Orientation for New Physics and Astronomy Graduate Students

Monday, 19 August 2013

Teaching Physics Labs

Professor Peter Koch (at Stony Brook since 1982)

Presently supervising labs for PHY 121/3 (Physics for Life Sciences I, 8 TAs), PHY 133* (General Physics Lab I, 16 or 17 TAs), PHY 134* (General Physics Lab II, 4 TAs) (* means it serves PHY 125/126/127 and PHY 131/132)

PHY 121+123 (for “pre-meds”) is started in the Fall (F) semester (“on” sequence, now ~430 students) and in the Spring (S) semester (“off” sequence, now ~200 students) and finishes as PHY 122+124 the following semester.

PHY 131 (for “scientists and engineers”) has “on” (enrollment now ~750) and “off” (enrollment now ~100) semester starts and finishes with PHY 132.

PHY 125 (F & S), PHY 126 (F), PHY 127 (S) are the 3-semester course (slower pace than PHY 131/132) for “scientists and engineers”; typical enrollment ~300-400.

The above courses have, by far, the largest enrollment in the department.

Please answer this question with a show of hands:

How many of you have “taught” college/university students before? (“teaching” means lecturing from the front of a room and grading the work of students)
Anecdotal information:

Inquiries we made of other physics departments (ca. 20) indicate that many/most
start their graduate students as TAs, typically in introductory lab sections, with
little/no formal training in teaching methods. Few of these new TAs have had
previous teaching experience (“teaching” means lecturing from the front of a
room and grading work of students).

This means TAs starting out with “on the job training”.

Is this the best way to learn to teach? No!
Is this good for the undergraduate students being taught? No!

The rules/regulations of the Graduate School and of this department require one year
of satisfactory performance as TA at the time of receipt of the Ph.D. degree.

Consequences:

One (or maybe) two years as a TA at Stony Brook may be your only teaching
experience before, later in your career, becoming an Assistant Professor, at which time
it will be expected that “you are a good teacher”. Not “being a good teacher” will
be damaging to your academic career. You need to learn as soon as possible how to
teach effectively and well. Doing so takes effort and experience. It is part of our job
to help you in this endeavor. Learning how to teach well brings personal satisfaction.
Different lab courses are organized and taught in different ways.

“Small” lab courses have as few as one lab section. Under supervision of the course instructor, the TA will be running a “unique operation”.

“Large” lab courses have many sections, as many as 35 in some cases. Each TA, supervised by the course instructor(s), will have (primary) responsibility for, at most, two sections (and, in certain cases, secondary responsibility for two more). This creates the important issue of “uniformity across the different lab sections”. If one particular TA is considered by the students to be, say, “overly demanding” and a “hard grader”, there will be complaints by the students/“victims”, particularly if they think – rightly or wrongly– that one or more of the other TAs are “more reasonable”, which translates to “easy graders”.

Some lab courses require students to submit written lab reports for most experiments. 2 sections per week x 24 students per section yields 48 lab reports to be graded for those weeks. This takes time, but you improve with experience.

Other lab courses, in particular, PHY 123 and 124, do not require written lab reports. Instead, the “primary” TA and “secondary” TA give in-lab performance grades based on “exit interviews” of each student (up to 30 students per section in 2-student pairs) at “the end of the lab”. This requires for good teaching and organization skills and good judgment.

Few TAs “starting out” have these skills, but they can be learned. We will help you learn them.
Example of current TA list (likely to be revised):

The PHY 133 (up to 24 students/section) and PHY 134 (up to 24 students/sec) labs are no longer tied to one course. They now serve PHY 125/126/127 and PHY 131/132. Grading of students is done by combination of written lab reports for some labs and TA’s observation of in-lab work.

PHY 123 and PHY 124 labs have up to 30 students/sec. Grading of students is done by online pretest (up to 35/100) and in-lab “exit interviews” done by primary and secondary TAs for each section (up to 65/100). This is a crucial skill to be mastered.
Example of long email memo (1st page only) sent to lab TAs (before labs start) describing their duties and responsibilities in detail. A lab TA paid by State funds is an agent of the State and, thereby, has official responsibilities.

