

AMSC460 Computational Methods (Fall 2024)

Credits: 3

Time and Place: TuTh 12:30pm – 1:45pm, MTH 0103

Instructor: Dr. Haizhao Yang (hzyang@umd.edu)

Course Description

Basic computational methods for interpolation, least squares, approximation, numerical quadrature, numerical solution of polynomial and transcendental equations, systems of linear equations, and initial value problems for ordinary differential equations. Emphasis on the methods and their computational properties rather on their analytic aspects. Intended primarily for students in the physical and engineering sciences. Basic MATLAB skills are required.

Prerequisite

- One course with a minimum grade of C from:
 - a. MATH 240 (*Introduction to Linear Algebra*)
 - b. MATH 341 (*Multivariable Calculus, Linear Algebra and Differential Equation II*)
 - c. MATH 461 (*Linear Algebra for Scientists and Engineers*)
- One course with a minimum grade of C from:
 - a. MATH 241 (*Calculus III*)
 - b. MATH 340 (*Multivariable Calculus, Linear Algebra and Differential Equation I*)
- One course with a minimum grade of C from:
 - a. CMSC106 (*Introduction to C Programming*)
 - b. CMSC131 (*Object-Oriented Programming I*)
- A minimum grade of C from: MATH246 (*Differential Equations for Engineers*)

Textbooks

- U. Ascher and C. Greif. *A First Course in Numerical Methods*. SIAM 2011. The eBook version of the textbook can be obtained through the UMD library (free of charge).
- D. Levy. *Numerical Analysis Lecture Note*. The lecture notes can be downloaded at:
<https://math.umd.edu/~dlevy/classes/amsc460/lecture-notes.html>.
- C. Moler. *Numerical Computing with MATLAB*. 2004. The PDF version of the book can be downloaded at:
<https://www.mathworks.com/moler/chapters.html>.

MATLAB

MATLAB is a high-level programming language and interactive environment that enables one to perform computationally intensive tasks efficiently. MATLAB can be downloaded at:

<https://terpware.umd.edu>.

UMD has a campus-wide license so that all students can use MATLAB freely on their personal computers and laptops. We will use MATLAB, but the course is not a programming class. Therefore, students are required to have some basic programming knowledge and skills. We will NOT use the SYMBOLIC MATLAB commands in this course since we focus on numerical computations.

Office Hours

For technical questions about course work, it is highly recommended to interact and discuss in the office hours. Please make use of the following office hours:

- **Time:** Tuesday 9 AM to 10 AM on Zoom
(<https://umd.zoom.us/j/9636512509?omn=97383864827>)
and Thursday 2 PM – 3 PM in person by appointment
- **Office Location:** 2211 Kirwan Hall

Please write AMSC460 in the subject line when you send an email to the instructor. Please do not email with questions that are easily found in this document. Please consider scheduling an in-person meeting with the instructor if your question requires discussions of mathematical formulae.

Homework

Homework assignments and due dates will be posted at Assignments in Canvas. A due date will normally be Monday and students are required to submit their homework on Canvas. The lowest grade will be dropped. Late submissions will not be accepted unless you have obtained a written approval by the instructor prior to the submission deadline or you are ill on the submission date and obtained a properly qualified note as above. Homework should be first attempted individually, after which collaboration is encouraged. Final submissions should be your own work.

Exams

There will be two midterms and one final exam. Here are the dates and time for the exams:

Midterm 1	Midterm 2	Final
Tue, Oct. 1 12:30pm – 1:45pm	Thu, Nov. 7 12:30pm – 1:45pm	Mon, Dec. 16 4:00pm – 6:00pm

All exams are closed books/notes and no internet connection is permitted. All midterms will be held in class instead of lecture.

Makeup

According to the University Attendance Policy, no make-up exams will be given without a valid reason and the instructor's approval. So, please make sure to notify the instructor of any such absence as soon as possible.

Special Examination Conditions

Student who requires special examination conditions must register with the office of the Accessibility and Disability Service (ADS). Student should make accommodated testing reservations at least one week in advanced of the test date. Documentation should be provided to the instructor and discussed within the first week of classes. Exams should be scheduled following ADS procedures.

Grading

Weights for homework and exams:

Homework	Two Midterms	Final Exam
25%	40%	35%

Final grading criteria:

A+	97 – 100	B+	87 – 89	C+	77 – 79	D+	67 – 69
A	93 – 96	B	83 – 86	C	73 – 76	D	63 – 66
A-	90 – 92	B-	80 – 82	C-	70 – 72	D-	60 – 62

F will be assigned for a grade under 60 as it becomes necessary.

Appeals

If you think a mistake has been made in grading your work, please contact the instructor no later than one week after the grades are released. After the one-week window, no further appeals will be considered.

Academic Integrity

The University's Code of Academic Integrity is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the University does not tolerate dishonesty. Students are required to fully understand this code and its implications and expected to adhere to this code. It is students' responsibility to read it and know what it says so that they are well-prepared for their professional lives. All cases of academic dishonesty will be referred to the Dean of Students Office.

Please visit the website:

www.ugst.umd.edu/courserelatedpolicies.html

for more detailed information of campus-wide policies that related to all courses.