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### Convener

Dr. B.M. Rajesh, Asst.Professor

Dr. D.N. Avadhani, Associate Prof. -Physics

### Address for Correspondence

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### Registration: Free

<https://forms.gle/apfgvYbMjha5EsrMA>

# R V College of Engineering

(Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi)

Bengaluru-560059



Five day Online Workshop

on

"Computational Physics for Higher Education"

Sponsored by

**Karnataka State Science and Technology Academy  
(KSTA)**

**10-14 MAY,2021**



Organized by

Department of Physics  
R.V. College of Engineering  
Bengaluru - 560 059

## About the Institution:

RV College of Engineering (RVCE) established in 1963 is one of the earliest self-financing engineering colleges in the country. The institution is run by Rashtreeya Sikshana Samithi Trust (RSST) a non-profit trust. RVCE is an autonomous college. Currently institution offers 12 bachelor, 16 Master Programmes and all the departments have research centers. affiliated to Visvesvaraya Technological University (VTU) Belagavi. Current annual intake for undergraduate, post graduate and research programmes in Engineering is in excess of 1200. Qualified and dedicated faculty motivate the students to achieve high academic proficiency.

Recent awards and achievements of the college include "Engineering College of the year-2019" by the higher education review Magazine, Ranked 70th in the country by National Institutional Framework (NIRF) -2020, Ranked 6th among the top 10 of 100 Pvt Engineering Colleges in the country by Education World Magazine. All the UG programmes and eligible PG programmes have been accredited multiple times by NBA.

## About the Department:

The Physics department has a team of enthusiastic and qualified faculty with a passion for teaching and research. Department has VTU recognised research center equipped with basic facilities and equipments like electrochemical workstation. The active research fields are thin films, polymer composites, energy storage devices and Computational Physics. Department has included Physics experiments using ICT tools in the syllabus and constantly organizing workshops and FDP's in the area of Computational Physics.

## About the KSTA:

Karnataka Science and Technology Academy (KSTA) is an autonomous organization under DST, GOK. KSTA has been carrying out a number of programmes to encourage students pursuing studies at different levels in an educational pyramid as well as popularization of science among general public.

## Objective of the workshop:

Participants will be exposed to open source hardware and software frame work for simulating Physics experiments using ICT tools.

## Topics covered in the workshop:

- Python for Scientists and Engineers-Lecture followed by hands on python tutorial.
- Computer interfaced Physics experiments.
- Scilab for Science education-Lecture with hands on tutorial.
- Modelling tool for Physics education.
- Open source ICT-tools for teaching and learning.



**RV COLLEGE OF ENGINEERING**  
**KSTA Sponsored**  
**FIVE DAY WORKSHOP ON"COMPUTATIONAL PHYSICS FOR HIGHER EDUCATION"**

**PROGRAM SCHEDULE: 10<sup>th</sup> May TO 14<sup>th</sup> May 2021**

<b>Day &amp; Date</b>	<b>Morning Session</b>		<b>Afternoon Session</b>	
Monday 10-05-2021	Inauguration: 10.00 AM to 11.00 AM <b>Dr. Subramanya KN</b> , Principal Dr. Ramesh, KSTA, CEO Dr. Uma BV, Dean	<b>BREAK</b>	11.30 AM to 1.00 PM <b>Dr. Ajith BP</b> , IUAC Python for Scientists and Engineers: Introduction	2.00 PM to 4.30 PM <b>Mr. Dhruva Patil</b> Visualizing Quantum Mechanics with Python
Tuesday 11-05-2021	9.30 AM to 11.00 AM <b>Dr. Sharmista Sahu</b> Monte Carlo simulation of Buffon's needle.		11.30 AM to 1.00 PM <b>Dr. SharmistaSahu</b> Monte Carlo simulation of Buffon's needle.	2.00 PM to 4.30 PM <b>Mr. Shashank Holla</b> Hands on Training using Python for scientific computation
Wednesday 12-05-2021	9.30 AM to 11.00 AM <b>Dr. Rajesh BM</b> Demonstration of Experiments using an open source tools.		11.30 AM to 1.00 PM <b>Dr. Avadhani DN</b> Physics Simulation using XCOS	2.00 PM to 4.30 PM <b>Dr. Jayalatha G</b> Scientific Computation using Scilab: Hands on training
Thursday 13-05-2021	9.30 AM to 11.00 AM <b>Prof. Praveena T</b> Open source ICT tools for online teaching.		11.30 AM to 1.00 PM <b>Dr. Shubha S</b> Modeling tool for Physics Education using Easy Java Simulation	2.00 PM to 4.30 PM <b>Dr. Prakash R</b> Scilab for Scientific Computation: Hands on training
Friday 14-05-2021	9.30 AM to 11.00 AM <b>Dr. Kendaganna Swamy</b> Metacognitive Hybrid Learning Model using ICT tools		11.30 AM to 1.00 PM <b>Dr. Rajesh BM</b> Physics Simulation using Tracker	<b>Valedictory</b> 1.00 PM to 1.30 PM

## **Topics to be covered:**

### **Introduction to Python for scientific computation**

1. Fourier series, Power Series, Bessel Functions, Polynomials, Legendre Functions, Spherical Harmonics, Numerical Differentiation, Solving Differential Equations: Runge-Kutta Integration.
2. A Python programming environment for Solving Schrödinger's Equation : Numerical method to find the solutions and plot the results. Numerical Methods: Forced oscillation, RCL, Runge–Kutta Method.
3. Plotting: Matplotlib, 2D Depiction, 3D Structure visualization (PyMol), Matrix math, Fourier transforms, ODEs.

### **Simulation and modeling using Scilab**

1. Solving Differential Equations using Scilab.
2. Plotting: Matplotlib, 2D Depiction, Matrix math, Fourier transforms, ODEs, and other deep math topics.
3. XCOS: A toolbox for the modeling and simulation of dynamic (continuous and discrete) systems.

### **Easy Java Simulation**

1. PhET: Interactive simulations for science and math, Interactive Illustrations, Explorations, and Problems for Introductory Physics.
2. Physlet: Interactive Illustrations, Explorations, and Problems for Introductory Physics.
3. Open Source Physics: It provides extensive resources for computational physics and physics simulations.

### **Demonstration of computer interfaced experiments using expEyes17**

1. Demonstration of Physics and Electronics experiments using expEyes

### **Tracker Video Analyzer**

1. Hands on training using Tracker tool for Spring and Mass system.

### **Simulations using spreadsheet:**

1. Monte Carlo simulation of Buffon's needle.