

**MATH. 4123/5123. SEC. 001, FOURIER TRANSFORMS, FALL 2026,
MWF 10:00-10:50 PM, 121 PHSC**

Instructor: Tomasz Przebinda, Room 524, PHSC; home page: <http://tomasz.przebinda.com/>;
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Office hours: via Zoom, any time negotiated via email.

Text: Fourier Analysis, and introduction, by Elias Stein and Rami Shararchi, Princeton University Press, plus other materials that will be announced in class.

Course outline: Fourier Analysis was initiated by Joseph Fourier (a general in Napoleon's army) in eighteenth century in an attempt to solve a heat equation, but then evolved and grew into a theory which found applications to Number Theory, Representation Theory, Automorphic forms, Cryptography, Quantum Computing, Physics, Computer Engineering and many others. We shall study the details of the Fourier transform for functions defined on the real line, on an Euclidean space and a finite cyclic group gaining sufficient background to understand applications to Isoperimetric Inequality, Tomography, Dirichlet L function and Magnetic Resonance Imaging.

Most of the material is contained in Chapters 1 - 7 of the text.

Exams: There will be two midterm exams, on Wednesday 10/14/2026 and Wednesday 12/1/2026. The final exam will be on Wednesday, December 16, 8:00-10:00 am. I plan to have all the exams in class, room 121 PHSC.

Homework: There will be weekly assignments, to be handed in on Wednesday at the beginning of the class. Please hand in your homework on time. Late assignments cannot be accepted.

Final grade: final exam 40% + midterm 20% + midterm 20% + homework 20%

Students with Disabilities: Any student having a disability that may interfere with the demonstration of his or her abilities should contact me as soon as possible to arrange accommodations necessary to ensure full participation in the course.

Grade of Incomplete: The grade of "I" is a special-purpose grade given when a specific task needs to be completed to finish the course work. This is typically a term paper or other special assignment, so rarely makes sense in a mathematics course. An "I" cannot be given to avoid a low grade in cases where the course work is not strong.