MEE 443 Mechanical Laboratory III Spring 2016

Syllabus

Introduction:

The course MEE 443 completes your training in experimental work by having you plan an experiment, then carry it out and report its results. Planning an experiment before it is conducted enables one to have a good idea of the quality of the results that will be obtained, and at least a rough idea of the results' expected range and magnitudes.

Proper planning is required, for the most successful outcome, to insure results are obtained with an acceptable level of quality, - accuracy and uncertainty. Often a detailed proposal is needed for an extensive project requiring several months to complete, so that management can get an idea of the likely benefits vs. costs. Proper planning is required to write such a proposal with a high likelihood that the experiment will be successful.

Course Objectives:

The course objectives are to teach you the following three things by planning, executing and reporting the results of an experiment. Specifically:

1. To teach you the steps necessary to successfully plan an experimental project;,
2. To have you execute the plan, i.e. create apparatus and conduct the experiment and report its results;
3. To provide you experience in the planning tasks and the divisions of time between planning, conducting and reporting results of experimental work.
4. To develop an understanding of the system response of instrumentation and the basics of signal processing

Textbook: No textbook is required. Textbooks from prior Mechanical Engineering courses will be useful as references as appropriate to the experimental project.

Instructor:

Mick Peterson, Professor of Mechanical Engineering, 200 Crosby Lab

Office hours: Tue and Thu 12:30 to 7 pm or by appointment

Course Outcomes: You will develop a better understanding of what it means to say "I (or we) can get this information by doing an experiment." Specifically you will develop:

1. An ability to devise a plan for using the available time to carry out an experimental project;
2. An ability to write a proposal of the planned project which includes the items needed to be purchased or built and the expected results of the project;
3. An ability to communicate the results of the project to other engineers through a formal laboratory report.
4. The ability to critically evaluate the process of digitization of measurement with basic concepts of measurement modeling

Topics: All MEE 487/488 projects have a need for experimental work.
Most students will fulfill the requirements of MEE 443 planning, conducting and reporting experimental work needed for MEE 487/488.

Attendance Policy: Each student is expected to attend each weekly class meetings. Repeated unexcused absences will lead to failure of the course. The MEE 443 projects are group efforts and it will not be tolerated for one or more members of a group not to participate in the group effort.

Graded Items:

The course grade will come from the items listed below which fall into two categories – those leading up to the project proposal and those after the proposal ending with the final report. The graded items are described in more detail on pages after the schedule of class meeting topics and items due.
Each item is one submission for the project group.

Objective(s) of the experimental project	5 pts
Apparatus and theory sections of the proposal	10 pts
Measurement model of system	10 pts
System response homework	10 pts
Final outline of report	15 pts
Analysis of noise, system response and discretization error	10 pts
Results prepared to standards for inclusion in the final project report	10 pts
Final written report on the project	30 pts

Briefly, the written proposal of the project is organized like a formal laboratory report, except that the results are expected rather than available and conclusions can't be drawn. Thus all the graded items are important as planning exercises to insure good results from the project, and they are valuable as drafts of the same sections in the final report.

Numeric to Letter Grade Conversion will be according to the following table:

		B +	87 – 89	C +	77 – 79	D +	67 – 69		
A	94 – 100	B	83 – 86	C	73 – 76	D	63 – 66	E	< 60
A -	90 - 93	B -	80 – 82	C -	70 - 72	D -	60 - 62		

Disability Statement:

If you have a disability for which you may be requesting an accommodation, please contact Disability Support Services in East Annex, 581-2319, as early as possible in the term.

Academic Integrity Statement:

Academic dishonesty includes cheating, plagiarism and all forms of misrepresentation in academic work, and is unacceptable at The University of Maine. As indicated in the University of Maine's undergraduate on-line "Student Handbook," plagiarism (the submission of another's work without appropriate attribution) and cheating are violations of The University of Maine Student Conduct Code. An instructor who has probable cause or reason to believe a student has cheated may act upon such evidence, and should report the case to the supervising faculty member or the Department Chair for appropriate action.

Sexual Discrimination Reporting

The University of Maine is committed to making campus a safe place for students. Because of this commitment, if you tell any of your teachers about sexual discrimination involving members of the campus, your teacher is required to report this information to the campus Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity.

