Lab Safety
The safety of students and staff is our highest priority.

- All PHYS Lab students must be registered for SMTE-0095 as a corequisite. Students must ensure that they have credit for that semester’s SMTE-0095 quiz in Blackboard. If a student has already completed an SMTE-009x quiz in the current academic year, they may be given automatic credit in Blackboard. If credit was not given, they must take the course and pass the quiz.

- **No food or drinks in the labs.**
- Closed shoes are required.
- Two types of personal protective equipment may be necessary:
  - Impact-resistant goggles (safety glasses).
  - Chemical lab goggles.
  Each lab’s instructions specify what is needed. Students may borrow from the lab or bring their own.

- **COVID-19**
  - **Face Coverings** – (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Extra masks will be made available if needed.
  - [https://www.tamucc.edu/campus-announcements/coronavirus.html](https://www.tamucc.edu/campus-announcements/coronavirus.html)
Hybrid Lab Format

“Hybrid” courses are those with both in-class and remote components. In this case, some students will be in the classroom, while others attend via Webex. The remote component of physics labs is “synchronous”, meaning the remote students participate during the scheduled lab time.

Pre-Lab: The lab instructor will be in the classroom and on Webex.

- The lab instructor will begin each lab session by giving a lesson and/or answering questions about the prelab practice material. Participate, ask questions!
- Students will then be given 30 minutes to complete a 10-question quiz on Blackboard.
- The lab instructor will give any needed explanation or demonstration of the lab activities.

Lab Activities:

- Students work in lab groups, typically with 3 in a group, though groups of 2 are allowed.
- To meet CDC distancing guidelines, only one lab partner will be in the classroom. The other two will participate via videoconference. https://tamucc-student.webex.com/ is available for students, or Blackboard Collaborate.
- There are 3 job roles each week:
  - **Hardware**: This is the student in the classroom manipulating the equipment.
  - **Software**: This student on Webex will take data and set up analysis calculations.
  - **Notes**: This student on Webex will take notes and make sure the report requirements can be fulfilled.
- Each week, students will take on different job roles. The lab instructor will have a schedule of the job roles (Hardware, Software, and Notes) for each group.
- Before leaving the lab, the Webex students are responsible for saving two documents in the Group File Exchange on Blackboard:
  - **Excel file**: Completed by Software. Contains all data and final results.
  - **Word file**: Completed by Notes. Contains the necessary procedural and logical information to complete the lab report.

Lab Report:

- Know whether you must complete a Data Report or a Formal Report.
- Communicate with your group so that everyone has input into the lab report. Don’t leave the entire process up to one partner.
- Complete the lab report by midnight on the day of your next lab. The last lab must be completed on the day of the lab (with an abbreviated report).

Lab Report Formats

Data Report

A data report contains 3 parts: Heading, Abstract, and Tables/Figures

- **Heading**: Title of Lab, List of Authors, Date of Lab
Only list those authors who contributed to the experiment and report.

- **Abstract**: One or more paragraphs of text that summarize the entire lab activity.
  - Make sure to meet all requirements listed at the end of the lab instructions.
  - An Abstract is not divided into sections. It’s just a few paragraphs. Generally, the pattern is as follows:
    - Introduction: should be 1-3 sentences, **not copied or paraphrased** from the lab instructions.
    - Methodology: can be fairly general. This is not a procedure. Only a few sentences are needed. Describe what was happening, what was measured, and how that relates to the final analysis. Do not give values here.
    - Discussion: summarizes the results, starting with the direct measurements and then the final result of analysis. Often, there is some comparison between the experiment and a theory or model. If there is a list of final values, give the most important value, a typical value, or an average value. If there was a graph with a trendline, state the trendline equation (translated to physics variables) and describe the important part of the trendline equation as part of the results.
    - Conclusion: make an objective statement, backed up by the results. An explanation of any sources of error and estimates of sizes of those errors should be included.
  - After the Abstract, give credit to the partner(s) who worked on it.

