

INSTRUCTOR: Professor Pak Kin Wong
AME N718
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Course website: D2L

SCOPE: Probability and statistics
Uncertainty analysis
Curve fitting of data
Statics and dynamics of measurement systems
Signal conditioning circuits
Digital data acquisition and analysis-LabVIEW
Transducers

PREREQUISITES: AME 230, ECE 207; Concurrent registration, AME 331

TEXT: Figliola and Beasley, *Theory and Design for Mechanical Measurements*, 4th Edition.
AME 300 Experiments Package can be downloaded from D2L.

HOMEWORK: Homework will be assigned. **There will be no credit for homework.** However, **quizzes** and **exams** will be based on the material covered by homework. The homework assignments and corresponding solution will be available from D2L.

OFFICE HOURS: Office hours for the Instructor and the Teaching Assistants will be selected so that as many students as possible can come to at least one office hour.

EXAMS: There will be two midterm exams and no final exam. There will be no make-ups for any exam. If you are unable to take a scheduled exam due to health reasons, you must notify the Instructor prior to the beginning of the exam. If you will be absent due to a death (or life-threatening illness) in your family, similar advance notification and subsequent documentation will be required. Students absent from the midterm exam for one of the above reasons will be assigned a grade reflecting performance on the other examination. Students missing exams under conditions not discussed above will normally be awarded a zero.

LABORATORY: The instrumentation laboratory is located in S426. The first lab meeting will be on Monday, September 15. Because of the large enrollment, each lab section will be divided into nine teams of two students. In the event of an odd number of students in a section, one team of three students will be permitted. You may choose your own lab partner or teams will be assigned by the teaching assistant in charge. Once a team is formed, it is fixed for the semester.

Each student will keep a laboratory notebook. The notebook must be hard bound and should be suitable for producing graphs of your raw data. The notebook is to be used for taking data, making calculations, sketching the laboratory apparatus, diagramming circuits and recording your thoughts regarding the experiment. Members of the team should take turns recording the data. It is particularly important that you make a rough plot of your data as you go along. It is much easier to spot trends from a plot than from a table of numbers. This will help you see mistakes while there is still time to correct them, and will also help you decide how many points to measure. Each experiment should start on a clean page. ***Your notebook must be signed by the TA at the end of the lab session.***

Laboratory procedure includes *being prepared*, doing a thorough job in your laboratory notebook documenting the experimental conditions, preparing understandable and useful data plots, making careful measurements, and following safe procedures in handling all equipment. ***The laboratory notes and the reference pages are required reading prior to the laboratory.*** As you read the laboratory notes, you should make a list of the measurements you will need to make during the experiment. It will help if you also plan the format of your data sheets for the full reports. You will be quizzed at the beginning of the lab session, and you will not be permitted to begin the experiment until you have demonstrated that you understand the material.

Each team will have a lab every other week. There will be six lab sessions altogether. Each team is expected to use each intervening week to prepare the lab report. You are encouraged to collaborate with your team member on all aspects of the report and write a report including discussion and conclusion sections. The reports are due at the beginning of your next lab period, which is usually in two weeks. There are two types of lab reports for AME 300 – the mini and the full. The mini report refers to completing the pages attached to the write up on the experiment. Include a photocopy of your lab book presenting the raw data and the notes you took during the lab with both types of report. There are three mini and two full reports. Each student should submit one report. **Credit wise, a full report is worth twice as much as a mini report.** Information regarding the full report format (AME 300 Report Format and Guidelines) is included in the package of laboratory notes describing the experiments available at the AME 300 website. Lab reports must be turned in ON TIME to receive full credit. Late reports will be penalized 10% per day late.

Laboratory Experiment Schedule

Experiment number	Date				Report type
	Monday	Tuesday	Wednesday	Thursday	
Lab 1	9/15	9/16	9/17	9/18	Mini
Lab 2	9/29	9/30	10/1	10/2	Full
Lab 3	10/13	10/14	10/15	10/16	Mini
Lab 4	10/27	10/28	10/29	10/30	Full
Lab 5	11/10	11/11	11/12	11/13	Mini
Lab 6	12/1	12/2	12/3	12/4	LabVIEW

The reports will be graded as follows:	<u>Full</u>	<u>Mini</u>
Lab preparation	20%	20%
Data analysis	20%	40%
Writing and format	40%	-
Discussion and conclusions	20%	40%

GRADING: The course grades will be determined using the following percentages:

Exam #1	20%
Exam #2	20%
Quizzes	10%
Mini reports	25%
Full reports	25%

The "break points" dividing letter grades will be determined by the Instructor at the end of the semester, based on the overall performance of the class and other relevant factors.

Grading exam papers is a difficult task, and errors or misjudgments occasionally occur. Any student who feels that his or her paper has not been graded properly may request that the paper be re-graded. However, all such requests must be made no later than **one week after the exam has been returned**. The complete paper will be reexamined, and the student's grade may go up or down. Furthermore, any complaint regarding grading of lab reports must also be made no later than **one week after the paper has been returned**, and a similar policy applies.

Tentative course schedule

Date	Topics	Lab Session
8/26	Introduction	
8/28	Measurement systems	
9/2	Probability and statistics I	
9/4	Probability and statistics II	
9/9	Probability and statistics III	
9/11	Measurement of phase	
9/16	Error propagation I	Electrical measurements
9/18	Error propagation II	
9/23	Regression Analysis I	
9/25	Regression Analysis II	
9/30	Regression Analysis III	Speed of sound
10/2	Regression Analysis IV	
10/7	First-order systems I	
10/9	First-order system II	
10/14	1st Midterm	Thermistor
10/16	Second-order systems I	
10/21	Second-order systems II	
10/23	Second-order systems III	
10/28	Second-order systems IV	First-order system
10/30	Signal conditioning circuit I	
11/4	Signal conditioning circuit II	
11/6	Signal conditioning circuit III	
11/11	<i>Veterans day, no class</i>	Second-order system
11/13	Data Acquisition I	
11/18	Data Acquisition II	
11/20	Transducers	
11/25	2nd midterm	
11/27	<i>Thanksgiving holiday, no class</i>	
12/2	Micro Transducers I	Sampling rate & LabVIEW
12/4	Micro Transducers II	
12/9	Micro Transducers III	