

# Course Learning Objectives - Math 273

## Introduction to Scientific Computing

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April 9, 1999

Upon completion of Mathematics 273, *Introduction to Scientific Computing*, a student shall be able to do the following using a computer or hand-held calculator, but without the aid of printed material or other assistance.

1. Write MATLAB scripts to set up and solve
  - Linear systems of equations
  - Linear least squares problems
  - Nonlinear equations and unconstrained optimization problems in one or several variables
  - Initial value problems in ordinary differential equationsand construct and evaluate polynomial interpolants.
2. Exploit MATLAB's capabilities for vectorization.
3. Use two and three dimensional graphics to visualize data and analyze problems.
4. Recognize ill-conditioning in the said problems.
5. Write an account of the standard algorithms for the said problems, discussing the following, as applicable:
  - stability
  - efficiency
  - accuracy
  - rate of convergence
  - effect of roundoff error
6. Carry out each algorithm step by step, in simple cases.
7. When more than one algorithm is available for a particular problem, list the advantages and disadvantages of each.