Orientation for New Physics and Astronomy Graduate Students

Monday, 20 August 2012

Teaching Physics Labs

Professor Peter Koch (at Stony Brook since 1982)
Presently supervising labs for PHY 121/3 (*Physics for Life Sciences I, 9 TAs*), PHY 133* (*General Physics Lab I, 12 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, typically 500-600 students) and in the Spring (S) semester (“off” sequence, typically 250-300 students) and finishes as PHY 122+124 the following semester.

PHY 131 (for “scientists and engineers”) has “on” (typical enrollment 500-600) and “off” (typical enrollment 100-200) 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 150-200.

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)
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).

This means they are started out with “on the job training”.

Is this the best way to learn to teach?  
Is this good for the undergraduate students being taught?

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. 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 25 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 the students to turn in written lab reports for (some) experiments they do. 2 sections per week x 24 students per section yields 48 lab reports to be graded for those weeks. This can take LOTS of time.

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 26 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 in-lab exit interviews by TA.

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).

FALL 2012 TA List
August 10, 2012

<table>
<thead>
<tr>
<th>Course</th>
<th>TA List</th>
</tr>
</thead>
<tbody>
<tr>
<td>AST 101/112</td>
<td>Alex DiRe</td>
</tr>
<tr>
<td>AST 105</td>
<td>Abhisodh Prakash</td>
</tr>
<tr>
<td>AST 205</td>
<td>Moshe Kellernstein</td>
</tr>
<tr>
<td>AST 248</td>
<td>Serpil Yalcin</td>
</tr>
<tr>
<td>AST 341</td>
<td>Zoya Zoya</td>
</tr>
<tr>
<td>PHY 113/115</td>
<td>Peter Petrov</td>
</tr>
<tr>
<td>PHY 119</td>
<td>Daniel Pinghero</td>
</tr>
<tr>
<td>PHY 121/123</td>
<td>Ryan Stuart MAT, Michael Hazoglo, Hari Raman, Anar Aragamalan, Gabriel Santucci, Yaniang Shi, Chengjian Wu, Yiqian Xu, Gustavo Montero</td>
</tr>
<tr>
<td>PHY 122/124</td>
<td>Vinay Uppal, Jean Nery, Zhongling Ji, Tatiana Konstantinova</td>
</tr>
<tr>
<td>PHY 133</td>
<td>Arturo Pazmino, Jian Peng Ang, Gong-Jun Choi, Simon Divilov, Rasmus Larsen, Xiaoyue Li, Aleksas Mazelauskas, Mehdi Namazi, Naveen Prabhakar, Peifeng Liu, Nicholas Tarantino, Mingliang Zhou</td>
</tr>
<tr>
<td>PHY 134</td>
<td>Yue Hang Leung, Justin Owen, Yizhuang Liu, Michael Stewart</td>
</tr>
<tr>
<td>PHY 445/515</td>
<td>Ludwig Krinner, Carlos Marques</td>
</tr>
<tr>
<td>PHY 501</td>
<td>Jian Liu</td>
</tr>
<tr>
<td>PHY 505</td>
<td>Xinyu Zhang</td>
</tr>
<tr>
<td>PHY 511</td>
<td>You Quan Chong</td>
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<tr>
<td>PHY 141</td>
<td>Mathew Madhavacheril</td>
</tr>
<tr>
<td>PHY 251/252</td>
<td>Yihong Wang, Donald Wilcox</td>
</tr>
<tr>
<td>PHY 277</td>
<td>Max Katz</td>
</tr>
<tr>
<td>PHY 300</td>
<td>Brian Arnold</td>
</tr>
<tr>
<td>PHY 301</td>
<td>Martin Polacek</td>
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<tr>
<td>PHY 303</td>
<td>Gervais Hualong</td>
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<tr>
<td>PHY 335</td>
<td>He Zhang</td>
</tr>
</tbody>
</table>
Example of email memo 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

To:

