

EE 521 Course Syllabus

Course title:

Measurement and Instrumentation

Instructor:

Dr. Anders M. Jorgensen

Workman 245

Phone: 505-835-5450

e-mail: anders@ee.nmt.edu

Class hours:

Monday and Wednesday 12:00-13:15

Classroom location:

Workman Center Room 117

Office hours:

Monday and Wednesday 8-10

Textbooks:

1. Introduction to instrumentation and measurement, Northrop, 2nd ed, 2005 (This book can be most easily purchased at www.barnesandnoble.com for \$99.95).
2. An introduction to error analysis, John. R. Taylor, 2nd ed, 1997 (This book is also available from www.barnesandnoble.com and costs \$38.00).
3. Handouts

Course objectives:

1. Understand the fundamental principles of measurement and uncertainty.
2. Understand how measurement systems are designed, calibrated, characterized, and analyzed.
3. Gain an understanding of some of the specific sensor systems trade-offs that must be made in commercial and scientific measurement systems.
4. Survey modern sensor systems for measuring a variety of physical quantities.

Prerequisites:

EE308, EE322, EE342 (or equivalent with consent of instructor)

Topics covered:

1. Measurement units and definitions.
2. Error analysis: meaning of uncertainty, estimating uncertain, uncertainty propagation, uncertainty distributions.
3. Noise and interference.

4. Signal conditioning and filtering.
5. Transducers.
6. Sensor applications.
7. Data acquisition, digital interfaces.
8. Detailed discussion of several specific sensor systems.

Course work:

1. Course readings and discussion problems. Students are expected to come to class prepared to discuss the assigned readings and problems.
2. Homework. Written homework will be assigned approximately every other week.
3. Research paper. A written paper will be required. It will discuss a sensor system chosen by the student.
4. Laboratory exercises. Approximately three laboratory exercises will be assigned during the semester, which will combine several skills learned in the course.
5. Final exam. There will be a take-home final exam.

Grading policy:

1. Homework 30%
2. Active participation in class 10%
3. Research paper and presentation 15%
4. Laboratory exercises 30%
5. final exam 15%