MATH 340 *Numerical Analysis* *Fall 2023*

Class meets: MW 12:00 - 1:50 in MH 412

Professor: Dr. Tyler McMillen `tmcmillen@fullerton.edu` MH 182i

Office hours: MW 5:00 - 6:30, or by app.

Prerequisites: MATH 250B; MATH 320, CPSC 120 or CPSC 121

Software: This course will have computing assignments using MATLAB.

Text: *Numerical Computing with MATLAB*, by Cleve Moler. Available online, along with supporting material, at `http://www.mathworks.com/moler/index_ncm.html`

Course Description: This course in numerical analysis and computation covers both the theoretical aspects of the analysis of numerical methods and the practical implementation in scientific computing. We will begin by reviewing key ideas of analysis and introducing finite precision arithmetic. Then we will study the numerical solution of linear and non-linear systems of equations, approximation theory and numerical differentiation and integration. The course will also cover numerical solutions of ordinary differential equations. Throughout the course we will explore limitations of algorithms and conduct error analysis both theoretically and through computation.

Homework: Homework is a key component of this course. Homework sets will be submitted via Canvas. You may be asked to present your solutions to the class.

Exams: There will be two midterms and one comprehensive final exam, tentatively scheduled as follows:

Midterm 1	Midterm 2	Final Exam
Mon, Oct 2	Mon, Nov 13	Mon, Dec 11, 1:00 - 2:50

Grading: The final grade will be based on the homework and exams, as follows:

Homework	Midterm Exams	Final Exam
25%	20% each	35%

Grades will be distributed according to the following percentages:

Grade	Percentage
A	85 - 90
B	70 - 84
C	60 - 69
D	50 - 59

Plus/minus letter grades will be given when appropriate. In borderline cases, I reserve the right to raise any student's semester grade for contributing to our class with a positive attitude, hard work, and active participation.

Important dates:

Sep 4 (Monday):	Labor Day (no class)
Sep 5 (Tuesday):	Last day to ADD with a permit or DROP without a "W".
Sep 18 (Monday):	Last day to drop with a "W" without a serious and compelling reason.
Nov 13 (Monday):	Last day to drop with a "W" with a serious and compelling reason.
Nov 20 - 26 :	Fall Recess (no class)

Additional comments: Should you be forced to miss a class, it is your responsibility to obtain the lecture notes and other important information from me or one of your classmates. It is very important in any mathematics course to attend class, to do all assigned reading and homework conscientiously and thoroughly, and to get any questions you might have cleared up as quickly as possible. You are strongly encouraged to get help in class, before or after class, during scheduled office hours, or any other time you can catch me. You are also welcome to contact me via e-mail or phone. Studying with your fellow students is also strongly encouraged. However, your final write-up must be in your own words. Any references, including those of other students, must be cited.

Academic dishonesty: Students who violate university standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the university. Since dishonesty in any form harms the individual, other students and the university, policies on academic integrity are strictly enforced. I expect that you will familiarize yourself with the academic integrity guidelines found in the current student handbook.

Students with disabilities: Students with disabilities should contact Disability Support Services (`http://www.fullerton.edu/DSS/`) so that proper accomodations can be made.

Use of internet-connected electronic devices:

During class lessons. Unless otherwise instructed, please put away cell phones, tablets, laptops, smart watches, or any other such devices during class time as this distracts you, other students, and the instructor.

During exams. Electronic devices such as those described above, whether connected to the internet or not, are prohibited on all exams. Use of such a device on a quiz or exam will result in a failing grade for the course and being reported to the Dean of Students. The Department will enforce a zero-tolerance policy on this issue.

Emergency information: In the event of an earthquake, shelter in place until it is safe to evacuate the building. In this event, or any other emergency such as a fire, take all your personal belongings and leave the classroom. Use the stairways located at the east, west, or center of the building. Go to the lawn area towards Nutwood Avenue, at least 150 feet from the nearest building. Stay with class members for further instruction.

Chapter order: 1, 2, 10, 3, 4, 5, 6, 7

Tentative schedule:

Week	Monday	Wednesday
Aug 21, 23	Overview	Ch. 1, $x = \pm(1 + f) \cdot 2^e$ (floating point arithmetic)
Aug 28, 30		Ch. 2, $Ax = b$ (linear equations)
Sep 4, 6	Labor Day (no class)	
Sep 11, 13	Ch. 10, $Av = \lambda v$ (eigenvalues & singular values)	
Sep 18, 20		Ch. 3, $p(x_k) = y_k$ (interpolation)
Sep 25, 27		
Oct 2, 4	Midterm 1	Ch. 4, $f(x) = 0$ (zeros and roots)
Oct 9, 11		
Oct 16, 18	Ch. 5, $y(t) \approx p(t)$ (least squares)	
Oct 23, 25		Ch. 6, $\int_a^b f(x)\,dx$ (quadrature)
Oct 30, Nov 1		
Nov 6, 8		
Nov 13, 15	Midterm 2	Ch. 7, $y' = f(y, t)$ (ordinary differential equations)
Nov 20, 22	Fall Recess	
Nov 27, 29		
Dec 4, 6		
Dec 11, 13	FINAL EXAM 1:00 - 2:50	

The professor reserves the right to change the content of the syllabus at any time.