Instructor

Prof. Matthew Pennybacker. My office is SMLC 226. For most matters, please contact me by email at `pennybacker@unm.edu`.

Overview

This course is meant as an introduction to numerical analysis. We will study numerical methods used to solve linear and nonlinear equations, to interpolate and approximate data, and methods for numerical integration and differentiation. We will implement many of these algorithms in Matlab, and begin the course with a Matlab tutorial. The second edition of *Numerical Analysis* by Tim Sauer is required. The second edition of *Matlab Guide* by Desmond J. Higham and Nicholas J. Higham is optional but highly recommended.

Homework

Homework is an important part of this course. A homework set will be assigned most weeks on Thursday and will be due the following Thursday. **Late homework will not be accepted** unless there are exceptional circumstances. Please contact me as soon as possible if this is the case. You are encouraged to work with each other on the homework, as well as make use of office hours, but **you must hand in all solutions in your own your own words and data**. An incorrect answer which is consistent with your work is worth more than a correct answer which is inconsistent with your work. I will drop one homework score when calculating your final homework grade.

Additionally, clear and concise presentation of your solutions is critical to receiving top marks on your homework. Up to 20 percent of each homework can and will be marked off for sloppy, careless, or difficult to follow solutions. Examples of mistakes which will lead to lost points include but are not limited to unlabeled plots, careless or sloppy handwriting, and inadequate or misleading data. I highly recommend that you type your homework solutions, and to assist in doing so, a LaTeX file for each homework set will be posted on the course webpage.

Exams

There will be two in-class exam and one final exam. The problems used on the exams will be similar to some of the homework problems.

Grading

The final grade will be calculated as a fraction of 100 possible points. Homework will comprise 50 points, each in-class exam 15 points, and the final exam 20 points. Passing grades will be assigned using the following point ranges.

A: 90 – 100, B: 80 – 89, C: 70 – 79, D: 60 – 69.

Communication

Please check your UNM email regularly or make sure to forward your email from that address to an account that you check at least once daily during the week. Email is the easiest way for me to communicate important information to the entire class. For the most current information about the syllabus, quizzes, and homework, you can visit the course webpage. Do not hesitate to contact me if you have any questions or you experience any difficulties that may affect your progress during the course.

Accommodations

In accordance with University Policy 2310 and the American Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructor's attention, as the instructor is not legally permitted to inquire. Students who may require assistance in emergency evacuations should contact the instructor as to the most appropriate procedures to follow. Please contact Accessibility Services at 505-661-4692 for additional information.

Sexual Misconduct

In an effort to meet obligations under Title IX, UNM faculty, Teaching Assistants, and Graduate Assistants are considered "responsible employees" by the Department of Education (see page 15 of `http://www2.ed.gov/about/offices/list/ocr/docs/qa-201404-title-ix.pdf`). This designation requires that any report of gender discrimination which includes sexual harassment, sexual misconduct and sexual violence made to a faculty member, TA, or GA must be reported to the Title IX Coordinator at the Office of Equal Opportunity (`oeo.unm.edu`). For more information on the campus policy regarding sexual misconduct, see `https://policy.unm.edu/university-policies/2000/2740.html`.

Tentative Schedule

Week	Dates	Reading	Topics
1	Jan 17, 19	0.1 – 0.4	Integer and floating point representation, machine epsilon, rounding errors and their effects.
2	Jan 24, 26	B.1 – B.6	Matlab tutorial.
3	Jan 31, Feb 2	1.1, 1.2	The bisection method and fixed-point iteration.
4	Feb 7, 9	1.3 – 1.5	Newton's method and the secant method.
5	Feb 14, 16	2.1 – 2.4	Gaussian elimination. LU and PLU factorizations.
6	Feb 21, 23	2.5	Iterative methods. In-class exam 1.
7	Feb 28, Mar 2	3.1, 3.2	Polynomial interpolation.
8	Mar 7, 9		**Spring Break**
9	Mar 14, 16	3.3	Chebyshev interpolation.
10	Mar 21, 23	3.4, 4.1	Splines and linear least squares.
11	Mar 28, 30	4.2, 4.3	Mathematical models and QR factorization.
12	Apr 4, 6	5.1	Numerical differentiation. In-class exam 2.
13	Apr 11, 13	5.2	Numerical integration.
14	Apr 18, 20	6.1, 5.2	More numerical integration.
15	Apr 25, 27	6.1	Initial value problems.
16	May 2, 4	6.2	Error and stability for initial value problems.