COURSE CALENDAR

NUMERICAL ANALYSIS I

FALL 2021

https://www.phys.uconn.edu/~rozman/Courses/m3510_21f/

Last modified: December 9, 2021

Section and page numbers in the table below refer to the following edition of the course textbook: T. Driscoll and R. Braun, *Fundamentals of Numerical Computation*, SIAM, 2017.

TUESDAY	THURSDAY
Aug 31st **Lecture 1** Course logistics. Git and GitLab. Matlab and matlab programming, I: Matlab graphics	Sep 2nd **Lecture 2** Matlab and matlab programming, II: scripts and anonymous functions; Homework 1 assigned: due 9/9/2021
Sep 7th **Lecture 3** Matlab programming, III: functions	Sep 9th **Lecture 4** Matlab programming, IV: loops and conditionals; timing of matlab code; Homework 2 assigned: due 9/16/2021
Sep 14th **Lecture 5** Matlab programming, V: vectors and matrices; preallocation of arrays; Computer representation of numbers. Sec. 1.1, pp. 9–13.	Sep 16th **Lecture 6** Polynomial interpolation. Sec. 2.1, pp. 31–35. Homework 3 assigned: due 9/23/2021
Sep 21st **Lecture 7** Stability of algorithms.	Sep 23rd **Lecture 8** Systems of linear equations. Triangular systems. Sec. 2.3, pp. 44–48. Homework 4 assigned: due 9/30/2021
Sep 28th **Midterm I**	Sep 30th **Lecture 9** Gaussian elimination and LU factorization. Sec. 2.4, pp. 51–59.
Oct 5th **Lecture 10** Gaussian elimination and LU factorization, II. Sec. 2.4, pp. 51–59. Efficiency of matrix computations. Sec. 2.5, pp. 61–65.	Oct 7th **Lecture 11** Efficiency of matrix computations, II. Sec. 2.5, pp. 61–65. Vector and matrix norms. Sec. 2.7, pp. 74–77. Homework 5 assigned: due 10/14/2021

Tuesday	Thursday
Oct 12th **Lecture 12** Condition number of a matrix. Errors of the solutions of systems of linear equations. Sec. 2.8, pp. 80-83	Oct 14th **Lecture 13** Symmetric and symmetric positive definite matrices. Cholesky factorization. Sec. 2.9, pp. 87–91. Homework 6 assigned: due 10/21/2021
Oct 19th **Lecture 14** Fitting functions to data. The least squares formulation. Sec. 3.1, pp. 96–99. The normal equations. Sec. 3.2, pp. 103–106.	Oct 21st **Lecture 15** The QR factorization. Least squares and QR. Sec. 3.3, pp. 107–112. Householder reflections. Sec. 3.4, pp. 113–114. Homework 7 assigned: due 10/28/2021
Oct 26th **Lecture 16** Computing QR factorization. Sec. 3.4, pp. 115–117.	Oct 28th **Lecture 17** **Take-home Midterm II – due Nov 4** Roots of nonlinear equations. Sec. 4.1, pp. 121–126.
Nov 2nd **Lecture 18** Newton's method in one variable. Sec. 4.3, pp. 135–142.	Nov 4th **Lecture 19** Root finding without derivatives. Sec. 4.4, pp. 143–151. Homework 8 assigned: due 11/11/2021
Nov 9th **Lecture 20** Newton's method for nonlinear systems of equations. Sec. 4.5, pp. 152–158.	Nov 11th **Lecture 21** Interpolation. Runge phenomenon. Sec. 5.1, pp. 175–180. Piecewise linear interpolation. Sec. 5.2, pp. 182–188. Homework 9 assigned: due 11/18/2021
Nov 16th **Lecture 22** Numerical differentiation. Sec. 5.4–5.5. Fornberg's method for calculation of weights in finite difference formulas. (handout).	Nov 18th **Lecture 23** Numerical integration: trapezoid rule Sec. 5.6, pp. 208–215. Numerical integration: extrapolation, Simpson's rule, Newton-Cotes formulas. Sec. 5.6, pp. 208–215.
Nov 23rd **Thanksgiving recess – No classes**	Nov 25th **Thanksgiving recess – No classes**
Nov 30th **Lecture 24** Basics of Initial Value Problems. Sec. 6.1, pp. 227–233. Euler's method. Sec. 6.2, pp. 235–240.	Dec 2nd **Lecture 25** Systems of differential equations. Sec. 6.3, pp.242–247. ~~Homework 10 assigned: due 12/9/2021~~
Dec 7th **Lecture 26** Runge-Kutta methods. Sec. 6.4–6.5, pp. 249–259.	Dec 9th **Lecture 27** Multistep methods. Sec. 6.6–6.7, pp. 261–271.
Dec 14th **Week of Finals**	Dec 16th **Week of Finals**