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

Cc: Michael.Rijssenbeek, Jacobus 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.
In case the formatting of the list above is garbled when being sent via email, here is as a screenshot graphic:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Section</th>
<th>Room</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHY 121-01</td>
<td>Physics for Life Sciences I</td>
<td>241</td>
<td>241</td>
<td>TuTh 11:20AM - 12:40PM</td>
</tr>
<tr>
<td>PHY 123-L01</td>
<td>Physics for Life Sciences I</td>
<td>30</td>
<td>30</td>
<td>Mo 2:20PM - 4:20PM</td>
</tr>
<tr>
<td>PHY 123-L02</td>
<td>Physics for Life Sciences I</td>
<td>24</td>
<td>24</td>
<td>Mo 5:20PM - 7:20PM</td>
</tr>
<tr>
<td>PHY 123-L03</td>
<td>Physics for Life Sciences I</td>
<td>28</td>
<td>28</td>
<td>Tu 12:00PM - 2:00PM</td>
</tr>
<tr>
<td>PHY 123-L04</td>
<td>Physics for Life Sciences I</td>
<td>19</td>
<td>19</td>
<td>Tu 5:00PM - 7:00PM</td>
</tr>
<tr>
<td>PHY 123-L05</td>
<td>Physics for Life Sciences I</td>
<td>28</td>
<td>28</td>
<td>We 2:00PM - 4:00PM</td>
</tr>
<tr>
<td>PHY 123-L06</td>
<td>Physics for Life Sciences I</td>
<td>18</td>
<td>18</td>
<td>We 5:00PM - 7:00PM</td>
</tr>
<tr>
<td>PHY 123-L07</td>
<td>Physics for Life Sciences I</td>
<td>26</td>
<td>26</td>
<td>Th 12:00PM - 2:00PM</td>
</tr>
<tr>
<td>PHY 123-L08</td>
<td>Physics for Life Sciences I</td>
<td>10</td>
<td>10</td>
<td>Th 3:00PM - 5:00PM</td>
</tr>
<tr>
<td>PHY 123-L09</td>
<td>Physics for Life Sciences I</td>
<td>29</td>
<td>29</td>
<td>Mo 11:45AM - 1:45PM</td>
</tr>
<tr>
<td>PHY 123-L10</td>
<td>Physics for Life Sciences I</td>
<td>29</td>
<td>29</td>
<td>We 11:45AM - 1:45PM</td>
</tr>
</tbody>
</table>

If both versions of the table are somehow garbled or missing, try to

http://www.ic.sunysb.edu/class/phy121pk/labs/doku.php?id=sections

and find another one there.

See also the PHY 121 home page (other web pages there are still under construction)

http://sbhepnt.physics.sunysb.edu/~rijssenbeek/PHY121_S12.html

and the PHY 123 home page (other web pages there are still under construction)

As we have done in the past, each Lab TA will have primary responsibility for two of the lab sections and secondary responsibility for two other sections. Primary Lab TA duties include

-- preparing and delivering the each no-more-than 12 minute "lab introduction" lecture at the beginning of each meeting of a lab section and being present in the lab for the entire 2-hour meeting. During the semester, three of the in-front-of-class presentations will be video-recorded for each TA for later observation -- within a day or two -- by the TA who delivered it and discussion of it with both course faculty members as a means for evaluating in-lab teaching performance and making needed improvements. After the video-recording and observation, but before the discussion, the primary TA will be expected to write a short (no more than one page) "self critique" listing and commenting on the relevant strengths and weaknesses of the teaching performance shown in the video recording. The first of the three will occur at the beginning of the semester for Lab 2 -- Acceleration during the week of 30 January – 2 February; the second will be a one-hour in-lab lecture/workshop during the week of 13-16 February; and the third will occur near the end of the semester, probably for Lab 9 – Poiseuille’s Law during the week of 16-19 April. Because Lab TAs from previous semesters have commented that they found this desirable and helpful for improving their teaching, we hope that each of you will agree to allow the other four Lab TAs to observe each of your video-recorded performances and that all five of you will work together on developing and improving your teaching methods.

-- preparing and using sign-in and sign-out sheets for each meeting of a lab section and keeping them as part of the permanent course record

-- being in charge of collating in-lab performance grades (based on "exit interviews" carried out jointly by the primary TA and the secondary TA) for all students in that section, promptly uploading them into the Blackboard electronic gradebook for that section, and maintaining and keeping well-organized, written records as part of the permanent course record

-- handling the email correspondence with students in that lab section as needed, e.g., about making sure that students who have missed one or more in-lab sessions are reminded that they will fail the course unless they complete all in-lab sessions and receive a grade for them, meaning that **missed labs have to be made up by such students at the scheduled makeup periods that include the specific labs that were missed**

-- supervising the make-up lab sessions for their affected students

-- preparing and delivering the "1 hour in-lab lecture/workshop" that is scheduled during the semester. Secondary Lab TA duties include

