AME 525: Engineering Analysis I
Prof. P.K. Newton, RRB 221, 740-7782 (newton@usc.edu)
Fall 2015
Time: MW 5:00-6:20, OHE 132
Office Hours: MW 4-5
TA & Grader: Jeffrey West (westjb@usc.edu); Zuchen Tang (zuchenta@usc.edu)

The course will cover techniques from linear algebra, vector analysis, and complex variable theory.

Grading:

- Homework 20 %
- Midterm (TBA) 35 %
- Final (Wed Dec 9th 4:30-6:30) 45 %
- No exceptions/extensions will be made on Midterm or Final Exams

Books:

Advanced Engineering Mathematics, Peter V. O'Neil (7th Ed.)

Lecture Outline:

1. Finite dimensional vector spaces and linear algebra
   (a) Basic concepts of linear vector spaces
   (b) Eigenvalues and eigenvectors
   (c) Solving $Ax = b$: The Fredholm alternative
   (d) Least squares methods
   (e) Diagonalization and spectral decomposition
   (f) Singular values

2. Vector analysis

   (a) Line integrals in the plane
   (b) Green's theorem in the plane
   (c) Path independence
   (d) Multiply connected domains
   (e) Line integrals in space
   (f) Gauss' divergence theorem
   (g) Green's identities
   (h) Stokes theorem

3. Complex variable theory

   (a) Basic concepts
   (b) Analytic functions and the Cauchy-Riemann equations
   (c) $x = f(z)$ as a mapping
   (d) Derivatives
   (e) Cauchy-Riemann equations
   (f) Harmonic functions
   (g) Integrals of complex functions
   (h) Contour integrals
   (i) Cauchy-Goursat theorem
   (j) Cauchy integral formula
   (k) Residue theory
   (l) Conformal mapping and 2D inviscid flows