ME 4840 – Mechanical Instrumentation
Syllabus and Class Policy
Fall 2015

Mr. Mitch Cottrell
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Office Hours: Monday – Friday 1:00 pm – 4:00 pm

Lecture Room 125 Civil Engineering (M, W 2:00-2:50)
Lab Room 317 Toomey Hall (See schedule for times and experiment schedule)
(Optional) LabVIEW session Room 251 Toomey hall (F 2:00 – 2:50)

Course purpose:
This course is designed to provide the students with a background in a broad number of transducers and measurement systems for recording and controlling real world processes and conditions. This course will combine a combination of lecture, laboratory and additional hands on work to teach the indicated topics. This course is VERY hands on, and the information is directly applicable to what many engineers end up doing early in their careers after leaving school, and even before, during internships and co-op positions.

Required Items:
Text Books:
Learning With Labview (Bishop) 978-0-13-402212-3 [required]
Mechanical Measurements 6th edition (Beckwith) 0-201-84765-5 [Optional]

Parts Kit: 
Cost $35 (Cash or check only!)
Includes all the parts and components that are required for use with your DAQ card for the assignments and experiments.
Kits will be available in 194 Toomey hall after the first day of class.

DAQ Card Kit:
Available from the campus book store
Cost $205 (approximate)
Or from the following site:
http://www.studica.com/mydaq/
select : With NI LabVIEW, NI Multisim, & NI Ultiboard
Part Number: 781327-01 (199)
Includes NI MyDAQ Card, cable, drivers and LabVIEW 2015 software

Computer headphones or earphones:
Student Supplied. Required for week 1 and 2 of Lab.

Clickers:
Clickers will be used in the lecture portion of this course. You may use any of the following options:
Existing XR or NXT clickers (like the ones used in previous years)  
Smart phone, PDA, iPAD, Laptop  
All of these now require a License for “turning point cloud” which costs $20 per year online  
http://edtech.mst.edu/support/turningtech/responseware/

**Attendance:**  
Attendance in the **lectures** is required, even though attendance will not be taken. Information will be presented in the lecture that will be impossible to get elsewhere. As an aspiring engineer it is up to you to manage your time and information adequately and to act as a professional. Clicker quizzes will be given during the lecture which count as extra credit points toward the application assignments.

Attendance at your scheduled **laboratory** section is mandatory. If you miss the scheduled lab section you will not be able to complete the experiment and will be placing your group, as well as yourself, in a bind. If missing a laboratory session is unavoidable, you must contact the teaching assistant for your section and your group members prior to the absence. Groups that need to make up the lab due to equipment failure may work with the TA of your section to schedule a time. Since lab hardware is changed from experiment to experiment frequently, not all labs will be available for makeup after certain dates. You should not plan on being able to do a makeup lab session.  
Missing a lab for a legitimate reason after notifying the other group members and the TA will result in a score of a 1 for the lab participation points on the base exam and any extensions the group does. Missing without previous notification for anything other than dire circumstances will result in a 0 on the participation, which will also prevent the student from completing the lab exams for that lab/experiment.

**Grading:**  
Grading of the course will consist of the following portions; Laboratory participation and lab tests, Application problems, Daily programming assignments and quizzes, Final project. Grading will be on the standard scale. It will be up to you to keep tabs on your standing through the semester. Blackboard will show the assignment points you have earned as well as the possible points for the assignment. Since there are a SIGNIFICANT number of assignments listed for the course, blackboard has no way of knowing which assignment should be done when and to calculate an appropriate score. For this reason there will be no blackboard calculated semester score.  
Your final grade will be calculated offline in excel and posted to blackboard.

The breakdown will be as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Experiments:</td>
<td>35%</td>
</tr>
<tr>
<td><em>In lab experiments and lab tests</em></td>
<td></td>
</tr>
<tr>
<td>Application Problems</td>
<td>30%</td>
</tr>
<tr>
<td><em>Homework and at home assignments</em></td>
<td></td>
</tr>
<tr>
<td><em>Extra credit clicker points</em></td>
<td></td>
</tr>
<tr>
<td>Daily Labview Assignments</td>
<td>5%</td>
</tr>
<tr>
<td>Project</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>15%</td>
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Class structure:
The lecture will consist of a common lecture period twice per week. The topics will vary from lecture to lecture as we cover different instrumentation types. The lecture will typically be broken into two parts, the first part a short lecture on the daily LabVIEW programming topic and the second on the selected measurement topic.

Laboratory sections meet once each week. Each section will break down into groups of two or three (not more than three per group/ not more than 4 groups per section). A detailed lab schedule is available on the class website that outlines what lab is done on each lab day.  (http://web.mst.edu/~cottrell/ME240).

