employed, and the horizontal orientation allows for easier handling and visualization of the samples during the separation process.	
Vertical Electrophoresis Unit This apparatus is used for the separation of nucleic acids or proteins based on their size and charge. The vertical setup is particularly suitable for separating proteins using polyacrylamide gels.	

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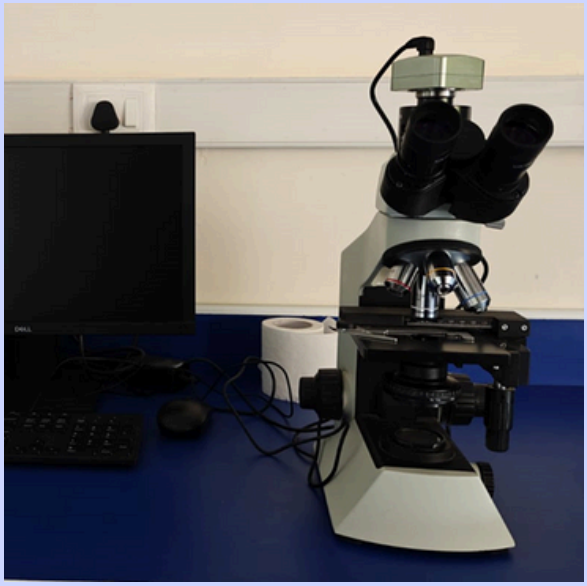
Name of the Instrument	Image of the Facility
Microscope with Camera A compound microscope equipped with a digital camera allows for high-resolution imaging of biological samples. The camera captures minute details essential for observing cellular structures, tissues and microorganisms and the analysis can be easily documented using the specialized software.	
Molecular Biology Workstation A molecular biology workstation is a dedicated area equipped with tools and equipment for performing molecular biology experiments. These workstations are designed to minimize contamination and ensure the integrity of sensitive experiments like PCR and cloning.	

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RESEARCH INITIATIVES

INTRAMURAL PROJECTS

Name of the PI/CO-PIs	Title of the Project	PIN No.
Dr. Vivek Kumar, Dr. Sanjay Gupta, Dr. Vijay Kumar, Dr. Akilesh Kumar, Dr. Geeta Bhandari, Dr. Yogesh Kumar	Metagenomic analysis of hospital waste water for determination of drug resistance genes	SRHU/FA/HSBS/2024-25/002
Dr. Akilesh Kumar, Dr. Sanjay Gupta, Dr. Vivek Kumar, Dr. Vijay Kumar	Assessment of the effects of air pollution on the gene diversity and population structure of the medicinally/economically important Shorea robusta roadside population using SSR markers	HSBS/2023/09
Dr. Vijay Kumar, Dr. Barnali Kakati, Dr. Vivek Kumar	Omics based study of drug resistant Acinetobacter : Unraveling moleculer machanisms and identifying therapeutic targets	SRHU/FA/RP/HSBS/2024-25/003

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RESEARCH INITIATIVES

INTRAMURAL PROJECTS

Name of the PI/CO-PIs	Title of the Project	PIN No.
Dr. Vijay Kumar, Dr. Vivek Kumar	Omics study of Non-ribosomal Peptide and Polyketide antifungal metabolites from actinobacteria isolated from leaf cutters ants	SRHU/Reg./Int./2023-655
Dr. Archna Dhasmana, Dr. Sanjay Gupta, Dr. Geeta Bhandari	Sustainable synthesis of biogenic nanopartical from waste as costeffective approch for biomedical application	HSBS/2023/02
Dr> Magha Sharma, Dr. Vikash Singh Jadon	Integrative phytochemical and transcriptomic profiling of Nyctanthes arbor-tristis (Harsingar) for uncovering therapeutic potential	SRHU/FA/RP/2025-26/004

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RESEARCH INITIATIVES

EXTRAMURAL PROJECTS

Name of the PI	Title of the Project	Total Cost	Sanctioning Agency
Dr. Geeta Bhandari	Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module	Rs 62,27,500/-	Department of Health Research, Ministry of Health & Family Welfare, Govt. of India

RESEARCH INITIATIVES

RESEARCH PATENTS

Name of the Inventer	Title of the Project	Application Number	Status
C S Nautiyal, Vishal Rajput, Vivek Kumar	PORTABLE SOIL MICRO BIOME ANALYZER (PSMA) WITH AI-BASED INTERPRETATION AND WIRELESS CONNECTIVITY	202511050003 A	Published

(12) PATENT APPLICATION PUBLICATION

(19) INDIA

(22) Date of filing of Application :24/05/2025

(21) Application No.202511050003 A

(43) Publication Date : 13/06/2025

(54) Title of the invention : PORTABLE SOIL MICRO BIOME ANALYZER (PSMA) WITH AI-BASED INTERPRETATION AND WIRELESS CONNECTIVITY

