Instructor: Paul Goerss, Lunt 206
Email: pgoerss@math.northwestern.edu
Office hours: MF, 2–3 W, 3–4, or by appointment

Course Time: MWFTh Lunt 101 at 1PM. Subject to Change!

The course covers all or part of Chapters 5, 10, and 11 with supplementary
material on PDEs. In particular, anyone taking this quarter would have a
healthy background in differential equations and their applications to science.

Web site: The web site will have the syllabus (this document), assignments,
information about our numerical solver, and the like.

Matlab: Matlab examples and supplements will be available from the class
web site.

Homework: Homework will be assigned every day and will be a basis of dis-
cussion in class. Most will not be collected.

The Evaluation Component – Grades: Your performance will be assessed
by means of two in-class exams, and three projects on a schedule of roughly
once every two weeks. The exact schedule is below. The test will be in a
standard, closed book, fifty minute format. The format for the projects will be
much more flexible, but each will have a mathematical (that is, written) and
computer component. More details will be supplied at the appropriate time.
Each of the five will count as 20% of your grade. There will be no final.

- Project 1: Due Monday, January 24. This will be drawn from Chapter 5
  (Laplace Transform).

- Test 1: Friday, February 4, with material from Chapters 5 and supple-
  mentary material on heat and transport problems.

- Project 2: Due Monday, February 21. The focus will be on a heat prob-
  lems.

- Test 2: Friday, March 4, with material from Chapters 10 and 11.

- Project 3: Due on or before 5PM, March 18. We will discuss and model
  the wave equation in 2 dimensions.

Note that there is no final exam. The last project is due on the last day of
exams, although your are welcome to hand it in earlier.

Students with disabilities: Any student with a documented disability need-
ing accommodations is requested to speak directly to the Office of Services for
Students with Disabilities (SSD; 847-467-5530) and to the instructor as early
as possible in the quarter (preferably within the first two weeks of class). All
discussions will remain confidential.
Schedule of Topics

The following schedule should be regarded as a close approximation, not completely exact.

Week 1.  Week of 1/3.
Laplace transform; applications to ODEs

Week 2.  (1/10)
Dirac delta function; application to ODEs with impulse forcing

Week 3.  (1/17)
No class Monday in observance of Martin Luther King Day.
Transport problems: introduction to PDEs

Week 4.  (1/24)
Project 1 due on Monday
More transport problems; connection to Laplace transform
Heat problems in ODEs; the heat equation as a basic PDE.

Week 5.  (1/31)
Basic PDEs: the wave equation
Exact solutions of the 1-dimensional wave equation.
Test 1 on Friday

Week 6.  (2/7)
Fourier Series and series solutions of PDEs

Week 7.  (2/14)
The heat equation and variants

Week 8.  (2/21)
Project 2 due on Monday
Bessel Functions; the wave equation in multiple dimensions

Week 9.  (2/28)
The wave equation on a drum head
Test 2 on Friday

Week 10.  (3/7)
Monday: Review for final project.
Reading week
Project 3 due exam week