Introductory Physics Labs
@ Stony Brook

Details of each to be discussed later in separate meetings

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Principle Focus of this presentation:
Physics 123/124 and 133/134
Introduction

• Structure of a large (introductory) course in our department
  – Pre-Med Introductory Physics 121/123, 122/124
  – Pre-Sci/Eng Introductory Physics: Three levels, four couplings
    • Physics 125, 126, 127 + Labs Phy 133, 134
    • Physics 131, 132 + Labs Phy 133, 134
    • Studio Physics 131/133 & 132/134 (Kelly/Dawber)
    • Honors Physics 141, 142 + Labs Phy 133, 134

• Laboratory Teaching Assistant’s duties
  – What, when, how
  – Grading practices for labs
  – Some times you will be asked to help in proctoring & grading exams
Lectures, Laboratory Sections & Recitations

- **Lectures:** All students meet together in a large class room
  - Principle instructor one of Physics & Astronomy (P&A) Faculty

- **Recitation Sections or Workshops:** Smaller groups of ~24
  - Recitation Sections: (Smaller groups of ~24)
    - Meet with P&A faculty for about 1 hr per week
  - Workshops: Held in regular class room hours
    - Use of clickers in class rooms or special 1 hr/week

Students need to take:

- **Laboratory courses:** Class divided in to groups of ~24-30
  - **YOU will meet these sections weekly**
  - Each Lab Experiment: ~2.5 hrs per week
  - You will supervise experiments, help students and grade them
Labs

- You will be assigned a Lab Sections in any of these labs with the principle instructor and others in the department office

- Labs run from Monday~Thursday
- Friday is the Change Over Day: Lab director Dr. Bent Nielsen will setup experiments for the following week.
- Friday is also YOUR DAY TO TRY OUT THE LABS
  - Typically by 12:00 Noon labs are ready
  - All TAs associated with Labs will assemble in the lab and perform the experiment, understand the intricacies and discuss the grading criteria with each other (and, when necessary, the principle instructor).
  - Each one of you will get to lead the discussions through the semester.
Grading the Labs

Pre-Med: Physics 123 & 124 are PASS/FAIL
Scientists & Engineers Physics 131 & 132 are letter graded:

Grades will be based on:

1. **Lab Report:** Students write a lab report and submit it to you for grading

2. **An Interview:** Lab TAs interview the students before they leave the Lab sessions and decide whether the student came prepared, and has understood what he/she is doing in the lab.
Grading the Labs: Lab Report Method

- Abstract, introduction [1 point]
  - What are they trying to test or prove
  - How to do it with a short sketch and short text
- Procedure [2 points]
  - Write what they did in the two hours
- Analysis of data [6 points]
  - Graphs, calculations, uncertainty estimates
- Conclusions [1 point]
  - Physics implied by the data
  - Any caveats or comments
Grading the Labs: Interview

• You go around the room, making sure things are running well, and get a feeling for who is doing what and how, and that students are doing things right (talk to them, take short notes for your “evaluation” of them)

• You go to each table and interview the students about their experiment and form an opinion about them based on:
  – Understanding of the subject matter
  – Work done in the lab
Interview Grading

What should I be looking for when you interview students?

• Did the student come prepared (as they are required to)
• Whether they understood your beginning presentation
• Probe whether both partners are taking (interest) & active role in the execution of the experiment
• The students are developing strategies to overcome the minor problems, that they will face

Make sure they are not struggling

• With something beyond their means (equipment failure)
  – You should intervene and help
A typical day at the Lab

• **You arrive at the Lab**, 10 minutes before the beginning, then students arrive (often late)

• **You distribute the Lab Reports (LR) from the previous session**

• 10-15 minutes (max) today’s Lab introduction
  – The students are supposed to read the laboratory manuals **before** they arrive at the Lab

• Lab work begins

• **At the end of the Lab, you sign a data sheet (for LR)**

• You go around the Lab interviewing students and grading them based on the set criteria

• Students leave

• **You lock the lab when you leave**
Safety & Security

• You are responsible for the equipment in the laboratory

• Do not leave students unattended for long periods of time

• Always lock the doors prior to leaving the laboratory

• Report problems immediately to the Instructional Laboratory Directors (Bent Nielsen)
Important details…

• Numbers should
  – Have units (always)
  – Be legible (always)

• Graphs should
  – Have axes labels with units (always)
  – Have reasonable range selections (always)
  – Fill the page
  – Data points should have uncertainty bars (always)
Collecting Lab Reports for grading

• Students given 48-72 hrs after the end of the Lab Section to write the lab report and submit to you

• Lab Collection Cabinets (LCCs) are located in A-131

• Students should deposit their labs in the slot for THEIR course and THEIR section during the room’s open hours
  – M-Th 8:00AM to 10:00PM
  – Friday 8:00AM to 04:00PM
Grading practices

- **Clarity:** Make it clear to students:
  - What you expect in the lab report / write up
  - Why he/she lost points if he/she did
  - How can they do better next time

- Set high standards

- Be consistent and fair

- Tune your grade to get 70% average
Uncertainty Analysis (UA)

• Methods expected may vary in different classes

• Details will be discussed by the principle instructors in organizational meetings with you

• This is often the 1st time the students are asked to do an uncertainty analysis, and this happens to be the most difficult aspect of the Laboratory experience for them

• While UA is not the purpose of the laboratory, it is one of the important aspect so “measurement” and “our every day experience” –hence important!
Equipment failure

• Bring broken equipment in to the instructional laboratory for repair

• Label the equipment with a brief description of what is wrong with it
Cheating

• Bad for every one: Make it clear to the students.

• Students should work in groups
• Similar conceptual mistakes will appear in different reports

• Identical lab reports (copies) are forbidden
• Warn students the 1st time not to do this. If repeats, subtract points, and have another talk with the student.

• Consult with your course instructor if the pattern persists.
General Remarks

• It is your responsibility to ensure that the Lab Class goes well
  – If for any reason you can not make it to one lab sections
    (illness, mandatory travel etc.) you
    • MUST find a substitute instructor and
    • Get the absence approved by Course Instructor

• Always make your expectations clear to the students
  – A handout detailing what is expected is much appreciated
    by students

• Maintain a positive friendly relation and helpful atmosphere
  in and out of the Lab section