PHY132-H1S
University of Toronto Physics

Measurement Project due March 31

Jason Harlow
Winter 2009

Overview and Motivation

If you took the pre-requisite for this course, PHY131, you completed the Error Analysis Assignment, which is still available for your review at: http://www.upscale.utoronto.ca/PVB/Harrison/ErrorAnalysis/ . We hope that as part of PHY131 and PHY132, you have been taught how to

- take careful measurements
- report all measurements with a ± error
- propagate errors when computing results based on measurements
- compute the average and standard deviation of multiple measurements of the same quantity
- distinguish between accuracy and precision
- report your findings carefully and convincingly

These are skills that will last you the rest of your life as you continue in any scientific, medical or other discipline in which measurements are important.

Another important skill is writing. You should be able to write a clear, readable report in English that informs the reader of your findings and conclusions. To this end, I am assigning this Measurement Project, due March 31. Your report should be about 2 pages, type-written, and should be submitted both electronically and in paper format.

Winter 2009 Topics

I would like you to answer exactly ONE of the following five general questions:

1. How high is the ceiling (or roof) of Convocation Hall at the University of Toronto?
2. What is the slope (rise / run) of the stairs near Newton's bust in McLennan Physical Laboratories between room 102 and the elevators? [Please express your answer in degrees as an angle above horizontal.]
3. How much sugar, on average, is in one of the little sugar-packets available at the coffee-shop in the main lobby of McLennan Physical Laboratories?
4. How fast do your own fingernails grow?
5. What is the average maximum temperature of the hot water coming out of the taps in the bathrooms in McLennan Physical Laboratories?

As part of your Motivation section, you should re-state the question so that it is more specific. Make sure that your final answer matches the question *you* are asking. [For example, if you are measuring the height of Convocation Hall, do you include the thickness of the roof, and where do you define zero height? ie, at the base of the steps at Kings College Circle, or the floor at the base of the stage?] If you would like to answer a question that is very different from any of the above five, please first obtain permission from Jason Harlow, the Practicals Coordinator.

Report Format

Your report should include the following sections:

1. **Title** It should be clear from your title which of the 5 questions you answered.
2. **Author, Date** Include your student number, Course Name, your Practical Section and your Practical Group code.
3. **Collaborators** List any friends who may have worked with you on taking the measurements.
4. **Abstract** This should be one or two sentences summarizing the main conclusions of the report, including the final numerical result.
5. **Motivation** What is the question you are trying to answer exactly?
6. **Procedure** Please detail exactly what you did, what measuring devices you used, any relevant environmental conditions, problems you encountered or innovations you may have devised to perform your measurements. You may wish to include a short table, summary or sample of your original measurements.
7. **Analysis** Describe any mathematical procedures you used to go from the raw original measurements to the final results.
8. **Conclusions**

The Measurement Project will, in part, be marked on writing style and on the organization and presentation of the material. Good English structure, spelling and grammar are expected, and graphs and diagrams should be clearly labelled.

Resources

The technologists for PHY132 are Larry Avramidis, Lilian Leung, Phil Scolieri and Rob Smidrovskis. They all share an office in MP127. With their permission you may borrow metre sticks, stopwatches, measuring tape, Vernier callipers, thermometers, and the like from the Resource Centre in MP126. They can also make a digital scale available to you. If MP126 is not open you can knock on the door of MP127 during regular business hours M-F 9-12, 1-5.

Due Date, Procedures for Turning in Report.

The Measurement Project in electronic format is due to www.turnitin.com by 11:59 PM on Tuesday, March 31, 2009. It must be submitted in electronic format (Word, PDF and several other formats are acceptable) to www.turnitin.com by the deadline, and an identical paper copy must also be submitted to your demonstrator either during your 9th Practical session Mar.25-31, or, at the very latest, into your TA's drop-box before noon on April 1. The paper copy may be turned in early if you wish, as can the electronic version. Your name, Student Number, Practical Section and Group code must appear clearly on the front of your Measurement Project. Note that the paper and electronic versions must be identical.