Memo to Lab TAs for PHY123 (lab for Physics for Life Sciences I) in the Spring 2012 semester

Peter Koch  to: Thomas Fan, bryan.field, hexugang, Matthew von Hippel, Stanislav Srednyak  01/19/2012 11:54 AM
Cc: Michael.Rijssenbeek, Jacobus Verbaarschot

Memo to Lab TAs for PHY123 (lab for Physics for Life Sciences I) in the Spring 2012 semester

To:

Fan, Thomas
Field, Bryan
Frednyak, Stas
He, Xu-Gang
von Hippel, Matt

Cc: Michael Rijssenbeek, Jac Verbaarschot

Dear Thomas, Bryan, Stas, Xu-Gang, and Matt,

Each of you has been assigned to teach PHY123 (Physics for the Life Sciences I) Lab sections in the Spring 2012 semester. We’re looking forward to working with you during the semester. N.B.: The present schedule promulgated by the Registrar has 10 lab sections, but as of today one of them has only ten students enrolled vs. the maximum number of 30. Tough we have asked that that section be cancelled and the 10 students enrolled in it be transferred into one of the other sections, it is unclear if this will happen. Therefore, the table below shows 10 lab sections; all will meet in room A-121. For completeness it also includes the schedule for the lectures, which will be held in Javits 100.
Example of Help Room schedule from a previous semester showing nearly full coverage during Monday through Friday.

Faculty, lab TAs, and, in this course, undergraduate TAs, too, staff the Help Room.

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<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<tr>
<td>9:35</td>
<td>Artem SERGANOV</td>
<td>9:50 Sami PERVAIZ</td>
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<td>9:50 Adam KHORASANCHE</td>
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<td>10:10</td>
<td>Jackie CHENG</td>
<td>10:20 Sami PERVAIZ</td>
<td>10:10 Cassandra ZURAWSKY</td>
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<td>10:50 Sami PERVAIZ</td>
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<td>11:45</td>
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<td>11:20 – 12:40 LECTURE</td>
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<td>11:45 Prof. Koch</td>
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<td>12:50</td>
<td>Dillon HAYES</td>
<td>12:50 Songkai HU</td>
<td>12:50 Dillon HAYES</td>
<td>12:50 – 12:40 LECTURE</td>
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<td>5:00–5:30 Youran WU</td>
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<td>5:00–5:30 Prof. Rijsenbeek</td>
<td>5:00–5:30 Sami PERVAIZ</td>
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*Last update: 8 February 2011 (P. Koch)*
To see the video shown in the 19 Aug. 2013 lecture:
go to http://www.ic.sunysb.edu/class/phy122ps/Fall2010phy122/hwvidselecu.php
For this lecture (I go directly to the video stored on my computer)

In the "Select Video" box, pull down the list, click on “AleksasMazeliaskasLab7IntroPHY133L10Spring2013.flv” and then "submit".

You should now be in a browser window that popped up. Turn up the sound on your computer, click on either of the two "arrowheads" and play the video in the embedded flash video player. You will see and hear Aleksas giving his PHY 133 Lab 7 (Simple Harmonic Motion) introductory talk on 25 April 2013 to section L10.

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Spring 2013, Sec. L10 of PHY 133:
Aleksas Mazeliauskas, Lab TA
giving his “10 minute” introductory lecture for
Lab 7, “Simple Harmonic Motion”
(video-recorded and discussed for improving teaching)

- All PHY 133 lab TAs had previously discussed what to cover.
- He used two blackboards: left and right, and “pre-loaded” them with most of what he would cover.
- Initial comments about student “misunderstandings” in the previous lab
- Lots (spoken words and blackboard words/figures) about expt. details and underlying “physics”
- Reminders/warnings about deadlines (e.g., for submittal of reports) and possible penalties

Important: He did not talk too long. His lecture lasted 9’ 16”.

Since 2 yrs. ago lab sections last only 1 hour 50 minutes! (For “us” this will increase to 2 hrs 20 mins in 2014.)

Make sure you start/stop on time with < 10 min. lab-intro lecture.

Particular strength of Aleksas: weekly “before” and “after” email-memos to his students (both sections) alerting them about important information: what to be careful about, what they did well, what they didn’t do well, and how to improve their performance in the course.

Be PROFESSIONAL with your students; you are not there to be their “friend”. You must earn their respect with TEACHING skill, COMMUNICATION skill, and LEADERSHIP skill, all of which you must work to develop.

Strong recommendation: Do not use your first name. Ask to be addressed as “Mr” or “Ms/Miss” so-and-so.
Some graduate students from our department have already received training in communicating science at the Alan Alda Center. We plan to have eight of you (from the pool of PHY 133 “lab TAs”) take part in the Fall 2013 semester. This is a unique opportunity provided by Stony Brook University!