

**Topics to Review:** The following topics are fair game on the first exam. Remember, you are allowed to bring a review sheet to the exam that fills one side of an 8.5x11" piece of paper. Also remember to bring a calculator.

- Transducers
  - Resistive Transducers (e.g., strain gages, thermistors)
  - Differential Capacitors
  - LVDTs
  - Thermocouples
- Detection Circuits
  - Wheatstone Bridge
  - Reactance Bridge
  - RLC Divider
  - What affects sensitivity, error reduction, etc.
  - Phase Demodulators
  - Full-wave Rectifiers
- Amplifiers
  - Ideal Op Amp Equiv. Model
  - Buffers
  - Inverting, Non-inverting
  - Summing
  - Differential, Instrumentation
- Passive and Active Filters
  - LPF, HPF, Bandpass, Bandstop
  - Identify and derive transfer functions and cutoff/resonant frequencies for first- and second-order filters
  - Bode plots (sketch and interpret)
  - Design "simple" filters
  - Integrators and differentiators
- Comparators (with hysteresis)
- Diodes, Relays and Transistors (to the level covered in lab and problem sets; used for isolation, switching)
- Miscellaneous
  - Know the difference between zero-order, first-order and second-order systems
  - Input/output impedance
  - Noise (different types, ways to actively and passively reduce noise at different stages in circuits)
  - Resolution, sensitivity, accuracy, precision, SNR

- Averagers, Convolution

### Types of Questions to Expect

- Evaluate a circuit
  - Solve for voltages and currents
  - Sketch waveforms of outputs or mid-circuit nodes
  - Modify a circuit to change its behavior
  - Early errors will not hose you, but you must show all of your work!
- Design a circuit
  - Block diagrams are your best friend!
  - Always state your assumptions
  - More than one way to do it
- Explain / define something
- Lab-based questions (not minutiae)
- Things **NOT** on the exam:
  - There will be no “plug-and-chug” problems; think homework problems with the ante upped a bit.
  - There will be no LabVIEW questions.
  - Correlation
  - Digital