AME 561–Mathematical Methods I
Fall 1999

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Office hours: when available	7-8:00 PM Wednesday	when available

Course web site: http://www.nd.edu/∼powers/ame.561

Listserver address: ame561-01-fa99@listserv.nd.edu. When e-mail is sent to this address, the entire class will be receive a copy of the mail.

Course time and location: MWF 12:50-1:40 PM, 117 DeBartolo

Help Session: Wednesdays, 6:00-7:00 PM, 119 DeBartolo

Prerequisites: formally none, knowledge of undergraduate calculus through differential equations

Catalog description: "Multidimensional calculus, linear analysis, linear operators, vector algebra, ordinary differential equations"

Comments: The course will consist of a survey of elements of advanced mathematics. Topics will be as listed in the catalog with some additional material interspersed. A primary source will be the course notes. The texts, of which Riley, Hobson, and Bence is the most comprehensive, will serve as complements to the lecture notes, which are self-contained.

Notes available in Lafortune (Dooley Room, 24 August-31 August, Copy Shop thereafter)

M. Sen and J. M. Powers, 1999, *Lecture Notes on Mathematical Methods* (required).

Texts available in Bookstore

K. F. Riley, M. P. Hobson, and S. J. Bence, 1997, *Mathematical Methods for Physics and Engineering*, Cambridge (required).
E. J. Hinch, 1991, *Perturbation Methods*, Cambridge (recommended).
B. Friedman, 1990, *Principles and Techniques of Applied Mathematics*, Dover (recommended).
P. G. Drazin, 1992, *Nonlinear Systems*, Cambridge (recommended).

Text on Reserve in Engineering Library

C. M. Bender and S. A. Orszag, 1978, *Advanced Mathematical Methods for Scientists and Engineers*, McGraw-Hill.
M. D. Greenberg, 1978, *Foundations of Applied Mathematics*, Prentice-Hall.
W. Kaplan, 1991, *Advanced Calculus*, Addison-Wesley.
E. Kreyszig, 1993, *Advanced Engineering Mathematics*, John Wiley.
G. Strang, 1986, *Introduction to Applied Mathematics*, Wellesley-Cambridge.
G. Strang, 1988, *Linear Algebra and its Applications*, Harcourt Brace Jovanovich.

Required Work and Grading

Exams will be closed book, closed notes and held in class. The final exam will be comprehensive. You can bring one 8 1/2" by 11" sheet with notes on both sides to the first exam, two to the second, and three to the final.

Homework will be assigned regularly. All homework will be graded and returned. Homework must be done on *one side only* of 8 1/2" by 11" *engineering* paper with no frayed edges. Multiple pages must be stapled. You should briefly restate the problem, give a sketch if helpful, give all necessary analysis, and place a box around your final answer. All plots must be computer generated, trimmed, and taped to engineering paper. Label all axes. Raw Mathematica or Maple output will not be graded. Neatness and effective communication are considered in grading as well as the final answer itself.

Two short (one page maximum) critical reviews of works from the literature will be required. The first review will consider a topic of current interest in applied mathematics from the journal *SIAM Journal of Applied Mathematics*. The second must consider an article on mathematics which has stood the test of time. It must be over fifty years old, written by a well-known mathematician, and should have a proven lasting value. The articles you choose should *not* fall into the category of review, historical discussion, biography, or other version of "math lite;" rather, it should be a substantive, original contribution. Your reviews should 1) summarize the article's major findings and 2) offer an argument why this paper is deserving of its recognition. The reviews are required to be written in a LaTeXformat and will be checked primarily for style, format, grammar, and content.

Grades will be assigned based on students' performance on examinations, homework, and papers. Pertinent information is as follows:

Exam I	25	Friday, 1 October 1999
Exam II	25	Friday, 19 November 1999
Final Exam	35	Thursday, 16 December 1999, 4:15-6:15 PM
Homework	13	
Reviews	2	Friday 24 September 1999; Friday 12 November 1999
Total	**100**	

Honesty Policy

Academic honesty is expected. When confronted with an apparent violation, I will enforce the appropriate University regulations to the best of my ability. I will also try to make my expectations clear. By and large, though, these issues are out of my control and as such I do not seek out violations. Instead, I depend upon your basic integrity to prevent any problems.

In brief my expectations are as follows. I encourage you to freely discuss the homework amongst one another as you formulate your solutions *individually*. *Your* written work should represent *your* understanding of the problem. In practice this means copying (in whole or in part) another student's homework, exam, computer program, or paper is *not* permitted. If you choose to discuss your work with a colleague, it should be a discussion in which one teaches another or both work to a mutual understanding. As a counter-example, it is not acceptable to give a friend your homework five minutes before class so that friend can copy your work. I also consider it unacceptable to copy work from a student who was in the class in a previous year. In your written reports, be careful to correctly use quotation marks for words that did not originate with you. Paraphrasing should be held to a minimum, but if used, the paraphrased section should be specifically identified and unambiguously cited. It is not sufficient to simply list a reference but not indicate where a specific quotation or paraphrase was employed. In addtion all sources used should be fully cited. As is done in the scientific literature, you should *briefly* acknowledge in writing any significant discussions or interactions you had regarding the work you submit. As a general principle, I do not accept the justification that you were not sure of my intentions. If you feel you may be in an ethical grey area, then you should consult with me *before* acting.