Late Measurement Projects will be penalized at the rate of 10% per day of lateness. The number of days of lateness will be the maximum of the electronic submission lateness, as based on the turnitin.com time-stamp, and the paper-copy lateness. A fractional number of days will always be rounded *up* to the nearest integer, and the penalty will be applied as a percentage of the

unpenalized mark. Measurement Projects with an electronic or paper lateness of more than 10 days will receive a zero.

To submit your assignment electronically you should follow these steps:

1. **Log on to www.turnitin.com . If you don't already have a user profile, set one up:**
    - Click *Create a user profile*.
    - Enter a valid utoronto.ca email address, password and your name. Please enter the same name that is on your University of Toronto I.D. so we can easily tell who you are.
2. **Enroll in this class**
    - From your turnitin homepage click the *Enroll in a class* button.
    - For this class the *Turnitin class I.D.* is **2619843** and the *Turnitin enrollment password* is **conhall** . The name of the class should be "PHY132 Winter 2009".
3. **Submitting a paper**.
    - From your Turnitin homepage select this class
    - Click on the Submit button and select *File Upload* from the pulldown menu.
    - Enter a submission title for your paper, which should include your name. You may use spaces in the title, but not commas or other special characters. Use the *Browse* button to select the file that you would like to submit. Click *Submit*.

NOTE: Turnitin automatically will generate a text-only version of your paper. This is what it uses to search for textual similarity with other documents in its database. This text-only version will NOT be used in the marking; ***please ignore it!*** If we wish to mark your electronic version, we will download the exact same file you uploaded, which will be complete with figures, tables, special characters, fonts, etc.

If you prefer, you may choose to submit only a hard-copy of your project, but in this case you must also provide a photocopy of the relevant notes you took while performing your measurements with dates and times, with numbered references linking the text in your formal report to the original measurement notes. Please speak with the lab coordinator at least one week before the project deadline if you prefer to submit a hard-copy only.

Length Limit

The typed report should be approximately 2 pages long, corresponding to about 500 words.

The absolute maximum word limit for your report is 800 words (including title, abstract, table and figure captions), and the absolute maximum number of pages, including figures, tables, etc is 5 letter-sized page sides total. Marks will be deducted if either of these length limits is exceeded. Note that www.turnitin.com sometimes overcounts the number of words, mostly depending on how you submitted your tables; in any case the turnitin.com word count should not exceed 1000 words.

Poster Option

The most common way to prepare the report is by using a word-processing program (such as Word) with a 12-pt Times New Roman font, into which you may insert figures, tables, etc. As

an alternative, you may instead submit your Measurement Project as a poster. The poster should be 28" tall and 36" wide, and should not have any text on it smaller than 24-pt. There are several good programs for making posters, including Powerpoint, Macromedia Freehand, Adobe Illustrator, Adobe Photoshop and Adobe PageMaker. In any case, you should make a PDF of your poster and submit it to turnitin.com following the instructions above.

You should NOT submit a poster in paper format. Instead, please attach the PDF file in an email to Jason Harlow by the electronic deadline. You will receive a confirmation that your report has been received. The very best posters submitted will be printed by the graphics department in Physics, and, with the author's permission, posted in the hall on the first floor of the North Wing of McLennan. Posters should include all the necessary information about your measurements and analysis, but should also be eye-catching, colourful and succinct.

Notes on "Originality"

While your Procedure may include work you do with your friends (who should be listed as collaborators in your report), your Measurement Project should be primarily your individual work. You must perform the analysis and write the entire report yourself. For information on "how not to plagiarize", please see http://www.utoronto.ca/writing/plagsep.html.

The turnitin.com version will be treated as your official submission, and the marker may download your report from the turnitin.com web site. The marker will also have access to an "originality report", which is a comparison of the text-portion of your report to millions of other documents, including all the online material for this course, all the other reports submitted to turnitin.com, and many documents which were available at some time on the world-wide-web. The originality report will probably not be used in the marking unless there is some evidence that an unusually large amount of your unquoted text is identical to some other source. If you do wish to quote a source, be careful to reference it and include the copied words in quotation marks, so it is clear to the reader that you did not write them.

Students agree that by taking this course your measurement project may be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.