MAT 400-101 APPLIED PARTIAL DIFFERENTIAL EQUATIONS: OUTLINE

2019/2020 Term 1

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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

•• **15** Lecture Notes can be downloaded from my course website (http://www.math.ubc.ca/∼jcwei/MATH
101-2020.html).

Topics and Teaching Scheme

- Solving First-order (linear and nonlinear) PDEs, Methods of Characteristics
- Quasilinear PDEs, Shocks, Expansion Fans, and Traffic Flow
- Wave Equation on Infinite Line: D'Alembert's representation
- Heat Equation on Infinite Line: Gaussian, Comparison of Wave Equation and Heat Equation
- Wave and heat equations in half line: method of extensions
- 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

Midterm dates: Midterm One, Oct. 11, 2019; Midterm Two, Nov. 15, 2019

Assignments:

There will be 8 assignments. (I will post them on my web page: www.math.ubc.ca/∼jcwei.) There will be two midterms and one final examination.

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

Assessment Scheme

Final Examination	1	50%
Two Midterm Examination	2	34 %
Assignments	8	16 %
Total		100 %

Office Hours:

Monday, Wednesday: 4:30-5:30pm; Tuesday, Thursday: 1-2pm.

Final Remark: Any questions? Please send me an email or drop by my office LSK 303B.