**Midterm 1 Study Topics – ChE 310 Spring 2019**

* MATLAB basics
  + Use of basic built-in functions (e.g. sin, exp, round, abs)
  + M-files: scripts vs. functions, concept of scope
  + Anonymous functions/function handles
  + Accessing and assigning array variables
  + Colon notation, linspace/logspace functions
  + Boolean expressions: relational and logical operators
  + If… ElseIf… Else structures
  + For loops
  + While loops, error estimation, and stopping criteria
  + Nesting of loops
  + Data import/export (to screen as well as to file)
  + Plotting: plot/semilog/loglog functions, fplot function, subplots
* Statistics and measurement
  + Accuracy and precision
  + Types and sources of error
  + True error, relative error, defining error tolerance
  + Built-in MATLAB statistical functions
    - mean, median, mode, std, iqr
    - Plotting: box, histogram
  + Probability density functions, cumulative density functions, MATLAB tools for fitting distributions and generating data according to those distributions
* Interpolation
  + *Order* of polynomials and relationship to size of data set
  + Newton/LaGrange methods for creating interpolating polynomials
  + MATLAB polynomial syntax
  + Built-in functions for finding and using interpolating polynomials: polyfit, polyval
  + Multi-dimensional interpolation
  + Piecewise interpolation and built-in functions (interp1, interp2)
  + Splines: common types, implementation in MATLAB
* Differentiation
  + Forward, backward, central difference formulas
  + truncation error notation
  + Differentiation of discrete data sets
  + Differentiation of functions
  + Differentiation strategies for unevenly spaced data