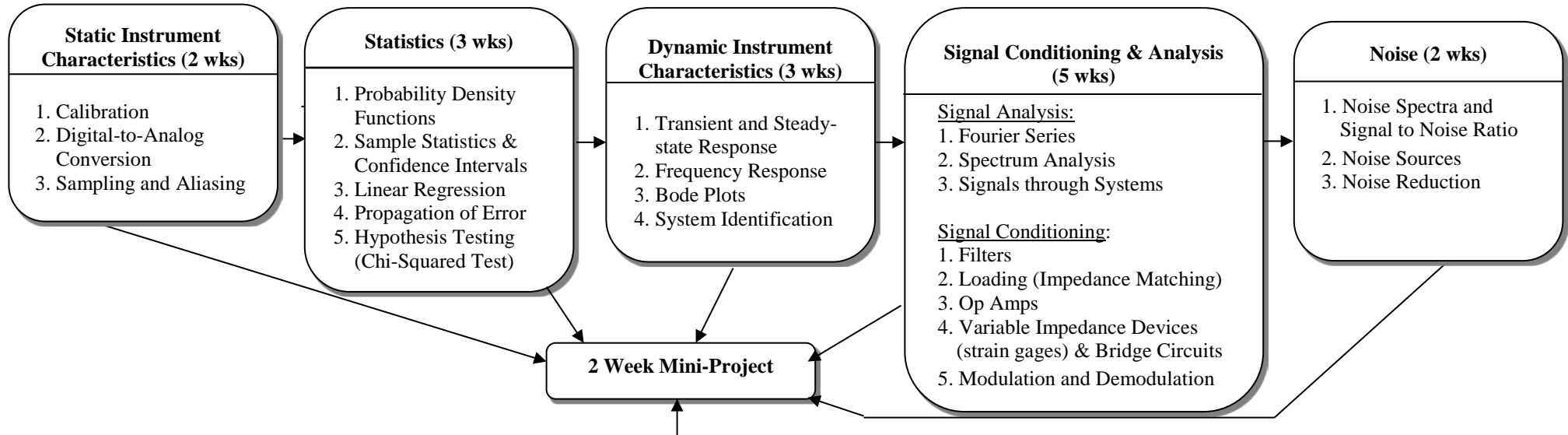


ME 365

SYSTEMS AND MEASUREMENTS

Course Outcomes [Related ME Program Outcomes in brackets]

1. Provide a fundamental knowledge of the *theory of measurement sciences*. [A2, A3, A4]
2. Gain knowledge of the *practice and art of measurements* through laboratory experiments. [A2, A3, A4]
3. Sharpen skills in *problem formulation and integration* of a broad range of technical capabilities through certain deliberately ill-defined experimental procedures. [A2, A3, A4]
4. Sharpen *technical communication skills* through short technical reports. [B3]



Laboratory Experiments

1. Basic Operation of Oscilloscopes, Function Generators, Timer-Counters, and Digital Multimeter
2. Digital Data Acquisition Hardware (A/D & D/A Converters, Op Amps, Quantization, Filters)
3. Introduction to LabVIEW software.
4. Statistics (Prob. Density Functs, Sample Stats, Confidence Intervals)
5. Temperature Measurements (Thermocouples, Calibration, Transient & Steady-State)
6. Frequency Response (Time and Frequency Domain Response, System Identification, Bode Plots)
7. Signal Conditioning and Loading (Filters, Op Amps, Impedance)
8. Freq. Analysis (Sampling, Aliasing Spectrum Analysis, Fourier Analysis)
9. Force Measurements (LVTDs, Proximeters, Strain Gages, Calibration, Spectrum Analysis, Modulation & Demodulation, Signal-to-Noise Ratio)

COURSE NUMBER: ME 36500		COURSE TITLE: Systems and Measurements	
REQUIRED COURSE OR ELECTIVE COURSE: Required		TERMS OFFERED: Fall, Spring, Summer	
TEXTBOOK/REQUIRED MATERIAL: Notes		PRE-REQUISITIES: ME 27400 Basic Mechanics II MA 26200 Linear Algebra and Differential Equations	
COORDINATING FACULTY: G.B. King		EE 20100 Linear Circuit Analysis EE 20700 Electric Measurement Techniques	
COURSE DESCRIPTION: The fundamentals of dynamic system modeling are reviewed with special reference to measurement systems. Analytical and experimental techniques of general importance in systems engineering are presented, including sensor utilization in feedback control. Engineering measurement fundamentals, including digital and frequency domain techniques, noise, and error analysis are covered.		COURSE OUTCOMES [Related ME Program Outcomes in brackets]: 1. Provide a fundamental knowledge of the <i>theory of measurement</i> sciences. [A2, A3, A4] 2. Gain knowledge of the practice and art of measurements through laboratory experiments. [A2, A3, A4] 3. Sharpen skills in problem formulation and integration of a broad range of technical capabilities through certain deliberately ill-defined experimental procedures. [A2, A3, A4] 4. Sharpen technical communication skills through short technical reports. [B3]	
ASSESSMENTS TOOLS: 1. Weekly homework assignments. 2. Pre and post laboratory assignments. 3. Two-week project with oral and written report. 4. Two 1-hour exams. 5. One comprehensive final exam.		RELATED ME PROGRAM OUTCOMES: A2. Engineering fundamentals A3. Analytical skills A4. Experimental skills B3. Communication	
PROFESSIONAL COMPONENT: 1. Engineering Topics: Engineering Science – 2.5 credits (83.3%) Engineering Design – 0.5 credits (16.7%)			
NATURE OF DESIGN CONTENT: In lab, the availability of several methods of achieving experimental goals, troubleshooting faulty equipment and the fact that any method employed will be in error due to assumptions and approximations when modeling system behavior, means that there is not a single <i>correct</i> answer to the problem and not a single <i>correct</i> way of solving it.			
COMPUTER USAGE: Students use PCs connected to data acquisition boards in lab. They use LABVIEW and EXCEL in the lab, EXCEL and MATLAB in their homework assignments, and work processing software, e.g., MS Word for their lab reports. Students use “ready-made” analysis modules in MATLAB and LABVIEW, in addition to writing their own special purpose programs (virtual instruments in LABVIEW) to simulate, acquire and analyze data.			
COURSE STRUCTURE/SCHEDULE: 1. Lecture - 2 days per week at 50/75 minutes. 2. Laboratory - 1 day every other week at 150 minutes.			
PREPARED BY: G.B. King		REVISION DATE: April 1, 2007	