Mth 622: Advanced Differential Equations - II

Instructor: Dacian N. Daescu
Office: Neuberger Hall M315
E-mail: daescu@pdx.edu
Phone: (503) 725-3581
Office Hours: 10:30 - 11:30 MW. Also by appointment.

Class Time and Location: MWF 11:30 - 12:20 Neuberger Hall 346

Textbook: Textbook: No textbook is required. Lectures will cover topics selected from the list of references.

References:

Partial Differential Equations by Lawrence C. Evans, Graduate Studies in Mathematics vol. 19, American Mathematical Society 1998.

Partial Differential Equations: Methods and Applications by Robert McOwen, 2nd Ed., Prentice Hall 2003.

A Course in Functional Analysis by John B. Conway, Springer-Verlag 1990.

Elliptic Partial Differential Equations of Second Order by D. Gilbarg and N.S. Trudinger, Springer-Verlag 1983.

Final Examination: Thursday, March 18, 12:30-14:20, in class

Course web site: Syllabus, homework assignments, and other information about the course will be available on the web site: http://www.mth.pdx.edu/∼daescu/mth622.html
Students are responsible for checking this site on a regular basis.

Course Description: The course will cover modern theory and applications of partial differential equations. Topics will be selected from:

Existence and uniqueness of weak solutions to general elliptic problems.

Spectral theory of elliptic operators: self-adjoint and compact operators, Hilbert-Schmidt theorem, applications. Riesz-Galerkin approximation to weak solutions.

Linear evolution equations: parabolic and hyperbolic equations, weak solutions, energy estimates, existence and uniqueness. Hille-Yosida theorem.

Variational inequalities, Stampacchia's theorem, the obstacle problem.

Introduction to the theory of nonlinear PDEs (if time allows).

Additional topics may be covered to accommodate students'interests

Student Learning Objectives: To become familiar with fundamental topics in the modern theory and solution techniques for PDEs; to build the skills and understanding necessary to pursue further research

in the field of PDEs.

Prerequisites: Mth 621.

Grading Policy: The final grade will be based on homework and a final project, as follows:

1. **Homework, 75% of the course grade**. Three sets of problems will be assigned as homework.
2. **Project, 25% of the course grade**. Each student is required to complete a project assignment divided into two parts: written report and in-class presentation.

In assigning final course grades, plus/minus grading will be used.

Main criteria for evaluating your work will be: correctness, completeness, and *clarity* of the presentation.

Working in team for your homework and project is encouraged *only if each student in the team is contributing to the problem solving.*

Disability requests: If you have a disability which may require special arrangements for seating, testing or other class requirements, please contact me after class or during my office hours.