DEPARTMENT OF MATHEMATICS AND STATISTICS, IISER K INVITES YOU TO

DMS DAY 2022

PLENARY LECTURES

APRIL 14, 2022

Lecture 1
9:50AM - 11:00AM

Title : A Journey Beyond Normality

Speaker : Prof. Debasis Kundu, IIT Kanpur

Abstract: Normal or Gaussian distribution has been used quite extensively in different areas of science and technology both in theory and practice. Although, it has several desirable properties, it has its own limitations also. Recently, various non-normal distributions (both univariate as well as multivariate) have been proposed in the literature for data analysis purposes. In this talk we will consider different non-normal distributions and discuss their properties and provide applications in different areas.

Lecture 2
3:30PM - 5:00PM

Title : From Finite Abelian Groups to an Uncertainty Principle

Speaker : Prof. Swagato K. Roy, ISI Kolkata

Abstract: If G is a finite abelian group consisting of n many elements then the set of all complex-valued functions on G has a natural structure of an n dimensional complex inner product space. The homomorphisms of G to the multiplicative group of complex numbers T={z: |z|=1} form an orthonormal basis of this inner product space. This marks the beginning of Fourier analysis on finite abelian groups. In the first part of the talk, we will develop this theory in detail.
In the second part of the talk, we will apply this theory to prove an uncertainty principle. Uncertainty principles generally say that a function and its Fourier transform both cannot be simultaneously small. Depending on the notion of 'smallness' one gets various uncertainty principles. We will apply Fourier Analysis to prove an uncertainty principle due to Donoho and Stark for finite abelian groups. If time permits, we will also discuss certain variants of this uncertainty principle which flows from a somewhat recent result by Terence Tao.
The prerequisite for this talk is elementary linear algebra, more precisely, the fact that a commuting family of finitely many unitary matrices are simultaneously diagonalizable.