Overview of semester

- **Basic Representations of Discrete-Time Systems (4 weeks).** Difference equations, block diagrams, operator expressions, system functions, feedback and control, Z transforms, convolution (O&W Chapters 1, 2, 10, 11)
- **Basic Representations of Continuous-Time Systems (3 weeks).** Differential equations, block diagrams, operator expressions, system functions, feedback and control, Laplace transforms, convolution (O&W Chapters 1, 2, 9, 11)
- **Signal Processing (3 weeks).** Fourier Series, Fourier Transforms, Filtering (O&W Chapters 3, 4, 5, and 6).
- **Sampling (2 weeks).** Sampling, aliasing, DT processing of CT signals (O&W Chapter 7).
- **Communications (2 weeks).** Modulation, AM, FM (O&W Chapter 8).

First one-third of semester

R1  Tank Problem: Differential Equation, Euler Forward approximation, Difference Equation
L1  Introduction to Signals and Systems
R2  Examples of Discrete-Time Systems: bank accounts and population growth
L2  Multiple Representations of DT systems: difference equations, block diagrams, and the R operator
R3  Exercises with \( R \): expand \( (1 + R)^3 \) using difference equations, block diagrams and polynomials
L3  Feedback, cyclic signal paths, and modes
R4  Examples of modes using second order difference equations
L4  Higher-order systems, poles and zeros, and the z-plane
R5  Examples of poles and zeros
L5  Hierarchical representations: System functions as building blocks, Black’s equation
R6  Examples of system functions
L6  Demonstrations of control systems: Robot arm and mobile robot
R7  Analysis of robot arm or mobile robot
L7  Stabilizing unstable systems
R8  Examples of stability
L8  Root locus
R9  Examples of root locus
L9  Z transform
Q1  Quiz 1.