- **Tables and Figures**: When scientists write reports for publication, the tables and figures are always provided separately (not embedded in the text). This section approximates that pattern. Often, the instructions provide templates for the tables/figures and their captions.
  - **Captions**: Every Table/Figure must have a caption.
    - **Label**: e.g. “Table 1”, “Figure 2”.
    - **Text**: 1-2 sentences giving that data context. If there is a controlled variable, state it in the caption.
    - **Credit**: Give credit to the lab partner(s) responsible for generating the table/figure.
  - **Tables**: Start with copy/paste from Excel, but do beautify the Tables.
    - Use text, not a screen shot. Screen shots don’t match the font/style of the document and often make text blurry or tiny.
    - Keep within the page. If it’s too wide/long, consider ways to consolidate.
    - Round off unnecessary decimal places.
    - Label rows/columns with units in parentheses of the label.
    - Do not include units next to each value.
  - **Figures**: Start with a copy/paste from Excel.
    - Do not use a screen shot. Copy/paste as an object.
    - If the text comes out the wrong size, make the graph larger/smaller in Excel and copy/paste again.
    - Make sure the trendline equation is readable.
    - Transcribe the trendline equation into physics variables in the caption.
Formal Report
This format closely matches what academic publishers want for scientific journal articles. It contains **Heading, Abstract, Main Body, and Tables/Figures**.

- **Heading**: Just like a Data Report (see above).
- **Abstract**: Just like a Data Report (see above). A few points about Abstracts:
  - Remember the Abstract is a summary, not an introduction.
  - The Abstract must summarize the results/conclusions, not just the intro/method. In other words, if a reader reads **only the Abstract**, they should get the gist of the report.
  - The Abstract should not state anything that isn't summarized from the Main Body. In other words, if a reader **skips the Abstract**, they shouldn't be missing anything.
- **Main Body**: This is 1-2 pages of text. Probably divide it into sections:
  - **Introduction**: 1-5 sentences **not copied or paraphrased** from the instructions. The instructions are written for students who will do the experiment. Your audience is people interested in the results and already knowledgeable about the field. Place the work in context.
  - **Methodology**: Not a “standard operating procedure”. **Do not copy or paraphrase** the instructions. Describe what object/system was studied, what it did, what was measured, and how the measurements were analyzed. Include equations used in the analysis.
  - **Discussion**: Describe the measurement results, analysis, and results of the analysis. Be clear about how each value was obtained. Don't list lots of similar values. Give a sample value or range of values, and refer to the Tables for the rest. Intermediate calculation results aren't needed here.
  - **Conclusion**: A sentence or two that summarizes the scientific results (not the skills gained). Make an objective statement backed up by the results. For example, you might compare the results of your data analysis with the expected values to say whether your results support or appear to contradict the theory. The theories we test are well-established, so if the theory is contradicted, you should explain where the errors may have come from. The conclusion must depend on your numerical results! It cannot contradict your results.
  - **Credit**: After the Main Body, give credit to the partner(s) who worked on it.
- **Tables/Figures** – Just like a Data Report (see above).

Grading Rubrics
Each lab has a Rubric attached to the lab submission Blackboard Assignment. Generally, they follow the Requirements listed in the instructions. Here are example points breakdowns:

Sample Rubric
- (10 points) Collaboration
- (45 points) Data, i.e. measurements and analysis.
- (45 points) Writing, i.e. Abstract, Main Body, and Captions.
Sample Data Report
A sample Data Report is available as a separate document:
https://goo.gl/Kf157H
(lower-case letter “ell” in the middle)

Absences and Penalties

- If a document (results in Excel, notes in Word) is missing from the Group File Exchange at the end of the lab period, the student with that job will be presumed to be not participating and will have a 50% penalty applied to their individual score.
- A student who is absent cannot receive credit for that lab.
- Students are allowed 2 excused absences during the semester. There are no makeup labs.
- To be excused, an absence must be arranged ahead of time if possible. Talk to your lab instructor as soon as you know you will miss a lab, especially if you are an athlete.
  - Examples requiring advanced notice: school-related events, job interviews, NCAA athletic competitions, doctor appointment, etc.
  - Examples of emergencies: car accident, sudden illness, loss of child care.
- Students with extenuating circumstances should contact Student Assistance http://studentaffairs.tamucc.edu/StudentAssistance.html.
- An unexcused absence results in a zero grade for that lab.