**Exam 2 – ChE 310 Study Topics (Spring 2019)**

* Root finding
	+ Graphical
	+ Bracketed methods
		- Bisection
		- False position
	+ Open methods
		- Fixed point iteration (successive substitution)
		- Newton Raphson method
		- Secant method
	+ Matlab tools
		- fzero
		- roots
	+ Excel solver
* Optimization (root finding)
	+ Global vs. local
	+ Golden search
	+ fminbnd
	+ fminsearch
	+ fmincon
* Systems of linear equations and matrix math
	+ Setting up system of equations from conservation type problems
	+ Condition and determinant
	+ Gauss elimination
	+ Partial pivoting
	+ LU factorization
	+ \ command
	+ Gauss seidel method
	+ Sparse (banded) matrix
		- Setting up from finite element problems
		- tridiag function
* Matrix inverse and other matrix measures
	+ Calculating the inverse
	+ Stimulus response problems
	+ Norm of matrix
	+ Condition number
* Systems of Non-linear Equations
	+ Graphical
	+ Multidimensional Newton Raphson
	+ newtmult algorithm with Jacobian
	+ fsolve
* Curve Fitting: Basic linear regression
	+ Regression vs. interpolation – when to use each method
	+ Residual
	+ Sum of squares of residuals
	+ Quantification of error
		- Coefficient of determination
			* What does it mean?
	+ polyfit
	+ fit
	+ plotting with confidence intervals
* Curve Fitting: Non-linear regression
	+ How linear least squares problems are reduced to a system of linear equations using ‘normal’ equations (15.1-15.2)
	+ General linear least squares (15.3)
	+ polyfit
	+ fit
	+ Curve Fitting Toolbox (cftool)
	+ Automating fits
		- Extracting goodness of fit measures
		- Extracting coefficients
		- Extracting confidence intervals