Physics TA Training

September 18, 2006

Note: All handouts distributed today can also be found at: `http://physics.ucsc.edu/~mjohnson/#headta`

1 Overview of a lab TA's responsibilities

- As a lab TA, you will be in charge of running 2 lab sections; you are essentially autonomous, and the lab courses are enrolled in separately from the lecture component.
- The instructor from the lecture component of the course is in charge of organizing the lab TAs, who in turn are responsible for assisting in the grading of mid-terms and finals.
- Our labor contract with UCSC dictates that half-time TAs (if you are doing 2 labs or 1 upper division discussion section, you are half-time) work no more than 20 hours a week on average (on TA duties that is, unfortunately our contract does not preclude all of those late nights doing homework). This is taken seriously, and if you are working more than this, please talk to the instructor for the class or the head TA to address this issue. Shown in Table 1 is a breakdown of the time a half-time lab TA should spend doing his or her various duties.

Duty	Time
Organizational meetings	1 hour at beginning of quarter / 30 min. a week
Teaching the lab	6 hours per week
Office hours	2 hours per week
Grading lab notebooks	4-6 hours per week
Preparation time before lab	1 hour per week
Grading/proctoring mid-terms and finals	3-5 hours for each of 2 mid-terms and 1 final
Assigning grades and writing Evals	variable – ?3-6 hours at the end of the quarter?

Table 1: The estimated/suggested time a TA should spend on various duties.

- Before each quarter, there will be a meeting to discuss the course. You are *absolutely* obliged to attend all such meetings arranged by the instructor or the department. Your continued pay is contingent on fulfilling this responsibility.
- Some instructors also require a short weekly meeting to discuss the labs and plan mid-term and finals grading etc. These meetings are not optional.
- Labs are 3 hours long(!) students should be there for about 3 hours (no longer – but also, not much less).
- For each lab section that you teach, you must hold 1 office hour. Students will often show up late, so do not assume that no students are coming and leave after 5 minutes!

- Lab notebooks are completed by the students during the 3-hour lab section, and turned in at the end of each class. There is to be no take-home portion of the lab write-up, and the only work outside of class that students should be expected to do is to read the lab notebook and complete the pre-lab questions. The TA will collect the lab notebooks at the end of class, and hand the graded books back to the students at the beginning of the next class (more on grading later....).

- It is extremely important to prepare for your lab sections. The new labs will usually be set up by noon on Friday, and you should spend some time in the lab to familiarize yourself with the equipment, perhaps taking a bit of data yourself to make sure that the apparatus is functioning properly. You will save stress (and embarrassment!) during lab if you are familiar with the experiments.

- You are *required* to assist in the grading of mid terms and the final. Keep this in mind as you make vacation plans, etc. If you are not there, another TA will end up doing your work for you (and will subsequently not be very happy), and there may be disciplinary action from the department.

- As a lab TA, you will be responsible for assigning grades (more on grades later....) to the students in your sections and writing their evals (see the Narrative Evaluations handout). These duties must be completed in a timely manner. For your convenience, the relevant dates for 2006-2007 are listed below:

  Fall – Grades due December 12, Evals due January 8.
  Winter – Grades due March 27, Evals due April 13.
  Spring – Grades due June 19, Evals due July 6.

- At the end of the quarter, students will complete evaluations of your teaching performance. The forms are passed out at the beginning of the class (at which point you leave the room for 10 minutes), and collected by a volunteer student who returns them to the physics office.

- You can read these evaluations after you have submitted your grades and evaluations for the students. **Always read your evals**, they are an invaluable source for learning what you should change the next time you TA.

2 Physics Lab Philosophy

What is the point of physics labs?

- Labs offer hands-on experience with concepts that may seem vague or confusing in lecture. Many people learn best by doing, and a well-taught lab course can really reach these students.

- This is your opportunity to help students learn to enjoy discovery and understanding rather than regurgitate data and facts that are meaningless to them.

- You are teaching students how to deductively understand concepts, which will undoubtedly service them in other parts of life.

- Conceptual understanding is of equal – or greater – importance than data collection/write-up. *You need to convey this to the students.*

3 Authority and Control

- You are the ultimate authority in the labroom, you dictate the overall attitude.
- Start out strict, and ease up later . . . students will base their opinion of you on their first impression. You must gain respect early, and you can always loosen up later if you want a more friendly atmosphere.
- This being said, keep some distance: you are not teaching lab to make friends (or meet romantic partners), you are there to learn how to be a good teacher (and make a living)!

4 What Makes a Good Teacher?

- Think of favorite teachers from your past . . . what made them great? . . . were they demanding, did they give a lot of "real" examples, etc.
- remember their methods, and watch current teachers' methods . . .
- synthesize your favorite aspects. This will eventually develop into your own style.
- Lead students to discover solutions on their own.

