Partial Differential Equations
Spring 2023, MATH-UA 263

Instructor: Prof. Oliver Bühler, room 1129, Warren Weaver Hall,
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Lectures:	Tu & Th,	2-3:15pm,	room 102, WWH
Office hours:	Tu & Wed,	4:45-5:45pm,	room 1129, WWH
Recitations:	Fri	2-3:15pm,	room 411, Silver

Teaching Assistant: Ryan Du sd3201@nyu.edu

Homework out Thursdays, due back the following Thursday.

Textbook: Peter J. Olver, "Introduction to Partial Differential Equations" ,
Springer Undergraduate Texts in Mathematics, 2014.
Corrected publication 2020
Free online access for NYU students:
http://link.springer.com/book/10.1007/978-3-319-02099-0

Assessment: homework, mid-term and final exam.

Syllabus

Hyperbolic equations: first-order PDEs, method of characteristics, wave equation in one dimension, initial value problem, energy conservation, spherical waves, characteristic formulation, method of images. Fourier series solution, normal modes.

Traffic waves, conservation laws, shocks, weak solutions.

Parabolic equations: heat equation in one dimension, fundamental solution, maximum principle, boundary conditions, well-posedness.

Linear dispersive waves, Fourier transform method, group velocity.

Elliptic equations: Laplace and Poisson equation, averaging property, well-posedness, Green's functions. Classification of second-order equations.