אוניברסיטת
בן-גוריון בנגב

The Department of Mathematics

2020–21–A term

Course Name Fourier analysis for Electrical Engineering

Course Number 201.1.9901

Course web page
`https://www.math.bgu.ac.il//en/teaching/fall2021/courses/fourier-analysis-for-el`

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Office Hours `https://www.math.bgu.ac.il/en/teaching/hours`

Abstract

Requirements and grading[1]

Course topics

.1 Complex valued-functions and the complex exponential. Fourier coefficients of piecewise continuous periodic functions. Basic operations and their effects on Fourier coefficients: translation, modulation, convolutions, derivatives.

.2 Unfiorm convergence: Cesaro means, the Dirichlet and Fejer kernels, Fejer's theorem. The Weierstrass approximation theorem for trigonometric polynomials and for polynomials. Uniqueness of Fourier coefficients. The Riemann-Lebesgue lemma. Hausdorff's moment problem. Convergence of partial sums and Fourier series for C^2-functions.

.3 Pointwise convergence: Dini's criterion. Convergence at jump discontinuities and Gibbs phenomenon.

.4 L^2-theory: orthonormal sequences and bases. Best approximations, Bessel's inequality, Parseval's identity and convergence in L^2.

.5 Applications to partial dffierential equations: the heat and wave equations on an interval with constant boundary conditions, the Dirichlet problem for the Laplace equation on the disk, the Poisson kernel.

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

Bibliography:

- **Korner**, *Fourier analysis*
- **Stein and Shakarchi**, *Fourier analysis*