AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY

VINAYAKA MISSIONS RESEARCH FOUNDATION

DEPARTMENT OF BIOTECHNOLOGY

Event Report on Hands-on Training on Fluorescent Microscope - Funded by SERB

Name of the Event	:	Hands-on Training on Fluorescent Microscope - Funded by SERB
Venue	:	Department of Biotechnology, AVIT, VMRF (DU), Chennai
Trainer	:	Mr. Suraj Kumar, Service Engineer, The Western Electric and Scientific Works, Ambala, Haryana, Phone: +91-7542886142
Date & Time	:	29th July 2025, 12.30 pm to 3.30 pm
Event Coordinator	:	Dr Shanmuga Sundar S, Associate Professor
Convener	:	Dr A Nirmala, Associate Professor & Head

A hands-on training session on Fluorescent Microscopy was successfully conducted at the Department of Biotechnology, AVIT, on 29th July 2025. The Department of Biotechnology, AVIT, warmly welcomed Mr. Suraj Kumar, Service Engineer from Western Electric and Scientific Works, Ambala, Haryana, for the hands-on training session on Fluorescent Microscopy.

Mr. Suraj Kumar was formally received and introduced by the organizing faculty, following which the training session began with an overview of the principles of fluorescence and the applications of fluorescent microscopy in biotechnology research and diagnostics. This training was organized as a part of the Science and Engineering Research Board funded project (SRG/2023/000928) led by Dr. Shanmuga Sundar S, and was aimed at equipping undergraduate students with direct exposure to fluorescence imaging techniques. The session aimed in benefiting students of B. Tech. Biotechnology (all years), to align with their academic syllabus and preparing them for practical research and diagnostics in life sciences.

Objectives of the Training:

- To provide students with practical knowledge of fluorescence imaging techniques
- To bridge the gap between theory and application in areas such as cell biology, molecular diagnostics, and immunotechnology

The hands-on training session on Fluorescent Microscopy covered a comprehensive range of topics designed to provide in-depth knowledge and practical skills relevant to modern biotechnology. The session began with an introduction to the fundamental principles of fluorescence, including the concepts of excitation and emission, fluorophores, and the Stokes shift. Mr. Suraj Kumar, the resource person, explained the structural components and working mechanism of a standard fluorescent microscope, emphasizing the role of high-intensity light sources (such as mercury or LED lamps), excitation and emission filters, dichroic mirrors, and objective lenses in capturing high-resolution fluorescent images. He also compared fluorescent microscopy with other microscopy techniques such as brightfield, phase contrast, and confocal

microscopy, enabling students to understand its unique advantages in specific biological applications.

The training further explored the biotechnological applications of fluorescence imaging, particularly in fields such as cell biology, molecular diagnostics, microbiology, and immunotechnology. The use of fluorescent stains and dyes, including commonly used markers like

DAPI (for DNA staining), FITC (for labeling proteins), and fluorescent protein tags such as GFP (Green Fluorescent Protein), was demonstrated with live examples. These techniques were linked to processes like cell viability assays, intracellular localization of biomolecules, real-time gene expression tracking, and antigen-antibody interactions in immunofluorescence. A core part of the session involved hands-on exposure to microscope operation (using human biopsy cells and a model slide), where students learned how to prepare and mount samples, adjust filter cubes and objectives, and optimize light intensity and exposure for image clarity. Participants also learned how to troubleshoot common issues such as photobleaching, background fluorescence, and focus drift. The importance of quantitative imaging and capturing reproducible results was stressed, along with tips on proper documentation and analysis of fluorescence data. Additionally, the session covered routine instrument maintenance, including cleaning of optical components, alignment procedures, storage protocols, and safety measures to protect both the equipment and the user.

Outcomes of the Session:

Through this training session, students gained valuable hands-on experience in using advanced fluorescence microscopy tools, allowing them to directly engage with equipment and techniques commonly used in modern biotechnology laboratories. They developed a clear understanding of how fluorescent tagging enables the real-time visualization of biomolecules, a key method in studying cellular functions and molecular interactions. This exposure significantly enhanced their preparedness for research projects, internships, and future roles in the biotechnology industry, equipping them with both technical skills and practical confidence. Moreover, the session sparked a deeper interest among students in pursuing higher studies and careers in life science research, encouraging them to explore opportunities in academic, clinical, and industrial biotechnology fields. The training session was well-received by students and faculty, with active participation and positive feedback highlighting the clarity and effectiveness of the demonstrations. The Department of Biotechnology extends heartfelt thanks to Mr. Suraj Kumar for his valuable contribution, and sincerely acknowledges the SERB for funding towards the procurement of fluorescent microscope.