ECE 3163 – Signals and Systems


I. Differential and Difference Equations
   A. System Properties
   B. Classical Analysis
      1. Natural Response
      2. Forced Response
   C. Recursive Simulation of Discrete-Time Systems

II. Convolution
   A. Impulse Response
   B. Calculation of Discrete-Time Convolution
   C. Calculation of Continuous-Time Convolution
   D. Properties of Convolution

III. Fourier Series
   A. Single-Sided and Double-Sided Line Spectra
   B. Calculation of Fourier-Series Coefficients
   C. Truncated Fourier Series
   D. Gibb's Phenomenon

IV. Fourier Transform
   A. Calculation of the Fourier Transform
   B. Properties of the Fourier Transform

V. Fourier Analysis of Discrete-Time Signals and Systems
   A. Discrete-Time Fourier Transform
   B. Discrete-Time Fourier Series and the Discrete Fourier Transform
   C. Circular Convolution

VI. Sampling
   A. Nyquist Sampling Theorem
   B. Aliasing

VII. Laplace Transform
   A. Properties of the Laplace Transform
   B. The Inverse Laplace Transform
      1. Partial Fraction Expansion
      2. Table of Transform-Pairs
   C. The Laplace Transform and Differential Equations
   D. Transfer Functions
   E. Block Diagrams
   F. Nyquist Stability Criterion
VIII. z-Transform
   A. Properties of the z-Transform
   B. The Inverse z-Transform
      1. Partial Fraction Expansion
      2. Table of Transform-Pairs
   C. The z-Transform and Difference Equations
   D. z-Domain Transfer Functions
   E. z-Domain Block Diagrams
   F. z-Domain Stability