Measurement and Instrumentation EE 3321-501, MW 6-7:50pm Summer 1994 Course Syllabus

 General Info:
 Instructor:
 J. H. Losh

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 losh@ftw.mot.com or losh@ee.uta.edu

Textbook: None. Handouts will be provided.

References: Brown, David, E. P. Hamilton III, <u>Electromechancial Energy Conversion</u>, MacMillan, 1984, ISBN 0-02-315590-6.

Dally, James W., *et. al.*, <u>Instrumentation for Engineering Measurements</u>, 2nd ed., John Wiley and Sons, Inc., New York, 1993, ISBN 0-471-55192-9.

Dorf, Richard C., <u>Modern Control Systems</u>, 4th ed., Addison-Wesley, Reading, MA, 1987, ISBN 0-201-05326-8.

Gonzalez, Rafael C., Paul Wintz, <u>Digital Image Processing</u>, 2nd ed., Addison-Wesley, Reading, MA, 1987, ISBN 0-201-11026-1.

Hutchinson, Charles L, ed., <u>The ARRL Handbook for the Radio Amateur</u>, 62nd ed., ARRL, Newington, CT, 1985, ISBN 0-87259-062-3.

Ogata, Katsuhiko, <u>Discrete-Time Control Systems</u>, Prentice-Hall, 1987, ISBN 0-13-216102-8.

Tompkins, Willis J., John G. Webster, eds., <u>Interfacing Sensors to the IBM PC</u>, PTR Prentice Hall, Englewood Cliffs, 1988, ISBN 0-13-469081-8.

Vlach, Jiri, Kishore Singhal, <u>Computer Methods for Circuit Analysis and Design</u>, Van Nostrand Reinhold, New York, 1983, ISBN 0-442-28108-0.

White, Donald, R. J., <u>EMI Control Methodology and Procedures</u>, 3rd ed., Don White Consultants, Inc., Gainsville, VA, 1982, LOCCC 76-39643.

Williams, Arthur B., Fred J. Taylor, <u>Electronic Filter Design Handbook</u>, 2nd ed., MacGraw-Hill, New York, 1988, ISBN 0-07-070434-1.

Dates: Instructor ou	t of town Monday, 13 Jun 94 Wednesday, 15 Jun 94
Test I	Monday, 27 Jun 94
Drop Date (l	JG) Tuesday, 28 Jun 94
Midsemeste	Wednesday, 6 Jul 94
Test II	Monday, 25 Jul 94
Last Date to	Drop (UG) Tuesday, 26 Jul 94
Instructor ou	t of town Monday, 1 Aug 94
	Wednesday, 3 Aug 94
Test III	Monday, 15 Aug 94 @ 6:00 pn

Topics:	Introduction to instrumentation systems Electronic instrumentation systems Electronic -vs- non-electronic systems Discussion of instrumentation system applications Process control Control system concepts Feedback Overview of instrumentation errors and performance issues Linearity and offsets Sensitivity Stability and repeatability Noise sources Transducer-induced error Transducer interface errors
	Modeling transducers and conditioning circuits Simple dependant models and short review of circuit analysis Non-linear -vs- linear device modeling Step-wise linearization of non-linear devices Discussion of frequency analysis issues Discrete devices: resistors, capacitors, inductors, diodes, transistors Analog devices: op amps, instrumentation amps, comparators, multipliers, dividers, oscillators Diaital devices: gates, counters, timers
	Survey of transducers for measuring: Electrical quantities: voltage, current, resistance, capacitance, inductance Electromagnetic quantities: B-field, E-field Optical quantities: luminance, wavelength, image recognition Temporal quantities: time, frequency Mechanical quantities: strain, force, pressure, moment, torque, displacement, velocity, acceleration, flow rate (mass, volume) Thermal quantities: temperature, heat flux, specific heat, thermal conductivity
	Discussion of transducer interfacing Shielding, grounding, and isolation Transmission line and lead-wire effects Impedence and matching considerations Advanced topics: telemetry, digital links Signal processing issues Filtering (low-pass, high-pass, band-stop, band-pass) Digital -vs- analog systems Analog to digital (A/D) converters Quantization and linearity errors
Grading:	All final grades will be assigned and composed as follows: Test I (33%), Test II (33%), Test III (33%) A (>= 90%), B (80-89%), C(70-79%), D(60-69%), F (<60%) No grade of incomplete (X) will be awarded. Any cheating will result in a grade of zero on the work submitted and subsequent filing for disciplinary action with the Associate Dean of Engineering. Any requests for regrading of material must be written.
Prereqs:	Circuits I (EE 2315), Physics I (PHYS 1443), Physics II (PHYS 1444), Useful, but not required: Electronics I, Digital, Microprocessors, Statics, Dynamics, Strength of Materials, Thermodynamics.