

COURSE ANNOUNCEMENT FOR SPRING 2019
MATH 564 – TOPICS IN ANALYSIS – FOURIER ANALYSIS

Instructor: Jennifer Brooks
Meeting Time: MWF 2:00 – 2:50
Location: Math 305.

Fourier analysis is the branch of pure mathematics that has its origins in the study of Fourier series and integrals. For a function f on the unit circle, its *Fourier series* has the form

$$\sum_{n=0}^{\infty} [a_n \sin nt + b_n \cos nt] = \sum_{n=-\infty}^{\infty} c_n e^{int}.$$

By analogy, for a function f on the real line, one has the associated *Fourier integral*

$$\int_{-\infty}^{\infty} \hat{f}(\xi) e^{it\xi} d\xi.$$

Fourier series and integrals are very useful to the applied mathematician because they give powerful techniques for solving differential equations. But the usefulness of these techniques depends on a solid theoretical understanding of the properties of such series and integrals. In what sense do they “represent” the function f ? Do they converge pointwise to f , or perhaps only with respect to some norm? How do the properties of the Fourier coefficients c_n or the Fourier transform \hat{f} relate to properties of the original function? This course deals with these questions.

Intended audience/prerequisites: This course is intended for students who have had at least one analysis course at the 400-level or above. It is *not* necessary to have any background in measure theory or the theory of the Lebesgue integral. The course is designed to be accessible and interesting to students in both pure and applied math.

Assignments and Exams: Because this is a special topics course, there will be no exams. Homework will be light and designed to give students considerable flexibility to explore the topics they find most relevant. Also, each student will give a presentation on a topic of his or her choice.