(51) International classification	:C12Q0001686900, G06N0020000000, C12Q0001680600, B01L0003000000, C12N0015100000
(86) International Application No Filing Date	:NA :NA
(87) International Publication No	: NA
(61) Patent of Addition to Application Number Filing Date	:NA :NA
(62) Divisional to Application Number Filing Date	:NA :NA

(71)**Name of Applicant :**
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Name of Applicant : NA
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(72)**Name of Inventor :**
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2)Dr. Vishal Rajput
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3)Dr. Vivek Kumar
Address of Applicant :School of Biosciences Swami Rama Himalayan University, Jolly Grant, Dehradun-248016 Dehradun ---------- ----------

(57) Abstract :
The present invention provides a portable soil micro biome analyzer (PSMA) with AI-based interpretation and wireless connectivity. The device automates sample processing and nucleic acid extraction via a miniaturized microfluidic system, eliminating the need for laboratory infrastructure. Nanopore sequencing provides real-time, long-read DNA data, while cloud-based machine learning models identify microbes, predict functional traits, and generate actionable microbiome insights. Results are transmitted wirelessly to smartphones or servers, supporting integration with precision agriculture, ecological monitoring, and research networks. Rugged, battery-powered, and user-friendly, the analyzer is suitable for use in remote environments by non-experts. This innovation democratizes soil microbiome analysis, enabling timely, data-driven decisions for sustainable agriculture, environmental monitoring, and soil health management, effectively bridging the lab-to-field gap in microbial genomics.

No. of Pages : 29 No. of Claims : 8

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RESEARCH INITIATIVES

RESEARCH PUBLICATIONS

Name of the Author	Title of the Publication	Name of the Journal	Year	DOI
Akhilesh Kumar	Review On Threatened Medicinal Plants In Uttarakhand And Their Genetic Diversity Assessment Through Molecular Markers	Journal of Advanced oology	2024	https://doi.org/10.53555/jaz.v45iS3.4490
Ashok Kumar Dogra, Archana Prakash, Sanjay Gupta, Meenu Gupta	Vitamin D and Vitamin D Receptor FokI, ApaI, and BsmI Gene Polymorphisms and their Relation with the Risk of Breast Carcinoma: A Case-control Study	Journal of Clinical and Diagnostic Research	2024	10.7860/JCDR/2024/69296.1924
Arjun Paliwal, Sanjay Gupta, GK Dhingra, Shalini Kotiyal and Ankita Singh	Assessing the significance of the β-actin gene in tuberculosis diagnosis: an analytical study utilizing anal fistula specimens	Research Journal of Biotechnology	2025	https://doi.org/10.25303/202rjbt01030113
Arjun Paliwal, Sanjay Gupta and Narotam Sharma	Evaluating the Diagnostic Potential of Human Growth Hormone and RNase P Genes in Tuberculosis Detection: An Analytical Study Using Menstrual Blood and Sputum Samples	Journal For Basic Sciences	2025	
Ashok Kumar Dogra, Archana Prakash, Sanjay Gupta, Meenu Gupta	Prognostic Significance and Molecular Classification of Triple Negative Breast Cancer: A Systematic Review	European Journal of Breast Health	2025	10.4274/ejbh.galenos.2025.2024-10-2

Swami Rama Himalayan University

WORKSHOP ORGANISED

1. **Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW) 10th Feb to 8th March 2025**

2. Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW) 7 th July to 2 nd August 2025

Swami Rama Himalayan University

WORKSHOP ORGANISED

Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module
Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)
10th Feb to 8th March 2025

Overview: A training program entitled "Modern Biology: Advanced Molecular Tools for Healthcare" was organized from 10th February to 8th March 2025 at the Himalayan School of Biosciences, Swami Rama Himalayan University, Dehradun. The training program was sponsored by the Department of Health Research (DHR), Ministry of Health and Family Welfare, Government of India under its scheme to strengthen human resource development in the field of biomedical and healthcare research through hands-on exposure to advanced molecular biology techniques.

Objective: The primary objective of the training was to equip young researchers, faculty members, and scientists with advanced knowledge and practical skills in modern molecular diagnostics and techniques, with a strong focus on translational research and real-world applications in healthcare.

A total of 30 participants from diverse academic and research institutions across India were selected for the training. They represented a wide range of disciplines including medicine, microbiology, biotechnology, biochemistry, and allied health sciences. The program structure included both theoretical lectures and practical sessions led by experienced scientists and professionals from reputed institutions. The curriculum was meticulously designed to cover a broad spectrum of topics such as nucleic acid extraction and quantification, polymerase chain reaction (PCR), quantitative PCR (qPCR), gel electrophoresis, animal cell culture and bioinformatics tools for sequence analysis and data interpretation.

