MATH 631 Harmonic Analysis Fall 2022

MWF 9:55-10:45, 232 Carver

Instructor: P. Sacks Office: 436 Carver

Telephone: 294-8143 Email: psacks@iastate.edu

Office Hours: M,F 11-2, W 2-3

Textbook: *Fourier Analysis: An Introduction* by E. M. Stein and R. Shakarchi

Course Content: This course will cover the classical theory of Fourier series and the Fourier transform, with related topics and applications as time permits.

- *Fourier series of periodic functions*: Fourier series of functions from various function spaces, norm and pointwise convergence, Gibbs phenomenon, summability methods, approximation by trigonometric functions
- *Fourier transform on R^n*: Fourier transform in L^1, L^2 and the Schwartz space, interpolation of operators and the Fourier transform in L^p, sine and cosine transforms, Fourier transform of radially symmetric functions and Bessel transforms
- *Fourier transform in the complex domain*: Analyticity properties of Fourier transforms, Hardy spaces, Hilbert transform, Paley-Wiener theory
- *Applications*: may include selections from the following topics: sampling theory, Radon transform, fast Fourier transform, wavelet theory

Course Grade: Will be based on 5-6 homework assignments, mostly from the textbook.

Other Excellent References:

Introduction to Fourier Analysis and Wavelets by M. Pinsky

Fourier Series and Integrals by H. Dym and H. McKean

Fourier Analysis by J. Duoandikoetxea

Introduction to Fourier Analysis on Euclidean Spaces by E. Stein and G. Weiss

Trigonometric Series by A. Zygmund

Fourier Analysis by T. Körner

An Introduction to Harmonic Analysis by Y. Katznelson

ISU Statement on Public Health

If you are not feeling well, you should stay home and focus on your health. Should you miss class due to illness, it is your responsibility to work with your instructor to arrange for accommodations and to make up coursework, as consistent with the instructor's attendance policy.

You may choose to wear a face mask and/or receive the COVID-19 vaccine and boosters, as well as other vaccines such as influenza, but those options are not required. Thielen Student Health Center will continue to provide COVID-19 vaccinations free-of-charge to students. The university will continue to offer free masks and COVID-19 test kits during the fall 2022 semester. Other wellbeing resources for students are available at: https://www.cyclonehealth.iastate.edu/wellbeing-resources/

Public health information for the campus community continues to be available on Iowa State's public health website. All public health questions should be directed to publichealthteam@iastate.edu.