

## 1 Syllabus and Schedule

Find the course syllabus and schedule on Canvas. Read through them carefully and bring your questions to the second day of class.

## 2 Compare Fourier Series to Particle-in-a-Box

*None* Consider the function:

$$f(x) = \begin{cases} 0 & 0 < x < \frac{L}{3} \\ D & \frac{L}{3} < x < \frac{2L}{3} \\ 0 & \frac{2L}{3} < x < L \end{cases}$$

- (a) You can think of this function as periodic, with period  $L$ . Expand this function in a Fourier series. Plot an approximation containing eight nonzero terms. Make a histogram of your coefficients. Be thoughtful about the horizontal axis of your histogram.
- (b) **Extra Credit Challenge** You can also think of this function as representing a quantum particle in a box of size  $L$ . Expand this function in quantum particle in a box energy eigenstates. Plot an approximation containing eight nonzero terms. Make a histogram of your coefficients. Be thoughtful about the horizontal axis of your histogram.
- (c) **Extra Credit Challenge:** Briefly reflect on the similarities and differences between the previous two cases. You may find it interesting to plot your approximations from  $x = -2L$  to  $x = 2L$