

Instructor: **J. Nathan Kutz**

Website: <https://faculty.washington.edu/kutz/am301/am301.html>

## Schedule

- Lecture 1 (9/29): Vectors and matrices (Sec. 1.1)
- Lecture 2 (10/1): Programming logic: IF and FOR (Sec. 1.2)
- Lecture 3 (10/4): Linear spaces and operators: (notes sent separately)
- Lecture 4 (10/6):  $\mathbf{Ax} = \mathbf{b}$ : Gaussian elimination (Sec. 2.1)
- Lecture 5 (10/8):  $\mathbf{Ax} = \mathbf{b}$ : LU decomposition (Sec. 2.1)
- Lecture 6 (10/11):  $\mathbf{Ax} = \mathbf{b}$ : Iterative solutions (Sec. 2.2)
- Lecture 7 (10/13): Eigenvalues and eigenvectors (Sec. 2.3)
- Lecture 8 (10/15): Eigen-decompositions and iterations (Sec. 2.1-2.3)
- Lecture 9 (10/18): Singular value decomposition (Part 3: Sec. 15.1)
- Lecture 10 (10/20): Principal component analysis: Applications in modeling (Part 3: Sec. 15.3)
- Lecture 11 (10/22): Principal component analysis: Face recognition (Part 3: Sec. 15.1-15.3)
- Lecture 12 (10/25): Numerical differentiation (Sec. 4.1)
- Lecture 13 (10/27): Numerical integration (Sec. 4.2)
- Lecture 14 (10/29): EXAM #1
- Lecture 15 (11/1): Differential equations & time-steppers (Sec. 5.1)
- Lecture 16 (11/3): Error and stability of numerical schemes (Sec. 5.2)
- Lecture 17 (11/5): General time-stepping schemes (Sec. 5.1-5.2)
- Lecture 18 (11/8): Fourier transforms (Sec. 6.1)
- Lecture 19 (11/10): The FFT, DCT and DST (Sec. 6.2)
- Lecture 20 (11/12): Image compression (Part 3: Sec. 14.1)
- Lecture 21 (11/15): Curve fitting and least-squares (Sec. 3.1)
- Lecture 22 (11/17): Polynomial fitting and splines (Sec. 3.2-3.3)
- Lecture 23 (11/19): EXAM #2
- Lecture 24 (11/22): Nonlinear curve fitting (Brunton & Kutz, Sec. 4.1)
- Lecture 25 (11/24): Gradient descent optimization (Brunton & Kutz, Sec. 4.2)
- Lecture 26 (11/29): Neural networks and simple classification (Brunton & Kutz, Sec. 6.1-6.2)
- Lecture 27 (12/1): Backpropagation algorithm (Brunton & Kutz, Sec. 6.3)
- Lecture 28 (12/3): Stochastic gradient descent (Brunton & Kutz, Sec. 6.4)
- Lecture 29 (12/6): Deep convolutional networks (Brunton & Kutz, Sec. 6.5)
- Lecture 30 (12/8): Neural networks for dynamics (Brunton & Kutz, Sec. 6.6)
- Lecture 31 (12/10): EXAM #3