<p align="center">**ELEC 5760/6760 Exam 1 Study Guide**</p>

I.   Sensor and Fabrication Terminology

Know terms such as: transducer, measurand, sensor, actuator, SOI wafer and structure, Young's Modulus, MEMS, transmissibility, resistivity, bimorph, Wheatstone bridge, strain gauge, piezoresistor, stiction, types of damping, synchronous demodulation, 2-point/4-point resistance measurement, EC sensing, gauge factor (GF), TIA, microfabrication lab tour class presentation, etc… <u>Fabrication techniques will NOT be covered!</u>

II.   Sensor Structures

a. Find k (spring constant) from a structure design
b. Find $T(s)$ from a plot of $|T(j\omega)|$
c. Know how to relate: m, c, k, Q, ς, ω_n, f_n, displacement to a force

III.   Op Amp Circuit and Sensor Interface Circuit Analysis (homework problems)

IV.   Sensing Methods

a. Conductivity
b. Resistance (temperature effects, strain gauge, piezoresistor)
c. Electrical Conductivity in aqueous solutions
d. Capacitance (calculating Cnom/max/min, interface circuits)

V.   I will provide:

a. Constants: π, ε_o
b. Material properties (E, etc.)
c. Equations for: Gauge Factor, Resistivity as f(Temp), Resistance as f(resistivity), Spring Constant, Ring Oscillator Frequency, Phase Delay, Laplace Transforms (if needed), etc.

VI.   You need to know equations for:

a. Ohms law
b. Impedance of a capacitor
c. Capacitance of a parallel plate capacitor
d. $T(s)$ as a function of m, c, k, Q, ς, ω_n
e. Relation between Q and ς, <u>and</u> between f and ω
f. Unit conversions (pF to F, Ω-cm to Ω-m, μm to m, etc…)
g. Units for m, k, c

VII.   Things to watch out for:

a. Units on answers and <u>in the units asked for</u>
b. Answer all parts of questions
c. Show calculations and do NOT round values given in the problem!
d. Convert parameters to a common unit before calculating the answer
e. Give numerical answers, not symbolic like $3\pi/13$

VIII.   **Test Is 50 Min, Closed Book, Closed Notes, No Laptop/Notebook PC's**