GG 312: Geomathematics

Fall 2006

Instructor: Cecily Wolfe
(POST 819A, x66347)
cecily@soest.hawaii.edu
TA: Karl Stein
kjstein@gmail.com

Text

The text is *Advanced Engineering Mathematics, 2nd Ed.* by Michael Greenberg which is available in the bookstore.

Topics

Introduction and review
- Calculus: derivatives and integrals
- elementary functions: logs exponentials, trignometric functions
- Coordinate systems: Cartesian, polar, cylindrical, spherical
- Infinite series: Taylor Series, Binomial Expansion
- Functions of two or more variables: partial derivatives (Chapter 13)
- Complex numbers, complex exponentials (Chapter 21)

Ordinary differential equations (ODEs)
(Chapters 1-3,6)
- First order ODEs
- Second order and higher order ODEs
- Systems of coupled ODEs
- Applications
- Numerical methods (Euler's method, Mid-Point rule, Runge-Kutta)

Matrices and linear algebra (Chapters 8,10,11)
- Matrix algebra
- Systems of linear equations
- Matrix inversion and solutions of a linear system
- Eigenvalues and eigenvectors
- Applications

Vectors, Tensors, and Vector Calculus
(Chapters 9,14-16)
- Vectors and unit normals
- Scalar (dot) and vector (cross) products
- Coordinate transformations
- Gradient, Divergence, Curl
- Multidimensional integrals
- Integral Theorems
- Conservation laws: mass and momentum

Fourier Series (Chapter 17)
- Fourier series of a periodic function
- Applications

Topics may also be added or deleted depending on the background and interests of class members.

Examinations

There will be one midterm and one final.

Homework

An assignment will be handed out each Friday, to be returned the following Friday.

Grading

50% Homework, 20% Midterm, 30% Final.

Computing

Matlab will be used for some assignments. If you do not already have a computer account with access to Matlab, see me.