MATH 535-011 Introduction to Partial Differential Equations
TR 12:30-1:45, EWG 210 Spring 2013
Web Page: http://www.math.udel.edu/~edwards/download/m535/s13home.html

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Introduction

Welcome to MATH 535! In this course you will be learning to solve various types of partial differential equations. Since many of you are not mathematics majors, the focus of this course will be on the *applications* of partial differential equations, rather than the *theory* behind it (except when explaining the theory will enhance your understanding of the concepts). I will be passing around a sheet today asking each of you what your major is. Then I will try to present examples from those subjects so that you can see how PDEs are applied to your area of interest.

The texts for this course are as follows:

Colton, David. *Partial Differential Equations: An Introduction*. New York: Dover, 2004.
Haberman, Richard. *Applied Partial Differential Equations with Fourier Series and Boundary Value Problems*, 5th ed. New York: Pearson, 2012.

The text is required, since you will be assigned both reading and homework problems from the books. In addition, I may also be lecturing from various other sources, so class attendance and participation is necessary for successful mastery of the material.

If you have a problem, question about the material, or interesting application you would like me to address in class, please feel free to contact me during my office hours or make an appointment. **Extra copies of handouts are available at the Web page listed above.**

Please turn off portable phones, etc. before entering the classroom. You may bring a recorder with you to class, if you wish; however, unattended recorders will not be permitted. There will be no makeup classes for snow days unless mandated by the University.

Homework

The most effective way to succeed in this course is to do all the homework assignments. I select the problems carefully to illustrate the most important topics in the course. Even if you are registered as a listener, I recommend doing the homework, and I will review it.

In most cases, homework will be distributed every Thursday during lecture. and it will be due the following Thursday. (The first homework assignment is attached to this sheet.) The homework will ideally cover material up through the day it is distributed. **ABSOLUTELY NO LATE HOMEWORK WILL BE ACCEPTED!** If you must miss a due date because of University business, it is your responsibility to make sure the homework gets to me ***before*** the due date. Since mathematics is a subject where the material for one section builds on the section before, it is critical that you keep up to date on the homework: hence the stringent policy. However, to calculate your semester-long homework average, I will drop your two lowest homework scores. Therefore, low scores for assignments where you were pressed for time can be erased as long as you don't have too many of them.

Though you may not copy directly from another's paper or use someone else's ideas (including online aids) as your own[1], I encourage you to discuss the homework problems with your classmates. Any scientific endeavor is rarely done in a vacuum; therefore it is to your advantage to learn the benefits of collaborating. Model homework solutions will be posted in Morris Library after the assignment is due. Hopefully these will assist you in learning the material.

Homework assignments should be folded like a book with the following information on the "front cover:"

Name
MATH 535—Edwards
Assignment Number
Date

You will turn in your assignments this way so that I can put your grade on the inside, thus ensuring your privacy. I will make every effort to ensure that your graded homework is returned in a timely manner. The number of points assigned to each problem will be listed.

Obviously, I can assign only a select few homework problems to be turned in. Therefore, I choose ones which, if mastered, show adequate understanding of the material. The examinations will largely be based on the material covered in the homework assignments. However, you are encouraged to try other problems in the book for practice.

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[1] For more details regarding academic dishonesty, see the Student Handbook (`http://www.udel.edu/stuguide/`).

Exams

There will be two in-class midterms and a final exam for the course; the dates are listed on the attached schedule. Please be prepared to show picture identification in order to enter the examination room. Attached to each examination will be a course evaluation form so that I may receive your suggestions for how the course could be improved. These forms will be seen only by me, so if you have comments that you wish the department to hear, please contact them directly.

When the exams are returned, they will have a numerical score and a letter grade on them. The numerical score is your score for the exam; *the letter grade is your grade for the course* to that point, including all homework scores.

Assessment

Your grade for the course will be determined in two stages. First your *raw score* will be calculated using the *higher* of the two algorithms:

1) The exams will count for 90% of your grade (final counts double), and the homework counts 10%.
2) The exams will count for 80% of your grade (final counts double), and the homework counts 20%.

Therefore, performing well on the homework will not only help you learn the material, it can also directly help your grade. (In the past, it has been my experience that the vast majority of students improve their grades by using their homework scores.) Then each of the raw scores will be scaled to determine final grades.

Electronic Communication

The Web page for this course is listed above: there you will find copies of handouts available for downloading. Also at the URL

`http://www.math.udel.edu/~edwards/download/suggest.html`

you will find an anonymous suggestion box. For more information on how to use electronic resources, contact the Help Center (x6000).

Tentative Schedule

Note: This is only a tentative schedule; there may be deviations from it.

week of February 5: review material, the heat equation, separation of variables
February 5: Homework 1 distributed
week of February 12: separation of variables, Fourier series
February 14: Homework 1 due; Homework 2 distributed
week of February 19: Fourier series and the heat equation, Laplace transforms
February 21: Homework 2 due; Homework 3 distributed
week of February 26: Laplace and Fourier transforms
February 28: Homework 3 due; Homework 4 distributed
week of March 5: Fourier transforms, classification of PDEs
March 7: Homework 4 due; Homework 5 distributed
March 12: classification of PDEs
March 14: Exam I (covers up through Fourier transforms)
week of March 19: classification of PDEs, the wave equation
March 21: Homework 5 due; Homework 6 distributed
week of March 26: spring break
week of April 2: the wave equation, Sturm-Liouville theory, Bessel functions
April 4: Homework 6 due; Homework 7 distributed
week of April 9: Bessel functions, Laplace's equation
April 11: Homework 7 due; Homework 8 distributed
week of April 16: Laplace's equation, spherical harmonics, first-order equations
April 18: Homework 8 due; Homework 9 distributed
April 23: first-order equations
April 25: Exam II (covers up through spherical harmonics)
week of April 30: nonlinear first-order equations, shocks
May 2: Homework 9 due; Homework 10 distributed
week of May 7: shocks, Stefan problem, traveling waves
May 9: Homework 10 due; supplemental study material distributed
May 14: review
Final: TBA