

## **VIRTUAL LABORATORIES IN APPLIED SCIENCES, ENGINEERING AND TECHNOLOGY (E&T)**

Laboratory experimentation has a vital role in science education. With the potential offered by information and communication technologies for the educational domain, virtual laboratories have emerged as a valuable alternative to face-to-face, hands-on laboratories. Moreover, the possibility of virtual laboratories opens new perspectives for higher education sustainability. They are a perfect approach for training learners to understand scientific principles in many fields of science by offering them the possibility to illustrate the scientific phenomena through automated and virtual practical activities that employ computer simulation.

### **MAJOR OBJECTIVES OF VIRTUAL LABORATORY**

- To facilitate science and E&T educational process by moving the whole environment from reality to virtual. This transition includes replacing heavy and costly equipment with graphical tools, which are easier and faster to move with drag and drop features.
- To provide opportunities for learning by doing at a cheaper, more secure, and widely used cost.
- To optimize the problem solving, critical thinking, creativity, conceptual understanding, science process skills, lab skills, motivation, interest, perception, and learning outcomes of the students.
- To provide students coalesce modern scientific and technological means with modernized new educational concepts to cultivate new types of technical talents needed in the 21st century.
- To create a possibility of experiment based courses through SWAYAM online education platform.

### **LINKs OF VIRTUAL LABORATORIES**

1. For Chemical Sciences, Physical Sciences, Computer Science, Mechanical Engineering, Biotechnology and Biomedical Engineering Students  
<https://vlab.amrita.edu/>
2. For Physics and Engineering and Technology students.  
<https://www.vlab.co.in/participating-institute-iit-kanpur>
3. For Physics and Engineering and Technology students.  
<http://vlabs.iitkgp.ernet.in/be/#>
4. For Physics and Engineering and Technology students.  
<https://de-iitr.vlabs.ac.in/>