Lab grading:

Laboratory experiments consist of two parts, the first (base) portion of the experiment is a step by step process that all groups must do. These reinforce particular transducer characteristics and instruct you on how the experiment operates. The second (extension) portion consists of one or more parts that typically give a general goal of a measurement, allowing the student group to use the information in the lecture and the base portion of the experiment to formulate their own procedure to reach that goal. Each extension is designed to reinforce a different concept or characteristic. Each group must do one extension, however additional extensions may be done for extra credit points.

Each portion of the laboratory has as section of “things to do and think about”. The calculations, graphs and questions provided in this section, along with the procedures you followed to get the data, form the basis for the lab exams. You are encouraged to work with your group to do these calculations and discuss these questions prior to taking the exams.

The lab TA will award participation points up to 25 points for the base portion of the lab and up to 10 points for each extension. Groups that come unprepared, don’t have the appropriate materials or lab procedure write-ups will not only be penalized by being harder to get the labs done, but the lab TA will deduct an appropriate number of points from the possible points for the participation score.

The base score for participation is 35 points (base section plus one extension), however up to 10 points of extra credit per extension may be obtained by completing additional extensions if time permits within the regular lab section time.

Absences from lab must be arranged for in advance. Absences that have been arranged for in advance will allow the student in question to obtain 1 point for the base experiment and 1 point for each extension. This point indicates that you took the time to arrange for your absence and also allows you to take the lab exams. You must still obtain any data or information from your group partners. If you fail to attend without prior notice you will get 0 participation points and will not be eligible to take the lab exams for that laboratory topic.
Lab Examinations:
Rather than doing written reports for each lab, when you have conducted the lab and the TA has entered your participation score, a blackboard laboratory exam will become available. The laboratory exams are individual efforts, and are pulled from pools of questions that are randomized. The end result is that no two exams is likely to be the same, although all the same material will be covered on each exam. Questions will include multiple choice, True/false, matching, multiple answer and calculations. The total possible points for the lab exam is 75 points. See the document on blackboard for more details on the exam procedure.

Clicker Questions:
There will clicker questions given periodically through each lecture session. The percentage of the points accumulated for these will be added as extra credit on the applications assignments, normalized to the weight of one application assignment (50 points).

It is the student’s responsibility to ensure their clicker license is established and linked to blackboard. The new process started last semester was cumbersome and sometimes didn’t seem to have worked the first time, or a step was left out. Even hardware clickers now require a license, like the phone and tablet apps do. I will periodically post the clicker points to blackboard. If you think you should have clicker points, but show no points, ensure that you have properly licensed your clicker with the cloud system and linked it to blackboard. If you still don’t receive points, I can check to see if your clicker is logging any points and associating them with you, beyond that it would be up to IT to help you resolve the problem.

Daily Assignments:
To help reinforce the LabVIEW programming following each lecture there will be a small assignment that will only take a few minutes to do, followed by a short online quiz. The quiz questions will be worth one point each. The total of these will be worth 5% of the total course grad. These quizzes will be available on blackboard for approximately 48 hours following the lecture.

Application Problems:
There will be application problems assigned in lecture. These problems will be worth a total of 30% of the course grade. These problems are designed to reinforce information from the lab and lecture, as well as challenge you to expand your knowledge of LabVIEW programming. These problems may be done groups of up to 2 students unless otherwise indicated. Assignments that are significantly plagiarized will receive zero points for the assignment. Late application assignments will be penalized 50% for submission within the first 24 hours and not accepted after that.

Project:
There will be a project near the end of the course that will allow you to debunk or prove some myth, explore some interesting physical property or even create some useful tool for a student project or home use. The project will REQUIRE that you do some kind of
instrumentation and data acquisition. More will be coming about this at a later time in the semester.

**Final Exam:**
There will be a comprehensive online final exam given during finals week. Questions on the exam will be derived from information presented during the lecture sessions, obtained from conducting and analyzing the laboratory experiments and from the homework assignments. This will be an online timed exam but will be open note/open book. More details will be presented as the semester progresses.

**Plagiarism:**
There is a certain amount of group work, particularly on the application (homework) assignments. Homework assignments are generally (unless otherwise specified) allowed to be done in groups of 2. That means 2 people working together submitting a single assignment. If you choose to work with another group you are required to have your own program, your own data and your own assignment submission.

Over time I have seen reports that are essentially identical with the exception of a few words changed here and there, or that contain the same, sometimes incorrect data from past semesters. These submissions violate the spirit of the assignment. For this reason assignments that are extremely similar, contain identical data, or contain data or programs from previous semesters or other assignments turned in by other students, will automatically receive a 0. More egregious examples of plagiarism will result in more extreme penalties up to and including receiving a failing grade for the course.

If you choose to share your data and or program with a friend, do so at your own risk. If your friend chooses to use your data and or program in their report, I have no way of knowing who did the work and who copied, so both reports will receive a 0. It is a simple fact that files exist. The use of a file is considered cheating. If you choose to use a file on lab exams or homework assignments and get caught, the penalty will be significant. In addition, using a file will fail to prepare you for the final exam and final project. I highly recommend that you forgo the files and do the work necessary to understand the concepts.