COURSE CALENDAR

NUMERICAL ANALYSIS I

FALL 2020

https://www.phys.uconn.edu/~rozman/Courses/m3510_20f/

Last modified: December 3, 2020

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
Sep 1st **Lecture 1** Course logistics. Git and GitLab.	Sep 3rd **Lecture 2** Matlab and matlab programming: matlab as a calculator; vectors and matrices. scripts and functions; matlab graphics Homework 1 assigned: due 9/10/2020
Sep 8th **Lecture 3** Matlab programming, II: loops; more graphics; preallocation of arrays;	Sep 10th **Lecture 4** Matlab programming, III: conditionals; vector operations. Homework 2 assigned: due 9/17/2020
Sep 15th **Lecture 5** Timing of matlab code Computer representation of numbers. Sec. 1.1, pp. 9–13.	Sep 17th **Lecture 6** Polynomial interpolation. Sec. 2.1, pp. 31–35. Homework 3 assigned: due 9/24/2020
Sep 22nd **Lecture 7** Systems of linear equations. Triangular systems. Sec. 2.3, pp. 44–48.	Sep 24th **Lecture 8** Gaussian elimination and LU factorization. Sec. 2.4, pp. 51–59. Homework 4 assigned: due 10/1/2020
Sep 29th **Lecture 9** **Take-home Midterm I – due Oct 6** Efficiency of matrix computations. Sec. 2.5, pp. 61–65. Vector and matrix norms. Sec. 2.7, pp. 74–77.	Oct 1st **Lecture 10** Vector and matrix norms. Sec. 2.7, pp. 74–77. Condition number of a matrix. Errors of the solutions of systems of linear equations. Sec. 2.8, pp. 80-83

Tuesday	Thursday
Oct 6th **Lecture 11** Symmetric and symmetric positive definite matrices. Cholesky factorization. Sec. 2.9, pp. 87–91.	Oct 8th **Lecture 12** Fitting functions to data. The least squares formulation. Sec. 3.1, pp. 96–99. The normal equations. Sec. 3.2, pp. 103–106. Homework 5 assigned: due 10/15/2020
Oct 13th **Lecture 13** The QR factorization. Sec. 3.3, pp. 107–112.	Oct 15th **Lecture 14** Householder reflections. Sec. 3.4, pp. 113–114. Computing QR factorization. Sec. 3.4, pp. 115–117. Homework 6 assigned: due 10/22/2020
Oct 20th **Lecture 15** Roots of nonlinear equations. Sec. 4.1, pp. 121–126.	Oct 22nd **Lecture 16** Newton's method in one variable. Sec. 4.3, pp. 135–142. Homework 7 assigned: due 10/29/2020
Oct 27th **Lecture 17** Root finding without derivatives: bisection.	Oct 29th **Lecture 18** **Take-home Midterm II – due Nov 10** Root finding without derivatives: interpolation-based methods. Sec. 4.4, pp. 143–151.
Nov 3rd **Lecture 19** Newton's method for nonlinear systems. Sec. 4.5, pp. 152–158.	Nov 5th **Lecture 20** Quasi-Newton methods. Sec. 4.5, pp. 159–165.
Nov 10th **Lecture 21** Interpolation. Runge phenomenon. Sec. 5.1, pp. 175–180. Piecewise linear interpolation. Sec. 5.2, pp. 182–188. Cubic splines. Sec. 5.3, pp. 189-195.	Nov 12th **Lecture 22** Numerical differentiation. Sec. 5.4–5.5. Fornberg's method for calculation of weights in finite difference formulas. (handout). Homework 8 assigned: due 11/19/2020
Nov 17th **Lecture 23** Numerical integration: trapezoid rule Sec. 5.6, pp. 208–215.	Nov 19th **Lecture 24** Numerical integration: extrapolation, Simpson's rule, Newton-Cotes formulas. Sec. 5.6, pp. 208–215.
Nov 24th **Thanksgiving recess – No classes**	Nov 26th **Thanksgiving recess – No classes**
Dec 1st **Lecture 25** Basics of Initial Value Problems. Sec. 6.1, pp. 227–233. Euler's method. Sec. 6.2, pp. 235–240.	Dec 3rd **Lecture 26** Systems of differential equations. Sec. 6.3, pp.242–247. Runge-Kutta methods. Sec. 6.4–6.5, pp. 249–259.
Dec 8th **Reading days – No classes** **Office hours during the regular class times**	Dec 10th **Reading days – No classes** **Office hours during the regular class times**

Tuesday	Thursday
Dec 15th **Week of Finals**	Dec 17th **Week of Finals**