

APMA 2240: PARTIAL DIFFERENTIAL EQUATIONS II

Instructor: Hongjie Dong
Email: Hongjie_Dong@brown.edu
Division of Applied Mathematics
Brown University
182 George St., Room 227.

Lectures: MWF, 10:00–10:50, Barus & Holley 165.

Office hours: Monday 11:00–11:50 am, Wednesday 2:30 - 3:30 pm.

Grader/Teaching Assistant: to be announced.

Outline of the course: This is the second part of a year-long course, which serves as an introduction to the theory of partial differential equations. I will take materials from my notes and the supplementary books listed below.

We will cover some basic properties of second-order elliptic and parabolic equations including the Schauder estimates, L_p estimates, the DeGiorgi–Nash–Moser and Krylov–Safonov estimates for elliptic (and parabolic) equations, partial regularity for elliptic systems, harmonic maps, etc.

Reference books:

- L. C. Evans, “Partial differential equations”, AMS, Graduate Studies in Mathematics, V. 19.
- M. Giaquinta, “Introduction to regularity theory for nonlinear elliptic systems”, Lectures in Mathematics ETH Zürich, Birkhäuser Verlag, Basel, 1993.
- M. Giaquinta, L. Martinazzi, “An introduction to the regularity theory for elliptic systems, harmonic maps and minimal graphs”, Second edition, Scuola Normale Superiore di Pisa (New Series), 11. Edizioni della Normale, Pisa, 2012.
- D. Gilbarg, N. S. Trudinger, “Elliptic partial differential equations of second order”, Springer-Verlag, Berlin, 2001.
- N. V. Krylov, “Lectures on elliptic and parabolic equations in Hölder spaces”, AMS, Providence, RI, 1996.
- N. V. Krylov, “Lectures on elliptic and parabolic equations in Sobolev spaces”, AMS, Providence, RI, 2008.

Prerequisite: Basic knowledge of real and functional analysis (Lebesgue integral, Banach and Hilbert spaces).

Grades: There will be a take-home final exam, and a few (about five) homeworks will be assigned during the semester. The final grade will be based on them (Homeworks 70%, Final exam 30%).