Fourier Analysis - Web course

COURSE OUTLINE

Cesaro summability and Abel summability of Fourier series, Mean square convergence of Fourier series, A continuous function with divergent Fourier series, Applications of Fourier series Fourier transform on the real line and basic properties, Solution of heat equation Fourier transform for functions in L^p, Fourier transform of a tempered distribution Poisson summation formula, uncertainty principle, Paley-Wiener theorem, Tauberian theorems, Spherical harmonics and symmetry properties of Fourier transform, Multiple Fourier series and Fourier transform on R^n

COURSE DETAIL

Module No.	Topic/s	Hours
1	Definition, examples and uniqueness of Fourier series, Convolution, Cesaro summability and Abel summability of Fourier series, Mean square convergence of Fourier series, A continuous function with divergent Fourier series, Applications of Fourier series such as isoperimetric problem, wave equation, etc.	10
2	The Schwartz space, Fourier transform on the real line and basic properties, Approximate identity using Gaussian kernel, Solution of heat equation, Fourier inversion formula, Fourier transform for functions in L^p, $1=p=2$, Theory of distributions, Fourier transform of a tempered distribution	12
3	Poisson summation formula, Heisenberg's uncertainty principle, Hardy's theorem, Paley-Wiener theorem, Wiener's theorem, Wiener-Tauberian theorem, Spherical harmonics and symmetry properties of Fourier transform, Multiple Fourier series and Fourier transform on R^n	18

References:

1. E. M. Stein and Rami Shakarchi, Fourier Analysis, An introduction, Princeton University press, 2003.

2. W. Rudin, Functional Analysis, Tata Mcgraw-hill, 1985.

NP-TEL

NPTEL

http://nptel.iitm.ac.in

Mathematics

Pre-requisites:

Real Analysis, Measure theory, Complex Analysis

Additional Reading:

H. Dym and H. P. McKean, Fourier series and Integrals, Academic press, 1972.

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