MATH 527
PARTIAL DIFFERENTIAL EQUATIONS A
Fall Semester, 2004

Time and Place:	MWF 9:00-10:20 AM (lectures on two of the three days), classroom TBA
Instructor:	Mark A. Lewis
Offices:	545B CAB
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Office Hours:	To be announced
Text:	Robert McOwen, *Partial Differential Equations: Methods and Applications.*

The Course. Math 527 is a core course for students in applied mathematics, mathematical finance, scientific computing, fluid dynamics and so forth. The contents include:

1. First order equations: Cauchy problem, method of characteristics, weak solutions, conservation laws, general nonlinear equations
2. Higher order equations: Cauchy problem, existence and uniqueness classification, adjoints and weak solutions, fundamental solutions
3. Wave equation: one, two and three dimensional solutions, Huygen's principle, conservation of energy, domain of dependence
4. Laplace equation: Green's identities, maximum principle, existence theory, harmonic functions
5. Heat equation: eigenfunction expansions, regularity and similarity, nonhomogeneous problem, maximum principle
6. Linear functional analysis: Sobolev spaces, Hahn-Banach and Reisz representation theorems, weak solutions, Lax-Milgram Theorem, dual spaces, weak convergence, compactness, Sobolev embedding theorems, Holder continuity, imbedding theory.

Prerequisite. Prerequisite: 436 or equivalent; pre- or corequisite: MATH 518.

Homework. Homework sets will be assigned.

Grading. There will be a midterm and a final exam.

A percentage will be calculated based on the homework, midterm and final, and the percentage will be translated to a course grade according to a scale given out at the start of class.

Supplemental Texts

1. L. Evans *Partial differential equations*, 1998.
2. F. John *Partial differential equations, 4th edition*, 1991.