** arriving at the end of the 1st hour of the 2-hour lab session to help out and share with the primary TA the responsibility of giving the exit interviews for determining the in-lab performance grades for the students in that section

** making sure that the primary TA is provided with a proofread list of the in-lab performance grades awarded by the secondary TA before the primary TA and secondary TA part company at the end of each in-lab section meeting. It will be the duty of the primary TA to upload all those grades into Blackboard before the end of the day of the meeting of that lab.
Additional duties for both primary and secondary responsibilities include

### preparing beforehand for attending each regularly scheduled, weekly lab preparation meeting (up to 2 hours) that will include all four TAs and at least one of the faculty members co-teaching the course. “Preparing for” means having carefully read (and observing the accompanying video in) the online lab manual so that both are already well understood before the weekly meeting and having done the on-line “lab pretest” delivered by MapleTA software. **We propose that the weekly lab preparation meeting will start promptly at 8:30 am on the Friday before each week that there is a lab being done by the students; it will take place in the lab room, A-121.** Since this has worked well in previous semesters, we expect all five of you to discuss during the meeting what are the key points that must be covered by all of you during the next-week’s lab intro lecture. With the responsibility rotating among you each week, these key points should be put onto the left-hand blackboard panels in A-121 (with a “Do Not Erase” notation) for use by all of you. The right-hand blackboard panels in A-121 will be left free for each of you to put up more volatile material for your lab intro lectures.

### being vigilant during the lab preparation meeting and during the lab section meetings to identify any faulty lab equipment that will be/is being used by students, to take it out of service and notify Joe Feliciano immediately after the meeting/that lab section that it is faulty and needs to be repaired/replaced. Include a written description of the problem with the date, your name, course name, lab section number, and cellphone number, and tape it to the faulty equipment before you give it to Joe. This semester we must work with Joe to have ready in the lab room, A-121, **before each lab**, whatever spare, “replacement” equipment is available so that you can deal with faulty equipment promptly as soon as the fault is identified.

### preparing beforehand and attending two hours of (to-be-scheduled) time in the PHY 122 Help Room, room A-131. “Preparing for” means having worked out all the problems assigned to the PHY 122 students via MasteringPhysics.

### sharing the proctoring duties for both midterm exams (Midterm 1: 8:30 - 10 pm, Wednesday, 29 February; Midterm 2: 8:30 - 10 pm, Wednesday, 21 March) and the final exam (8:00 - 10:45 am, day in May to be announced). The course faculty will prepare the exams, and they will be “machine graded”.

To take the first step for scheduling, please look over the lab schedule and give us your preferred sections in order of preference (1=most preferred, 2=next, etc.). Also give us the sections you CANNOT attend, the only valid excuse being a time conflict with a course you are taking. For this you should give us the number and name of the course, its (presently) scheduled meeting time, and the name of the faculty member teaching it.

To take the second step for scheduling, confirm that you are able to attend a weekly, lab-preparation meeting starting at 8:30 am on each Friday before a week when a lab will be done by students. If at this point you think you have some reason why you cannot meet at this time, we will work with you to solve that scheduling conflict so that you are able to meet at this time.

We will begin to schedule the Help Room hours during the first week of classes.

Thanks,

Peter Koch
Michael Rijssenbeek
Example of Help Room schedule showing nearly full coverage during Monday through Friday.

Faculty, lab TAs, and, in this course, undergraduate TAs, too, staff the Help Room.
To see the video shown in the 20 Aug. 2012 lecture:

go to http://www.ic.sunysb.edu/class/phy121pk/hwvidselectKJF2.php

In the "Select Chapter" box, pull down the list, click on "1", and click "submit".

In the "Select Video" box, pull down the list, click on "Chapter 01, Problem 99", and click "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 Thomas Fan giving his PHY 123 Lab 5 (Conservation of Angular Momentum) introductory talk on 15 March to section L04.

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Spring 2011, Sec. L04 of PHY 123:
Thomas Fan, Lab TA

giving his “10 minute” introductory lecture for
Lab 5, “Linear Momentum”
(video-recorded and discussed for improving teaching)

- All PHY 123 lab TAs had previously agreed what to cover.
- He used two blackboards: left and right.
- He “pre-loaded” both with what would be covered.
- Right: Some experimental/apparatus details.
- Left: More about “the physics” with some expt. details.

Important: He did not talk too long. His lecture lasted 9’ 08”.

Starting this semester: Lab sections last only 1 hour 50 minutes !!!

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