

The Chinese University of Hong Kong
MATH 5021 — Theory of PDEs I

1. GENERAL INFORMATION.

Instructor: Chenyun Luo.

Office: LSB 213.

Instructor's email: cluo@math.cuhk.edu.hk.

Lecture time and location: Th, 2:30 am–5:15 pm in LSB 222.

2. COURSE INFORMATION.

We will discuss the classical theory of hyperbolic PDEs. Topics include linear hyperbolic equations, Lorentzian geometry, semilinear and quasilinear wave equations, and other related topics. Students are expected to know multivariable calculus, graduate-level real analysis, and undergraduate-level PDE (e.g., Evans Chapters 1–7) before taking this course. Prior exposure to differential geometry is recommended but not required.

This course is extremely challenging and requires a lot of time commitment. My previous experience suggests that less than 40% of registered students can complete this course without dropping out.

2.1. **Textbook.** No textbook is required. All lectures will be conducted based on the instructor's notes.

2.2. **Reference.**

- *Partial Differential Equations I–III*, by M. Taylor.
- *Nonlinear Dispersive Equations*, by T. Tao.
- *Introduction to Nonlinear Wave Equations*, by J. Luk.
- *Lectures on Nonlinear Hyperbolic Differential Equations*, by L. Hörmander.
- *Geometric Analysis of Hyperbolic Differential Equations: An Introduction*, by S. Alinhac.

3. COURSEWORK

There will be three to four homework assignments throughout this term. One comprehensive final exam (2 hours) will be scheduled in class on November 28.

4. GRADING POLICY.

Each student's performance will be evaluated based on the following criteria:

- Attendance 10%, Homework 40%, Final exam 50%.