

INTRODUCTION TO PARTIAL DIFFERENTIAL EQUATIONS

Math 411

Spring 2007

Instructor: Dr. Katherine Socha, SB 168, (240) 895-4353, ksocha@smcm.edu

Class: MWF, 9:20–10:30, SB 164

Office Hours: MW 4-5pm; or by appointment; or by chance.

Text: Partial Differential Equations of Mathematical Physics and Integral Equations by Guenther and Lee.

Supplementary Text: Fourier Series and Orthogonal Functions by Davis (on reserve in the library)

Course Structure: This class will emphasize combining physical modeling with rigorous mathematics, determining the effects of physical assumptions in model equations, understanding the limitations of a mathematical model, and understanding the effectiveness of mathematical models in predicting qualitative properties of physical systems.

We will cover most of Chapters 1 through 5, augmented with higher dimensional material from Sections 10-1, 2, 3, 4; 8-1, 2; 9-1,2; 11-1, 2.

Class time will be a mixture of lectures, discussions, and group work. Prepare for each class by reviewing the material already covered.

Assessment:

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| Exams (2 at 15% each): | 30% |
| Homework: | 20% |
| Participation: | 10% |
| Final Project: | 20% |
| Final Exam: | 20% |

Homework: Typically due every 10-14 days. The lowest two homework scores will be dropped.

Exams: If your final exam percentage is higher than a midterm exam score, the final exam score will replace the midterm. Tentative dates: Friday 2/21 and Friday 3/28.

Final Project: The final project for this course is up to you! I want you to come up with ideas about ways you could explore the material or how to explain the material. You may choose to apply techniques we learn to other sample equations, you may choose to develop computer code to solve a big problem, you may choose to develop a wonderful way to explain or demonstrate behavior of a partial differential equation. Before you spend hours and hours on a project, you should talk to me to make sure it is an acceptable. Each project will receive three grades out of 100 on three components: (1) Mathematical content: It is not sufficient to report a mathematical fact—you should try to explain, artfully, the *idea*, the *why*, not just the how. (2) Creativity: How much of a departure from the text and the class have you made, how inventive is the project? (3) Quality: Is the project well-designed and well-made, or did you throw it together over the weekend?

These three grades will be averaged, equally weighted, for the project grade.