REPORT

Lecture 1: Function on $\mathbb{T}$ and 2π periodic functions on $\mathbb{R}$. Translation invariance of integral on $\mathbb{T}$. Fourier series, Partial sum as convolution with Dirichlet kernels. Riemann-Lebesque Lemma, Expression of Dirichlet kernels.

Lecture 2: C^2 functions and uniform convergence of Fourier series, convergence of Fourier series at the points of differentiability, Fourier series of Lipschitz continuous functions, Example a function with conditionally convergent Fourier series (Sawtooth function), Fourier series of piecewise C^1 functions, Riemann's localization principle.

Lecture 3: Mean square convergence, Plancherel and Parseval's theorem, uniform convergence of Fourier series for C^1 functions.

Lecture 4: Tauberian theorem for Abel summability, Tauberian theorem for boundedness of Abel means and partial sums of a series of complex numbers, $\sum_{n=-\infty}^{-1} \frac{e^{in\theta}}{n}$ is not a Fourier series of any Riemann integrable 2π periodic function.

Lecture 5: Construction of a continuous 2π periodic functions whose Fourier series diverges at zero.

Lecture 6: Weyl's equidistribution theorem.