MAT 400 APPLIED PARTIAL DIFFERENTIAL EQUATIONS: OUTLINE

2013/2014 Term 2

Instructor: Juncheng Wei, Math Annex 1224, Tel. 604-822-6510, E-mail: jcwei@math.ubc.ca

Objectives: This course is intended for analytical methods in solving partial differential equations (PDE's) coming from physical applications. The focus is on the analytical techniques. Very few proofs will be involved.

Textbook : No required textbook. Optional textbook: Walter A. Strauss, Partial Differential Equations, An Introduction, John Wiley & Sons, Inc., 1992

Additional References

- Richard Haberman, "Elementary Applied Partial Differential Equations"

Topics and Teaching Scheme

- Solving First-order PDEs, Methods of Characteristics
- Quasilinear PDEs, Schocks, and Traffic Flow
- Wave Equation on Infinite Domain: D'Alembert's representation, Fully Nonlinear First Order PDE and Caustic
- Heat Equation on Infinite Domain: Gaussian, Comparison of Wave Equation and Heat Equation
- Steady-state solutions for the Heat Equation
- Heat and Wave Equation in Bounded Domains: Separation of Variables, Sturm-Liouville, and Eigenfunction Expansion
- Laplace and Poisson's Equation: Poisson Formula, and Qualitative Properties of PDE
- Bessel Functions: Heat and Wave Equation in High Dimensions

- Integral Transforms and Infinite Domain Problems: Fourier Transformations, Laplace Transforms
- Nonlinear PDEs (time permits)

Assignments:

There will be 7 assignments. (I will post them on my web page: www.math.ubc.ca/∼jcwei.) There will be one midterm and one final examination.

Lecture notes, assignments, solutions to assignments, quizzes and examinations will be posted on my web when they are ready.

Assessment Scheme

Final Examination	1	50%
Midterm Examination	1	25 %
Assignments	4	35 %
Total		100 %

Office Hours:

TBA

Final Remark: Any questions? Please send me an email or drop by my office Math Annex 1224.