Measurement and Instrumentation EE 3321-001, MWF 10-10:50am Course Syllabus for Fall 1993

General Info:	Instructor: J. H.	Losh	
	Office: 142t	NH	
	Hours: MW	F 10-11am	
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Textbook: John Wiley and	Dally, James W., et. al Sons, Inc., New York, 1	., <u>Instrumentation for Engineering Measurements</u> , 2nd 993, ISBN 0-471-55192-9.	ed.,
References: 1984, ISBN 0-02	Brown, David, E. P. H 2-315590-6.	amilton III, <u>Electromechancial Energy Conversion</u> ,	MacMillan,
1987, ISBN 0-20	Dorf, Richard C., <u>Mod</u>)1-05326-8 .	ern Control Systems, 4th ed., Addison-Wesley, Reading,	MA,
Wesley	Gonzalez, Rafael C., P , Reading, MA, 1987, IS	aul Wintz, <u>Digital Image Processing</u> , 2nd ed., Addison- 3BN 0-201-11026-1.	
ARRL, Newingt	Hutchinson, Charles L on, CT, 1985, ISBN 0-8	, ed., <u>The ARRL Handbook for the Radio Amateur</u> , 62nd 37259-062-3.	ed.,
216102-8.	Ogata, Katsuhiko, <u>Dis</u>	crete-Time Control Systems, Prentice-Hall, 1987, ISBN 0-	13-
Prentice Hall, Er	Tompkins, Willis J., Jo nglewood Cliffs, 1988, I	ohn G. Webster, eds., <u>Interfacing Sensors to the IBM PC,</u> SBN 0-13-469081-8.	PTR
Van No	Vlach, Jiri, Kishore Si strand Reinhold, New Y	nghal, <u>Computer Methods for Circuit Analysis and Design,</u> Tork, 1983, ISBN 0-442-28108-0.	
Consultants, Inc.	White, Donald, R. J., <u>I</u> , Gainsville, VA, 1982,	EMI Control Methodology and Procedures, 3rd ed., Don LOCCC 76-39643.	White
MacGra	Williams, Arthur B., F aw-Hill, New York, 198	red J. Taylor, <u>Electronic Filter Design Handbook</u> , 2nd ed., 8, ISBN 0-07-070434-1.	
Dates:	Labor Day Holiday	Monday, 6 Sep 93	
	Census Date	Monday, 13 Sep 93	
	Test I	Friday, 1 Oct 93	
	Drop Date (UG)	Friday, 8 Oct 93	
	Midsemester	Friday, 22, Oct 93	
	No Class	Friday, 29 Oct 93	
	Test II	Friday, 5 Nov 93	
	Last Date to Drop (UC	b) Friday, 19 Nov 93	
	No Class	Friday, 26 Nov 93	
	Project Due	Friday, 10 Dec 93	
	Final	Monday, 13 Dec 93 @ 8am	

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		
	Linearity and offsets		
	Transducer-induced error		
	Sensitivity and hysteresis		
	Stability and repeatability		
	Noise and environmental causes of error		
	Transducer interface errors		
	Modeling Transducers		
	Simple dependant models and short review of circuit analysis		
	Computer simulation of models		
	Non-linear -vs- linear device modeling		
	Step-wise linearization of non-linear devices		
	Discussion of frequency analysis issues		
	Operational amplifiers		
	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 and grounding		
	Lead-wire effects		
	Impedence and matching considerations		
	Advanced topics: telemetry, digital links		
	Signal processing issues		
	Filtering (low-pass, high-pass, band-stop, band-pass)		
	Amplification and offset correction		
	Digital -vs- analog systems		
	Analog to digital (A/D) converters		
	Quantization and linearity errors		
Cradin	All final grades will be assigned and composed as follows:		
Grading	g: All filled grades will be assigned and composed as follows:		
	Λ (>= 0.0%) R (80, 80%) C(70, 70%) D(60, 60%) E (<6.0%)		
	A(-50%), B(00-05%), C(70-75%), D(00-05%), F(<00%)		
	No grade of incomplete (\mathbf{X}) will be awalded.		
filing fo	r disciplinary action with the Associate Doan of Engineering		
ming to	A py requests for regrading of material must be written		
	Any requests for regracing of material must be written.		
Prereas	Circuits I (EE 2315), Physics I (PHYS 1443), Physics II (PHYS 1444).		
10	Useful, but not required: Electronics I, Digital, Microprocessors. Statics.		
	Dynamics, Strength of Materials, Thermodynamics.		