

The Department of Mathematics

2017–18–B term

Course Name Fourier Analysis

Course Number 201.1.0231

Course web page

<https://math.bgu.ac.il/en/teaching/spring2018/courses/fourier-analysis>

Lecturer Prof. Izhar Oppenheim, <izharo@bgu.ac.il>, Office 316

Office Hours <https://math.bgu.ac.il/en/teaching/hours>

Abstract

Requirements and grading¹

Course topics

- Cesaro means: Convolutions, positive summability kernels and Fejer's theorem.
- Applications of Fejer's theorem: the Weierstrass approximation theorem for polynomials, Weyl's equidistribution theorem, construction of a nowhere differentiable function (time permitting).
- Pointwise and uniform convergence and divergence of partial sums: the Dirichlet kernel and its properties, construction of a continuous function with divergent Fourier series, the Dini test.
- L^2 approximations. Parseval's formula. Absolute convergence of Fourier series of C^1 functions. Time permitting, the isoperimetric problem or other applications.
- Applications to partial differential equations. The heat and wave equation on the circle and on the interval. The Poisson kernel and the Laplace equation on the disk.

¹Information may change during the first two weeks of the term. Please consult the webpage for updates



- Fourier series of linear functionals on $C^m(\mathbb{T})$. The notion of a distribution on the circle.
- Time permitting: positive definite sequences and Herglotz's theorem.
- The Fourier transform: convolutions, the inversion formula, Plancherel's theorem, Hermite functions. Time permitting: tempered distributions, further applications to differential equations.
- Fourier analysis on finite cyclic groups, and the Fast Fourier Transform algorithm.