Advance Molecular Biology Laboratory

Swami Rama Himalayan University

WORKSHOP ORGANISED

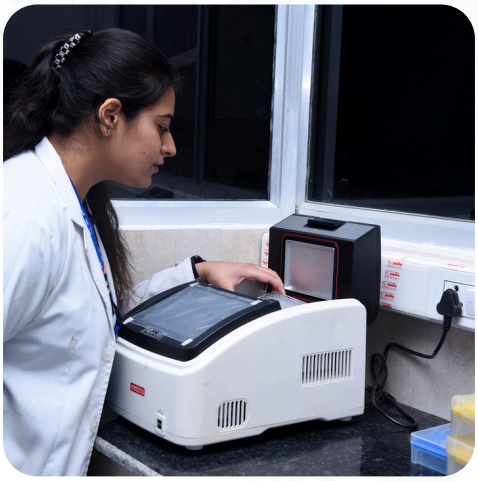
Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module

Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)

10th Feb to 8th March 2025






Swami Rama Himalayan University

WORKSHOP ORGANISED

Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module

Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)

10th Feb to 8th March 2025

Swami Rama Himalayan University

WORKSHOP ORGANISED

Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module

Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)

7 th July to 2 nd August 2025

The School of Biosciences, Swami Rama Himalayan University (SRHU), organized a training workshop entitled "Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module" from 7th July to 2nd August 2025. The initiative is supportedby the Department of Health Research (DHR), Ministry of Health and Family Welfare, Government of India, with the objective of enhancing research competencies in biomedical and healthcare sciences. The four-week training program, brought together 30 selected participants comprising faculty members, clinicians, research scholars, and postgraduate students from reputed institutions across the country and professionals from the biotechnology and healthcare industry. The program was meticulously designed to offer an integrated approach combining theoretical knowledge with practical, hands-on laboratory training across key areas of modern biology. Initial sessions covered animal cell culture and tissue engineering, including 2D/3D culture systems, biomaterials, bio-graft designing, tissue- engineered implant fabrication, and cytotoxicity assays. This was followed by modules in molecular biology that trained participants in nucleic acid and protein extraction, electrophoresis, blotting, PCR, qPCR, TA cloning, primer/probe design, and diagnostic RT-PCR. Participants were also exposed to advanced technologies such as next generation sequencing, flow cytometry and confocal microscopy. A major highlight of the program was the inclusion of bioinformatics, artificial intelligence in healthcare, Python programming, statistical modelling, and drug design and discovery. Participants also visited clinical diagnostic labs tounderstand real-world applications.

Advance Molecular Biology Laboratory

Swami Rama Himalayan University

WORKSHOP ORGANISED

Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module

Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)

7 th July to 2 nd August 2025

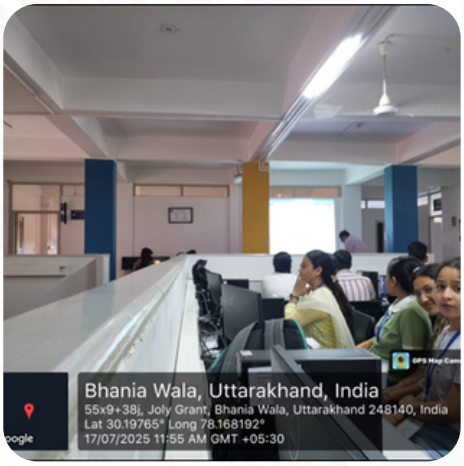
Swami Rama Himalayan University

WORKSHOP ORGANISED

Modern Biology: Advanced Molecular Tools for Healthcare – A Comprehensive Training Module

Sponsored by Department of Health Research, Ministry of Health and Family Welfare (MoHFW)

7 th July to 2 nd August 2025



Center of Excellence Advanced Molecular Biology (OMICS Laboratory)					
1	Characterization of Enzymatic Profiles in *Hericium erinaceus* and *Pleurotus ostreatus* for Biotechnological Innovations	Dr. Geeta Bhandari Dr. Nupur Joshi Dr. Vikash Singh Jadon Dr. Gourav Kumar Dr. Sanjay Gupta	SBS	24 Months	40.00
2	To develop bioactive scaffolds for skin wound infection and tissue regeneration	Dr. Purandhi Roopmani, Dr Sanjay Gupta, Dr. Ruchira Nautiyal, Dr Smitha Chandra	SBS	24 Months	14.00
3	Screening of herbal bioactive components for anti-cancerous activity	Dr Archana Dhasmana Dr C.S. Nautiyal	SBS	24 Months	51.00
Total					**105.00**