Behaviors that can be "sexual discrimination" include sexual assault, sexual harassment, stalking, relationship abuse (dating violence and domestic violence), sexual misconduct, and gender discrimination. Therefore, all of these behaviors must be reported.

Why do teachers (or professors) have to report sexual discrimination?

The university can better support students in trouble if we know about what is happening. Reporting also helps us to identify patterns that might arise – for example, if more than one victim reports having been assaulted or harassed by the same individual.

What will happen to a student if a teacher (professor) reports?

An employee from the Office of Sexual Assault & Violence Prevention or the Office of Equal Opportunity will reach out to you and offer support, resources, and information. You will be invited to meet with the employee to discuss the situation and the various options available to you.

If you have requested confidentiality, the University will weigh your request that no action be taken against the institution's obligation to provide a safe, nondiscriminatory environment for all students. If the University determines that it can maintain confidentiality, you must understand that the institution's ability to meaningfully investigate the incident and pursue disciplinary action, if warranted, may be limited. There are times when the University may not be able to honor a request for confidentiality because doing so would pose a risk to its ability to provide a safe, nondiscriminatory environment for everyone. If the University determines that it cannot maintain confidentiality, the University will advise you, prior to starting an investigation and, to the extent possible, will share information only with those responsible for handling the institution's response

The University is committed to the well-being of all students and will take steps to protect all involved from retaliation or harm.

If you want to talk in confidence to someone about an experience of sexual discrimination, please contact these resources:

For confidential resources on campus: Counseling Center: 207-581-1392 or Cutler Health Center: at 207-581-4000.

For confidential resources off campus: Rape Response Services: 1-800-310-0000 or Spruce Run: 1-800-863-9909.

Other resources: The resources listed below can offer support but may have to report the incident to others who can help:

For support services on campus: Office of Sexual Assault & Violence Prevention: 207-581-1406, Office of Community Standards: 207-581-1409, University of Maine Police: 207-581-4040 or 911. Or see the OSAVP website for a complete list of services at http://www.umaine.edu/osavp/

MEE 443 Class Topic and Assignment Schedule (Wednesdays) Spring 2016

Meetings 2:10 to 3:00 PM on Mondays prior to Spring Recess for those registered for Monday class section

Class Date	Project Meeting/Class Activity	Required Items from Project Team Graded items are one per group item due dates electronic to class email as PDF	
1/20 /16	Explain Nature of Course and Basic Introduction	Nothing due	
1/27/16	Discuss project objectives	**Project objective(s) document (5 pts)**	2/9/16
2/3/16	Discuss apparatus, theory and procedure,.	**Apparatus and theory section of proposal/report(10 pts)**	2/13/16
2/10/16	Discuss measurement model, signal processing	**Measurement model of system (10 pts)**	2/20/16
2/17/16	Discuss written proposal of project	**System response homework(10 pts)**	2/24/16
2/24/16	Discretization	Nothing due	
3/2/16	Convolution	**Final outline of report (15 pts)**	3/4/16
3/9/16& 3/16/16	Semester Break		
3/23/16	Final outline review and correction	Nothing due	
3/30/16	Data model	Nothing due	
4/6/16	Modeling	Nothing due	
4/13/16	Digital signals and sensors	**Analysis of noise system response and discretization error (10 pts)**	4/13/16
4/20/16	Modeling and progress	**Results section of report quality(10 pts)**	4/22/16
4/27/16	" " " "	" " "	
5/4/16			
5/11/16	Final reports due	**Formal project report (30 pts)**	Final Exam Period

Ditto marks for Results section of report quality, is recognition that completion date of that item cannot be absolutely predicted a priori.

Example of planning required for successful testing

Plan of Work to Verify the Performance of a Vehicle Suspension System

from 2/19 to 5/7 2016

Items to be completed W	Dates 2/19/16	2/26/16	3/5/16	3/12/16	3/19/16	3/26/16	4/2/16	4/9/16	4/16/16	4/23/16	4/30/16	5/7/16
Building of test fixtures												
Purchase spring shock absorber, LVDT displacement transducer & accelerometer												
Assemble test apparatus with and instrumentation												
Verify proper operation of apparatus,												
Progress report												
First data taken												
Record displacement and acceleration data of the system under simulated road loads												
Reduce acceleration data to velocity and displacement, compare displacement from accelerometer data to displacement from LVDT												
Results of report quality												
Prepare final report on the project												