

**ME 473 Instrumentation v 6.0**  
 Department of Mechanical Engineering  
 University of Washington  
 8:30–9:20 MTWF, MEB 242, Autumn 2003

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Prerequisite: Systems Dynamic Analysis and Design (ME 374).

Text: *Measurement Systems: Application and Design*, 5<sup>th</sup> Ed., Doebelin, E. O., McGraw-Hill, 2004.

Web Site: <http://courses.washington.edu/mengr473/>

Grade: Homework - 20%, Lab - 15% 2 Midterm Exams - 35%, Final Exam - 30%.

Last Day: Wednesday, December 10, 2003      Holidays: November 11 & 28

Final Exam 8:30–10:20 p.m. Monday, December 15, 2003

Problems will be assigned on Fridays and are due in the ME main office by 4:30 PM of the following Friday.

Subject	Suggested Reading	Problems
<b>1 Introduction</b> Functional Instrumentation Paradigm Performance Criteria, Error Analysis	Chapters 1 & 2 Sections 3.1 & 3.2 ( skim p. 74 - 94)  Section 3.3 to p. 157	2.7, 2.10 3.1, 3.3, 3.6, 3.21
<b>2 Dynamic Response</b> Review 1st, 2nd & nth order response Transient and Frequency Analysis Bode Diagrams Impedance Analysis, Spectral Analysis	Section 3.3 to p. 157 Notes Notes	See Handout
<b>3 Filters and Compensators</b> Bridges & Amplifiers Low-pass, High-pass & Band-pass Filters Dynamic Compensation, Modulation	Sections 10.1 & 10.2 Sections 10.3 - 10.5  Section 3.3 p. 157–169	See Handout
<b>4 Motion Measurement</b> Relative Displacement	Sections 4.1 - 4.3	4.2, 4.4, 4.9
<b>5 Motion Measurement [continued]</b> Relative Velocity & Acceleration	Sections 4.4 - 4.5	4.12, 4.14, 4.18
<b>6 Motion Measurement [continued]</b> Absolute Displacement, Velocity & Acceleration	Sections 4.6 - 4.15	4.19, 4.21, 4.22, 4.31
<b>7 Force, Torque, &amp; Shaft Power Measurement</b> Transducers Resolution of Vector Forces and Torques	Chapter 5	
<b>8 Pressure Measurement</b> Transducers & Dynamic Models	Sections 6.1 - 6.6	
<b>9 Fluid Flow Measurement</b> Volumetric Flow Rate Mass Flow Rate	Sections 7.1 & 7.2 Section 7.3	
<b>10 Temperature Measurement</b> Thermometers & Thermocouples Dynamic Response of Temperature Sensors	Chapter 8	