MATH 517
TOPICS on PARTIAL DIFFERENTIAL EQUATIONS

Term 2 (Jan-April 2015)

http://www.math.ubc.ca/∼jcwei/MATH517-2014.html

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Topic prerequisites: Introduction to PDE or Han-Lin's book or Gilbarg-Trudinger's book (Chapter 1 to Chapter 9)

Topics

- Part I: Qualitative Analysis of Solutions
  - Moser's iteration to linear equation
  - Moser's iteration to nonlinear equation
  - Classification of stable solutions in bounded domains
  - Doubling Lemma
  - Pohozaev's identity
  - Monotonicity formula
  - Modica's estimate
  - De Giorgi's conjecture in low dimensions
  - Classification of biharmonic equation with supercrical exponents
  - Applications of monotonicity formula
- Part II: Finite and infinite dimensional gluing methods
  - Finite-dimensional reduction method: one-dimensional Allen-Cahn
  - Finite-dimensional reduction method: higher dimensional Nonlinear Schrodinger
  - Finite dimensional reduction method: critical exponent problems

- Finite dimensional reduction method: problems without parameters
- Infinite-dimensional reduction method: two-dimensional Allen-Cahn
- Infinite-dimensional reduction method: minimal surfaces and three-dimensional ALlen-Cahn
- Infinite-dimensional reduction method: role of Toda system
- Infinite-dimensional reduction method: multiple layers and Jacobi-Toda system

Assessment:

Each student will be asked to present one paper as your final exam.