MSE 301 Course Objectives

The objectives of this course are to give the student the capability to understand and apply statistical techniques and numerical methods to solve engineering problems. At the conclusion of this course the student should be able to:

1. Apply the rules of probability (for example, union, intersection, conditional probabilities) to calculate probabilities of an event.
2. Apply one's knowledge of random variables and probability distribution functions to calculate probabilities of an event.
3. Calculate population expectations (for example, the population mean and variance) of a random variable.
4. Given a problem statement, identify the correct *discrete* probability distribution function and use it to compute probabilities and expectations.
5. Given a problem statement, identify the correct *continuous* probability distribution function and use it to compute probabilities and expectations.
6. Calculate statistics (for example, the sample mean, variance, and confidence intervals) of a sampled property.
7. Determine the number of solutions of a system of linear algebraic equations and, if solutions exist, solve numerically.
8. Perform a linear least-squares regressions of linear and higher-order polynomial models.
9. Use a numerical techniques (for example, the Newton-Raphson method) to solve a single non-linear algebraic equation for the roots.
10. Use a numerical techniques (for example, the multivariate Newton-Raphson method) to solve a system of non-linear algebraic equations for the roots.
11. Use a numerical technique (for example, a Simpson's rule) to integrate a function or data.
12. Use a numerical technique (for example, Euler or Runge-Kutta methods) to solve the initial value problem of a system of ordinary differential equations.
13. Write an acceptable technical report on a project involving statistical and numerical calculations.
14. Use a structured programming platform to implement the previous objectives.