

SYLLABUS

MATH 4364

INTRODUCTION TO NUMERICAL ANALYSIS IN SCIENTIFIC COMPUTING FALL 2020

Instructor: Alexander Mamonov
Class format: Asynchronous Online
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The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.

All class policies, announcements, lecture videos and notes, reviews, homework assignments, solutions, exams and grades are posted on Blackboard:
<http://elearning.uh.edu/webapps/portal/frameset.jsp>

Asynchronous Online Class: This course is being offered in the **Asynchronous Online** format. There is **no face-to-face component** to this course. **Lecture notes** and **videos** are posted on **Blackboard**. **Online office hours** are held at the times listed above, the link is available on **Blackboard**.

Prerequisite: MATH 3321 or MATH 3331 and an ability to perform computer assignments in Matlab or GNU Octave.

Reference R.L. Burden & J.D. Faires,
Textbook: *Numerical Analysis*, 9th edition, Thomson.

Objectives: Upon completion of this course, the students are expected to gain the understanding of the fundamental concepts of numerical analysis and computational techniques for solving nonlinear equations with a single variable, ordinary differential equations, systems of linear algebraic equations, as well as the techniques for numerical integration, differentiation, interpolation and approximation.

Assignments and Grading: Bi-weekly homework and two midterm exams are given. There is no final exam. Exam schedule and policies are posted on Blackboard. The course grade is determined by the homework and exams with each having the following weights:

Homework	40%
Midterm 1	30%
Midterm 2	30%

Topics:

The list is subject to change. Section numbering according to the Reference Textbook.

1.2 Round-off Errors and Computer Arithmetic

1.3 Algorithms and Convergence

2.1 The Bisection Method

2.2 Fixed-Point Iteration

2.3 Newton's Method and Its Extensions

2.4 Error Analysis for Iterative Methods

3.1 Interpolation and the Lagrange Polynomial

3.5 Cubic Spline Interpolation

4.1 Numerical Differentiation

4.3 Elements of Numerical Integration

5.1 The Elementary Theory of Initial-Value Problems

5.2 Euler's Method

5.3 Higher-Order Taylor Methods

5.4 Runge-Kutta Methods

5.11 Stiff Differential Equations

6.1 Linear Systems of Equations

6.2 Pivoting Strategies

6.3 Linear Algebra and Matrix Inversion

6.5 Matrix Factorization

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) and [Graduate Excused Absence Policy](#) for reasons including: medical illness of student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

Interim Undergraduate Grading Policy

Due to the unique and unprecedented challenges associated with the COVID-19 pandemic, the University of Houston has implemented an [Interim Undergraduate Grade Policy](#) for undergraduate grades which applies to all undergraduate students in courses offered in all sessions during fall 2020. Under this policy, students have the option of converting final assigned letter grades to S (Satisfactory, applicable to any letter grade from A to D-) or NCR (No Credit Reported COVID-19, applicable to grades of F) on their transcripts. Please visit [FAQs](#) for additional information.

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Center for Students with DisABILITIES](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings for their own studying and notetaking. Instructor's recordings are not authorized to be shared with *anyone* without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

Syllabus Changes

Due to the changing nature of the COVID-19 pandemic, please note that the instructor may need to make modifications to the course syllabus and may do so at any time. Notice of such changes will be announced as quickly as possible through email and Blackboard.

UH Email

Email communications related to this course will be sent to your [Exchange email account](#) which each University of Houston student receives. The Exchange mail server can be accessed via Outlook, which provides a single location for organizing and managing day-to-day information, from email and calendars to contacts and task lists. Exchange email accounts can be accessed by logging into Office 365 with your Cougarnet credentials or through Access UH. They can also be configured on [IOS](#) and [Android](#) mobile devices. Additional assistance can be found at the [Get Help](#) page.

Counseling and Psychological Services (CAPS) Statement

Counseling and Psychological Services (CAPS) can help students who are having difficulties managing stress, adjusting to college, or feeling sad and hopeless. You can reach CAPS (www.uh.edu/caps) by calling 713-743-5454 during and after business hours for routine appointments or if you or someone you know is in crisis. No appointment is necessary for the "Let's Talk" program, a drop-in consultation service at convenient locations and hours around campus.

http://www.uh.edu/caps/outreach/lets_talk.html