I.- Computational Science I - (Csc 301)  
Professor Betancourt

This course will cover the main basic techniques, through a series of projects using MATLAB as a computing and visualization utility.

Text: "Introduction to Scientific Computing: A Matrix-Vector approach using MATLAB."  

Additional material:

"Numerical Recipes: The Art of Scientific Computing (Fortran or C version)"
W. Press, B. Flannery, S. Teukolsky, W. Vetterling  
Cambridge University Press

Internet Software: Netlib

Grading: Based on several take-home projects, plus a final project.

Topics:

1.- Description of MATLAB – Examples, error, condition number, random variables.
2.- Polynomial Interpolation, Piecewise Polynomial Interpolation.
3.- Numerical Integration
4.- Matrix Computations, Linear Systems, QR and Cholesky Factorization.
5.- Nonlinear Equations and Optimization.
6.- Initial Value Problems, ODE solving.
7.- Special Topics: Netlib (Laplacian Solvers)  
Numerical Recipes (FFT, Advanced routines for many problems)
Final Project: Example from applications of differential equations to practical problems.