Course Description: Focuses on numerical solution of ordinary differential equations and partial differential equations, advanced topics in numerical linear algebra, and numerical optimization. Stresses significant computer applications and programming. Prereqs: APPM/MATH 4650 and knowledge of a programming language.

Course Objectives:
- To develop the ability to derive, analyze, and implement numerical algorithms.
- To recognize the wide use of numerical methods in applications.
- To extend the concepts learned in previous courses to a wider class of problems.
- To gain a broader knowledge of and appreciation for mathematics and its applications.


Programming: A central goal of this course is to be able to implement numerical methods and critically analyze the results relative to the developed theory. Knowledge of a programming language is a course prerequisite. We recommend using a high-level scripting language (e.g. Matlab, Octave, Mathematica, Python, Julia) but other languages (e.g. C/C++, Fortran, Java) are acceptable.

Problem Sets: You will be assigned homework periodically throughout the course. These problem sets may require proofs, derivations, or computer implementation/verification of a numerical method. You are expected to write-up the solutions neatly, with full explanations and justifications. You may discuss problems with your classmates, but all work (analysis and code) must be your own. Please be mindful of the due dates as late submissions will not be accepted. All problem set submissions will be done electronically.

Final Project: You will complete a final project (in groups of approximately three) which explores a practical application of interest to you. A project proposal is due on March 12th. A 15 minute group presentation will be required in the last week of class, with the final project report due on the last day of class.

Exams: There will be two in-class midterm exams and one final exam. The midterm exams will be in class on February 20th and April 10th. The final exam will be comprehensive but will emphasize material covered after the 2nd midterm exam.

Grade Determination: Your course grade will be determined from the two midterm exams (15% each), homework (30%), final project (20%), and the comprehensive final exam (20%).

Course web page: The course web page is accessible from the Dept. of Applied Math site (http://amath.colorado.edu) It is your responsibility to check the web page on a regular basis. Here you will find detailed information such as news, homework assignments and solutions, and instructor and TA office hours. In addition, it contains policies on illness, academic honesty, and special accommodations for religious holidays and documented special needs.

Dropping the course: Advice from the Dean’s office and your department advisor is recommended before dropping any course. After March 20, dropping the course is possible only with a petition approved by the Dean’s office.

Academic Honesty: Violation of the CU Student Honor Code (http://www.honorcode.colorado.edu) or the College of Engineering’s Academic Honesty Advising Guidelines (http://www.colorado.edu/engineering/academic/policies) will result in a final grade of F in this course.

Documented Disabilities If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner (for exam accommodations provide your letter at least one week prior to the exam) so that your needs can be addressed. Disability Services determines accommodations based on documented disabilities.