

## The Department of Mathematics

2018–19–A term

**Course Name** Fourier Analysis for Electrical Engineering

**Course Number** 201.1.0041

**Course web page**

<https://www.math.bgu.ac.il/en/teaching/fall2019/courses/fourier-analysis-for-el>

**Lecturer** Prof. Ilan Hirshberg, <ilan@bgu.ac.il>, Office 203

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

### Abstract

### Requirements and grading<sup>1</sup>

### Course topics

1. Normed spaces and spaces with inner products. The projection theorem for finite dimensional subspaces. Orthogonal systems in infinite dimensional spaces. The Bessel inequality and the Parseval equality, closed orthogonal systems. The Haar system.
2. The Fourier series (in real and complex form). Approximate identities, closedness of the trigonometric / exponential system. Uniform convergence of the Fourier series of piecewise continuously differentiable functions on closed intervals of continuity; the Gibbs phenomenon. Integrability and differentiability term by term.
3. The Fourier transform. The convolution theorem. The Plancherel equality. The inversion theorem. Applications: low pass filters and Shannon's theorem.
4. The Laplace transform. Basic relations and connection with the Fourier transform. A table of the Laplace transforms. The convolution integral. Application of the Laplace transform for solution of ODEs.

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



5. Introduction to the theory of distributions. Differentiation of distributions, the delta function and its derivatives. Fourier series, Fourier transforms, and Laplace transforms of distributions.