

Course Syllabus

EAS 596 Introduction to Numerical Mathematics for Computing and Data Scientists Fall 2018

Instructor

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Teaching Assistant

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Course Meeting Times

MW, 11:00 AM – 12:30 PM (Bauman), Bell 250

MW, 12:30 PM – 2:00 PM (Salac), Bell 250

Course Description

- To develop the ability to formulate and solve problems using mathematical methods and tools
- To apply knowledge gained in lower level mathematics courses
- To introduce concepts and methods of linear algebra
- To introduce a broad range of numerical methods
- To develop the ability to identify, understand, and solve algebraic equations
- To develop the ability to identify, understand, and solve differential equations
- To develop experience with numerical and symbolic mathematical software and their use in problem solving

Prerequisites

 Calculus

Textbooks & Other Course Materials

 There are three required texts.

- G. Strang, Introduction to Linear Algebra, 5th ed., Wellesley-Cambridge Press, 2016.
- L. N. Trefethen, D. Bau, Numerical Linear Algebra, SIAM, 2017.
- L. V. Fausett, Applied Numerical Analysis Using MATLAB, 2nd Ed., Prentice Hall, 2008.

The first half of the course will focus primarily on the first two texts. The second half of the course will focus on the third text.

You may find the following other references useful, but they will not be used in the course and you are not required to purchase them.

- S. C. Chapra, Applied Numerical Methods with Matlab for Engineers & Scientists, 4rd Ed., McGraw-Hill, 2018.
- S. S. Rao, Applied Numerical Methods for Engineers and Scientists, Prentice Hall, 2002.
- H. Moore, MATLAB for Engineers, 4th Ed., Pearson, 2015. This book is recommended to enhance your MATLAB programming skills.
- S. J. Chapman, Essentials of MATLAB Programming, Cengage Learning, 2009.
- W. H. Press, S. A. Teukolsky, W. T. Vetterling, B. P. Flannery, Numerical Recipes: The Art of Scientific Computing, Cambridge University Press, 2007.

Important Dates

- Last Day to Add/Drop — Tues. September 4
- Last Day to Resign — Fri. November 9
- Final Exam — TBD

Grading Policy Grades will be based on points accumulated from the course requirements.

Course Requirement	Percent of Final Grade
Exams (2)	60% (25/35% Each)
Homework Assignments (Approx. 10)	40% (4% Each)

You will be able to drop 1 homework assignment.

Exact cutoffs for specific grades will depend on the level of difficulty of exams and assignments. These cutoffs will be determined once the final exam has been graded. **All sections of EAS 596 will be assigned the same cutoffs.** However, the cutoffs will not exceed the following:

Percentage	Final Grade
92	A
82	B
72	C
62	D

In certain cases, students may be eligible to receive a temporary incomplete (“I”) grade. Students may only be given an “I” grade if they have a passing average in coursework that has been completed and establish well-defined parameters to complete course requirements. Prior to the end of the semester, students must initiate the request for an “I” grade and receive the instructor’s approval. Detailed information is available from the Undergraduate Course Catalog: <http://undergrad-catalog.buffalo.edu/policies/grading/explanation.shtml#incomplete>.

Computing/MATLAB Most assignments will have a computing component. MATLAB will be used throughout the course. MATLAB is available on all PCs in the SENS labs and is available through the “My Virtual Computing Lab” available to all students.

Topics Covered The planned schedule for the topics covered is given below. The dates may move slightly. Exam dates may be moved to a later date, but they will not be moved to an earlier date.

Week 1	08/27, 08/29	Intro/Vectors, Matrices/Vector Spaces
Week 2	09/03, 09/05	Nullspace/Rank/Basis, Dimension/Functions/Linear Transformations
Week 3	09/10, 09/12	Linear Transformations/Projection, Systems/Orthogonality
Week 4	09/17, 09/19	Solution of Linear Systems/Finite Precision, LU/Regression I
Week 5	09/24, 09/26	QR I/Regression II, QR II
Week 6	10/01, 10/03	QR III/Eigenproblems I, Eigenproblems II/SVD I
Week 7	10/08, 10/10	SVD II, Review
Week 8	10/15, 10/17	Exam 1 , Differential Equations I
Week 9	10/22, 10/24	Systems of Diff. Eqs, Fourier Series/PDEs
Week 10	10/29, 10/31	Numerical Differentiation, Initial Value Problems I
Week 11	11/05, 11/07	Initial Value Problems II, Boundary Value Problems
Week 12	11/12, 11/14	Nonlinear Equations, Nonlinear Systems I
Week 13	11/19, 11/21	Nonlinear Systems II, Holiday
Week 14	11/26, 11/28	Interpolation I, Interpolation II
Week 15	12/03, 12/05	Numerical Integration I, Numerical Integration II

Course Requirements The following table summarizes the requirements of the course.

Requirement	Quantity	Material Covered	Date
Exams	2	(1) Through numerical linear algebra (2) Through Integration/Comprehensive	(1) Week 8 (2) Finals Week
Homework	≈ 10	Variable; related to material covered in lecture	Taken in-class

Expectations of Students

- Students are expected to act in a professional manner. A student's grade may be reduced due to unprofessional or disruptive behavior. Examples include coming to class late, texting (or otherwise using your cell phone) during class, your cell phone ringing during class and/or exams, etc.
- Homework assignments will be assigned approximately weekly. Homework assignments are due **at the assigned date and time**.
- Homework assignments will be graded and returned to students.
- **Late submission of assignments will receive a grade of zero.**
- Students are encouraged to discuss assignments and share ideas, but each student must independently write and submit their own solution.
- Makeup exams will be given in the following circumstances only:
 1. You contact the instructor prior to the exam
 2. You have a valid and documented reason to miss the exam

- Serious illness or family emergency are acceptable reasons
- Sleeping in, lack of preparation, ennui, grogginess, etc. are not acceptable excuses

Accessibility Services and Special Needs If you have a disability and may require some type of instructional and/or examination accommodation, please inform me early in the semester so that we can coordinate the accommodations you may need. If you have not already done so, please contact the Office of Accessibility Services (formerly the Office of Disability Services) University at Buffalo, 25 Capen Hall, Buffalo, NY 14260-1632; email: stu-accessibility@buffalo.edu Phone: 716-645-2608 (voice); 716-645-2616 (TTY); Fax: 716-645-3116; and on the web at <http://www.buffalo.edu/accessibility/>. All information and documentation is confidential. The University at Buffalo and the School of Engineering and Applied Sciences are committed to ensuring equal opportunity for persons with special needs to participate in and benefit from all of its programs, services and activities.

Academic Integrity This course will operate with a zero-tolerance policy regarding cheating and other forms of academic dishonesty. Any act of academic dishonesty will subject the student to penalty, including the high probability of failure of the course (i.e., assignment of a grade of “F”). It is expected that you will behave in an honorable and respectful way as you learn and share ideas. Therefore, recycled papers, work submitted to other courses, and major assistance in preparation of assignments without identifying and acknowledging such assistance are not acceptable. All work for this course must be original for this course. Please be familiar with the University and the School policies regarding plagiarism. Read the Academic Integrity Policy and Procedure for more information: <http://undergrad-catalog.buffalo.edu/policies/course/integrity.shtml> Visit the Senior Vice Provost for Academic Affairs web page for the latest information at <http://vpue.buffalo.edu/policies/>