PHYS 3900: Methods of Mathematical Physics, Spring 2015

Instructor: H.-B. Schüttler


Office Hours: Any Time (by appointment; best: after class or Mon. p.m.)

Homework: Will assign problems. Selected Problems will be graded.

Projects: There will be at least two projects assigned that require numerical and visualization techniques.

Exams: Test I, Test II, Final

Websites: All homework problems and solutions, exams, numerical projects, and other course-related material will be posted at:

http://www.physast.uga.edu/classes/phys3900/schuttler/.

Additional copy-righted material can be accessed by login with your UGA MyID password at:

http://www.elc.uga.edu/.

Grade: Total Grade = 0.30×Homework + 0.10×Projects +0.20×Test I + 0.20×Test II + 0.20×Final

Grading Scheme: Use of the plus/minus system is a requirement – it is the only grading system approved for the University of Georgia.

\[
A \equiv [85, 100] \quad A- \equiv [82.5, 85) \\
B+ \equiv [80, 82.5) \quad B \equiv [70, 80) \quad B- \equiv [67.5, 70) \\
C+ \equiv [65, 67.5) \quad C \equiv [55, 65) \quad C- \equiv [52.5, 55) \\
D \equiv [40, 52.5) \quad F \equiv [0, 40)
\]

Absences: Final Grade Substituted for Excused Tests
Topics:

1. Complex variables
   (a) Complex Numbers
   (b) Functions of a Complex variable
   (c) Limits, derivatives, analytic functions
   (d) Taylor and Laurent Series
   (e) Calculus of Residues

2. Vector Analysis
   (a) Scalar and vector products
   (b) Scalar and vector fields
   (c) Vector calculus
   (d) Chain rule
   (e) Div, Grad, Curl and all that!
   (f) Line and Surface integrals
   (g) Gauss and Stokes theorems

3. Linear Algebra
   (a) Matrix Multiplication
   (b) Determinants
   (c) Matrix Inverse
   (d) Eigenvalues and Eigenvectors

4. Fourier Series and Transforms
   (a) Fourier Series
   (b) Fourier Integrals
   (c) Applications

5. Differential Equations
   (a) First order ODEs
   (b) Second order ODEs with constant coefficients
   (c) Variation of parameters
   (d) Series solutions
   (e) Numerical ODE solver algorithms