Math 257/316: Partial Differential Equations
Term 2, December - April 2019

Instructor: Mona Rahmani, email: mrahmani@math.ubc.ca, Office: Mathematics Building 110

Course webpage: https://blogs.ubc.ca/mrahmani/teaching/math257-316-2018/

Office hours: Mondays 2-3 pm, Wednesdays and Fridays 1-2 pm

Grading: Final exam: 50%. Students must get at least 35% on the final exam to pass the course.
Two in-class midterm exams (each 20%): 40%. There will be no make-up midterms. If you cannot make it to any of the midterms (for a legitimate reason), you must inform me at least two days before the test date.
Homework (including Matlab assignments): 10%. Assignments should be submitted at the beginning of the class on the day they are due. No late submission or electronic submission will be accepted. You must submit your assignment at the section you are registered in. The handed in assignment must be your own work.

Midterm dates: Friday, February 15 and Wednesday, March 20

Text book: (recommended but not required)
1. Elementary Differential Equations and Boundary Value Problems, W.E. Boyce & R.C. DiPrima (John Wiley & Sons) 2012
2. Applied Partial Differential Equations with Fourier Series and Boundary Value Problems (4th Ed), R. Haberman, (Pearson), 2004.

Online Resources:
- Professor Anthony Peirce's course material: https://www.math.ubc.ca/~peirce/
- Professor Richard Froese's lecture notes: http://www.math.ubc.ca/~rfroese/notes/Lecs316.pdf

List of topics and their reference section in Boyce & DiPrima:

1. Review of techniques to solve ODEs
2. Series Solutions of variable coefficient ODEs (Chapter 5)
    a. Series solutions at ordinary points (5.1-5.3)
    b. Regular singular points (5.4-5.7, 5.8 briefly)
3. Introduction to Partial differential equations (Chapter 10)
The heat equation (10.5), the wave equation (10.7), Laplace's equation (10.8)
4. Introduction to numerical methods for PDEs
    a. First and second derivative approximations using finite differences - errors
    b. Explicit finite difference schemes for the heat equation
    c. Explicit finite difference schemes for the wave equation
    d. Finite difference approximation of Laplace's Equation – iterative methods
5. Fourier Series and Separation of Variables (Chapter 10)
    a. The heat equation and Fourier Series (10.1-10.6)
    b. The wave equation (10.7) 3 hrs
    c. Laplace's equation (10.8) 5 hrs
6. Boundary Value Problems and Sturm-Liouville Theory (Chapter 11)
    a. Eigenfunctions and eigenvalues (11.1)
    b. Sturm-Liouville boundary value problems (11.2)
    c. Nonhomogeneous boundary value problems (11.3)