The following SPARC approved course will be offered at IIT Kanpur in December 2019:

Title: Cosmic Neutrino Observations at Ultra High Energy
Instructors: Dave Besson, Pankaj Jain, Sukanta Panda and Pravata K. Mohanty
Dates: December 16 to December 23
Total number of lecture hours: 18
Pre-requisites: basic course in High Energy Particle Physics

Course Description: This course will introduce the observational and experimental aspects of ultra high energy cosmic rays with a particular emphasis on cosmic neutrinos. It will discuss the generation and observation of extensive air showers and the deduction of primary properties. It will discuss the radio observation of cosmic ray neutrinos along with applications to ANITA and future detectors.

Course Content:

Topic	Contents	# of hours
Extensive Air Showers	Cosmic Ray Interactions with Air nuclei; Propagation in Earth's Atmosphere; Cascade Equation; Electromagnetic Cascades; Production of Radio Waves; Monte Carlo Simulations of Air Showers; Extraction of Primary Particle Properties	5
Experimental Techniques	Surface Detector Arrays; Cherenkov Radiation; Photomultiplier Tubes; Scintillation Detectors; Air fluorescence Technique; Detection of Muons; Askarian Effect; Radio Detection	5
Observation of Ultra High Energy Neutrinos	Neutrino Generated Particle Showers in Air and Ice; ICECUBE Observatory; Detection Using Radio Waves; ANITA Observatory; Future Observatories; ARA; ARIANNA	4
Simulation Techniques	Monte Carlo Simulation of Air Showers; Nuclear Fragmentation; Hadron Fragmentation Functions; Hadronic Models; Sampling Techniques; Simulation of Radio Pulse generated in air showers	4

Advanced undergraduate and graduate students are eligible to apply for this course.

Students interested in this course may contact:

Pankaj Jain
Physics Department
IIT Kanpur
Kanpur – 208016
email: pkjain@iitk.ac.in, pkjainiit@gmail.com