MATH 617-010 Introduction to Applied Mathematics II
MWF 10:10–11, EWG 204 Spring 2001
Web Page: http://www.math.udel.edu/~edwards/download/m617/s01home.html

Instructor: Prof. D. A. Edwards Office Hours: M3–4, T10–11 or by appointment
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Introduction

Welcome to MATH 617! In this course you will be learning not only the mathematical techniques used in applied mathematics, but also how they are actually used in practice to analyze physical systems. The texts for this course are as follows:

Required:

Guenther, Ronald B., and Lee, John W. *Partial Differential Equations of Mathematical Physics and Integral Equations*. New York: Dover, 1996.

Logan, J. David. *Applied Mathematics*, 2nd ed. New York: Wiley, 1996.

Recommended:

Weinberger, Hans F. *A First Course in Partial Differential Equations With Complex Variables and Transform Methods*. New York: Dover, 1995.

In addition, upon request I will put other books on reserve in the Morris Library that may prove helpful for certain sections.

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, pagers, etc. before entering the classroom. You may bring a tape recorder with you to class, if you wish; however, unattended tape recorders will not be permitted. There will be no makeup classes for snow days.

Electronic Communication

The Web page for this course is listed above. There you will find copies of handouts available for downloading, as well as any important announcements (corrections to typographical errors, etc.). Also at the URL

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

you will find an anonymous suggestion box.

Particularly important messages regarding this course may also be e-mailed to you directly. In addition, you may send me e-mail with questions regarding the course, homework assignments, etc. For more information on how to use electronic resources, contact the Help Center (x6000).

Exams

There will be a midterm and final exam for the course; the dates are listed on the attached schedule. **You will need a small blue book for each exam**. Attached to the midterm 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.

Writing Assignment

As each of you proceeds in your career, you will encounter situations where you will have to communicate your ideas to others. Those in academia have to submit theses and research articles; those in industry must make presentations and write reports. In order to prepare you for this sometimes daunting task, I am assigning a **MANDATORY** writing assignment. This semester you will continue to refine your writing assignments from last term to hopefully use additional techniques you will learn this semester. Deadlines are listed in the course schedule below.

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 Wednesday during lecture and it will be due the following Wednesday. (The first homework assignment is attached to this sheet.) The homework will ideally cover material up through the Friday before it is due. **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 as your own, 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 on the Web 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 617—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.

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) Each exam will count for 1/3 of your grade; the other 1/3 will be split between the homework and the writing assignment.
2) The writing assignment will count for 1/6 of your grade; the other 5/6 will be split evenly between the homework and exams.

Then each of the raw scores will be scaled to determine final grades, if necessary.

Tentative Schedule

Note: This is only a tentative schedule; you may expect deviations from it. (In particular, topics near the end of the schedule may be dropped if the other topics take more than the allotted time.)

week of February 5: linear first-order PDEs
February 7: Homework 1 distributed
week of February 12: quasilinear first-order PDEs
February 14: Homework 1 due; Homework 2 distributed
week of February 19: classification of second-order equations, the wave equation
February 21: Homework 2 due; Homework 3 distributed
week of February 26: the wave equation, Bessel functions
February 28: Homework 3 due; Homework 4 distributed
week of March 5: Laplace's equation
March 7: Homework 4 due; Homework 5 distributed
week of March 12: spherical harmonics, the Stefan problem
March 14: Homework 5 due; Homework 6 distributed
week of March 19: generalized Green's functions, non self-adjoint problems
March 21: Midterm Exam distributed
week of March 26: Spring Break (no class)
week of April 2: non self-adjoint problems, bifurcation theory
April 4: Homework 6 due; Homework 7 distributed
April 6: Outline of writing assignment due
week of April 9: traveling waves, epidemics
April 11: Homework 7 due; Homework 8 distributed

week of April 16: variational principles
April 18: Homework 8 due; Homework 9 distributed
week of April 23: Rayleigh quotient, the Navier-Stokes equations
April 25: Homework 9 due; Homework 10 distributed
week of April 30: limiting cases of the Navier-Stokes equations
May 2: Homework 10 due; Homework 11 distributed
week of May 7: inviscid flow, Volterra equations
May 9: Writing assignment due
May 14: Volterra equations
May 16: formal review session
May 16: Homework 11 due; supplemental questions distributed