MATH 3094 - SPRING 2019
FOURIER ANALYSIS AND APPLICATIONS

In the early 19th century, the French mathematician Joseph Fourier proposed that **any function can be decomposed** into a linear combination of elementary building blocks of wave functions (e.g., **sines and cosines**). His ideas evolved into the field known as Fourier analysis, which has had a huge impact on modern mathematics and on many different fields of science and technology, such as signal processing, image processing, electrical engineering, acoustics, optics, and quantum mechanics.

In this course we will explore the basics of Fourier analysis, and we will study applications to various problems in mathematics and science. Emphasis will be placed on developing tools and theorems to solve concrete problems (such as the isoperimetric problem, and estimating the age of Earth). Topics will include:

- Fourier series of periodic functions
- Gibbs phenomenon
- Convergence of Fourier series
- The isoperimetric problem and Weyl's equidistribution theorem
- Fourier Transform on $\mathbb{R}^n$
- Applications to Partial Differential Equations
- The discrete Fourier transform
- Fast Fourier transform and applications to digital sound

Prerequisites: Transitions to Advanced Mathematics (2710 or 2710W), or Advanced Calculus II (2142), or instructor's permission. Enrollment requires instructor permission.

Questions? Email the instructor:

Vasileios Chousionis, at `vasileios.chousionis@math.uconn.edu`.