

Department of Mechanical and Aerospace Engineering
University Of Texas at Arlington
Measurements Lab II - MAE 3183 - RM 219 WH

Instructor: Dr. P. S. Shiakolas

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Prerequisites: MAE 1312 (Statics), 2381 (Measurements I), 2314 (Fluid Mechanics), 3311 (Thermo II), 3314 (Heat Transfer), 3319 (Dynamic System Modeling and Simulation) (or 4310 Introduction to Automatic Control), and EE 2320 (Circuit Analysis) (or concurrent enrollment)

Note: If you do not have all the prerequisites and especially MAE 3311, MAE 3314 and MAE 3319 you should contact Dr. Shiakolas immediately

Course Description: Fundamental measurement techniques in the fields of thermal/fluid sciences, energy conversion, design/structures, dynamic systems, and introduction to advanced instrumentation concepts.

Course objectives: To provide an understanding of fundamental measuring techniques, obtain measurements and analyze said measurements based on engineering principles for a number of experiments/engineering applications in order to bridge the gap between theory and practice.

Topics covered: Basic Concepts, Uncertainty Analysis, Report and Memorandum writing procedures, Digital and Analog Data Collection and Analysis.

Course Learning Outcomes:

(b) Design & Conduct Experiments

This is a laboratory course and you are required to come prepared to the lab in order to conduct a series of experiments. In conducting the experiments you are required to familiarize yourselves first with safety issues and subsequently with the hardware, the type of measured equipment and software to be used for conducting the experiment. You are required to record your measurements on the provided sheets or save them in electronic format where applicable. The data sheets must be signed by the instructor or the teaching assistant once the experiment is completed and before the students leave the lab.

(g) Communicate Effectively

You are required to come prepared for each experiment to be performed by studying the lab manual and be ready to effectively communicate the theory and fundamentals of the experiment to the instructor through a weekly short question and answer period.

You are required to analyze the experimentally collected data using theory available in your lab manuals or your previous course work and engineering software for data analysis and graphing.

You are required to write professional technical formal lab reports or memoranda (you will be informed when a memorandum should be written) for each laboratory experiment performed. The reports should follow the procedures and format in the lab writing manual.

Key Assignments

In order to be considered for a passing grade in the class, you must perform all the laboratory exercises, and obtain a passing grade (>60%) on the frequency response experiment both in the Q&A and technical report independently.

Safety Notes:

- **You MUST wear EYE Protection and CLOSED TOE Shoes at ALL times in the Laboratory**
- **You must complete the Hazardous Material Training and Provide a Printed Copy of the Certificate before you can perform any experiments**

Lab Assignments: You will form groups of two during the first class meeting. A lab schedule will be posted on the web. The experiments and lab reports are a group effort. If a group member does not show up for the lab session, he/she will get a grade of zero for the lab unless arrangements are made with the TA to perform the lab and submit an individual report.

You must prepare before coming to the lab by reading and understanding the theory for lab you are assigned to perform. You must also prepare an individual pre-lab report and submit it when you come to class. The TA or the instructor reserve the right to question you on the theoretical aspects of the lab (15% of lab grade). If you are not fully prepared, you may be asked not to perform the lab and come back later. The penalties for late performance and report write-up will be enforced.

The TA or the instructor reserve the right to ask anyone for information appearing in their lab report, and if you cannot answer, then you will be penalized. Experiments will be performed according to the schedule, and the reports both written and electronic must be turned in at the beginning of the following class meeting. The first graded report will be available for you on time, usually a day or two before the next report is due to allow enough time for you to correct, if needed, the report to be turned in on the next experiment.

In addition to the printed reports and at the same time, you are required to provide an electronic version of the submitted report - bring it with you on flash drive or other removable media device. You will not be allowed to perform the assigned lab if the electronic version of the previous report is not turned in.

Q&A session and Written Report Clarification: All the Q&A sessions and the reports/memos for all the labs are to be treated as examinations for which you are getting credit. The purpose is to assess your understanding of the theory material that the lab addresses so at the end you will have a better understanding of the material and also to evaluate your preparation for performing the experiment in a safe manner for you and your classmates. You are not allowed to discuss the Q&A sessions and questions asked with other students in any of the sessions for this class, and you are not allowed to share your reports. If in doubt when to collaborate with anyone, just ask me or the TA. Also, if reports from previous semesters are used for any reason, then this will be considered as unauthorized collaboration with others. Should it be found out that unauthorized collaboration is taking place, actions will be taken according to the university policies, the university Academic Dishonesty policy and the college of engineering statement of ethics.

On-time Lab Attendance: It is important that you are in the lab on time at the university scheduled time. If you do not show up on time you might not be allowed in the lab and you will be penalized (see penalties note).

Course Manuals: The required format for each report/memo is described in detail in the Introduction of the lab manual. The lab manuals are on the web at the above address in Adobe Acrobat PDF format. Microsoft Excel support files for some of the labs are available on the web as well.

Experimental and Demonstration Testbeds:

You will perform 8 experiments through the semester addressing various areas of mechanical engineering discipline. The list of experiments is as follows:

Experiment 1: Impulse Turbine

Experiment 2: Viscous Flow

Experiment 3: Frequency Response of a Physical System

Experiment 4: Concentric Tube Heat Exchanger

Experiment 5: Air Drag Force

Experiment 6: Strain Measurement

Experiment 7: Fuel Cell

Experiment 8: Strain Gage Sensor Interface and LabVIEW Data Acquisition

Course Web Page: Go to <http://mars.uta.edu>, select Courses and then select Measurements Lab II MAE 3183.

Communication: Email communication will be through the MyMav system to your official UTA issued email account. Also, you are encouraged to check the class web page often for any notes or announcements.

Grading Policy: Grading will be based on

Semester Comprehensive Exam (normally last week of semester) 10 pts

Formal Lab Reports and Memos (two lab memos = a formal lab report) 80 pts

Lab Partner Grade (due when picking up last corrected report/memo) 10 pts

Penalties: A report must be written in the required format for each experiment. Every report (hardcopy and electronic) is due at the beginning of the class period one week after it was performed. Late reports will be subjected to a late penalty of 10% (of the report grade) per day. If you miss a lab, you must make it up and the late penalties apply.

The penalty for missing performing a lab will be 5% per day missed. The deadline for turning in the report remains the same irrespective on when the lab was performed.

Guaranteed Grading Scale: The guaranteed grading scale based upon the minimum percentage number of points obtained. No incomplete grade will be given unless prior arrangements are made with the instructor and only for extreme circumstances.

95%-100% A, 85%-94% B, 75%-84% C, 60%-74% D, 0-60% F

Drop Policy: The drop policy is according to university regulations.

Software: You may use any computer software that you like, but make sure that you are proficient in it for solving the assignments for this class. Limited support will be provided for software tools: Microsoft Excel, MATLAB, SCILAB (<http://www.scilab.org>) and LabVIEW available in the MAE CAD Lab.

Miscellaneous: If you have a disability, any religious holidays that you need to observe or anything else that might interfere with this class and you would like for me to know about it you must inform me in writing no later than the second class meeting.

Lab Schedule: The lab schedule for the semester will be posted once you form groups of two.

Americans with Disabilities Act:

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112-The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act - (ADA), pursuant to section 504 of The Rehabilitation Act, here is renewed focus on providing this population with the same opportunities enjoyed by all citizens. As a faculty member, I am required by law to provide "reasonable accommodation" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels. If you require an accommodation based on disability, I would like to meet with you in the privacy of my office no later than the second class meeting to make sure that you are properly accommodated.

Academic Dishonesty:

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspensions or expulsion from the University. "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22)