5 What to expect during lab

- There is no comfortable place to wait outside of the lab rooms, so please be sure to open up the lab $\sim$ 10 minutes before the official start-time. This is a good opportunity to check-in with students who show up early and ask how the lab/lecture is going.
- Lab should begin with a short lecture (no longer than 15 minutes). Use this time to:
  - introduce the basic physics concepts involved (the lecture will often become uncorrelated with the lab, so it is a good idea to keep track of what has been covered to know how detailed this discussion should be),
  - talk about any problems with the apparatus you might have uncovered during prep-time,
  - answer questions that the students might have,
  - and give the class feedback about their general performance (ie, "I noticed that in last week's lab, most people did not understand what was going on with . . . " or "In the lab notebooks, most people did not accurately describe how they . . . ").
- The rest of the time should be spent circulating throughout the lab answering questions and checking in with each lab group. You should be on your feet, talking to students for most of the 3 hour section.

Here are a number of suggestions for your time during the lab:

- Be aware of students who need help, but are not active in pursuing it.
- It's okay to say "I don't know." Be authoritative, but don't make up things that you don't understand. You are a resource for the students: help them look up an answer, or suggest to them where to look it up themselves.
- You're not expected to be able to answer every physics (or other) question the students will ask you. However, you should be fairly comfortable with the material that week. Skim the chapter in the textbook if you need to.
- Learn the students names and use them.
- If you get asked the same question a few times, get the lab's attention and give them a short lecture.
- Refer students to your office hours for answers to more detailed or tangential questions.
- If you find a typo or something that is overly confusing in the lab-book, let the head TA or your professor know (let your students know you're working on it).
- The cabinets in the back of the lab rooms have surplus supplies and additional tools you may want to use for examples (you never know when you're going to need a mass on a spring). feel free to use anything in there (and then replace it).
- try to enjoy yourself .....
- Convey to students your own understanding of difficult ideas. Explain how you are able to understand complicated ideas, or what enabled you to learn about them when you were in lower-division physics.
- Use "real" examples of what they're seeing in lab (*e.g.* "think about these collisions next time you play pool" or "this is why hurricanes spin counter-clockwise in the northern hemisphere," etc.).
- Lead students to deduce ideas on their own. Try not to just answer questions outright (*e.g.* "well, what do you think?" ... "that's absolutely right, but what about ...", etc).
- Keep the pace of the lab (*e.g.* tell the whole lab "we're an hour in, you should be at or near section three by now.," and then circulate to help the people who are moving slowly).
- Don't spend too long with one group. Lead them toward a solution and let them figure it out on their own.
- Use the chalkboard wisely:
  - write with the chalk held under your pointer finger (to prevent squeaks)
  - try to write straight and large – they must be able to read it from the back of the room
  - don't put too much on the board ... they won't read it all and many of them won't be able to see it
  - erase with the eraser, not your hand: chalk/ink will get everywhere and hands just don't erase very well
  - be wary of colored chalk, much of it is very difficult to erase

6 Office hours

During office hours, you should field questions related both to the lab and lecture.

- Most likely, students will come in with questions about specific homework problems.
- You should *not* just do the problems on the board for the students, though it is okay to help the students set up the problems.
- You do not have to answer questions like: "check my work for me and tell me if I did this problem correctly." If you get a question like this, ask the student to explain the concepts in the problem, and try to offer feedback on their understanding of these concepts.
- Though you are *not* expected to work through the lecture component's homework, it is useful to skim the chapter being covered in lecture before your office hours to remind yourself of the concepts.

7 Grading Lab Books

- **Grades must be somewhat consistent for all physics labs!!** It is not acceptable for one TA to give mostly A's while another gives mostly C's. The unofficial physics department standard is to have the mean grade be ∼B/B+.
- To achieve this, it is necessary to develop some consistency in your weekly grading scheme. This can also greatly reduce the amount of time you spend grading each week. *e.g.* ...
  - Choose either a 10 point scale, letter grade, or check/plus/minus and stick with it (I recommend the point system, since students are used to it, and it is easier to be more consistent).
  - Assign a fixed point value to each section for every lab (*i.e.* prelab = 1 point, procedure = 2 points, etc.),
  - although you can weight the sections of each lab differently each week based on (what you determine to be) their importance.
- Use a red pen or other color that stands out.
- Make a couple of strong points to the student at the end of their write-up, rather than lots of little marks everywhere. Tell them what you thought was good, what needed more effort, etc.
- Be specific in your comments.
- Write comments near the error.
- Grade each member of a lab group separately. Their write-ups can be very different
- Make backups of your grade sheets (!)

- Final grades are submitted by you using your "myucsc " account, but must be reviewed by the instructor to become official. Instructions on how to do this can be found at: `http://physics.ucsc.edu/~mjohnson/TA_Instructions_for_Grading.pdf`
  Please be considerate to the instructor, and do not submit your grades on the day of the deadline.

8 Before the First Lab

- Go through the entire lab (maybe with some other TAs). This is *extremely* important:
  - you will be able to answer most of their questions
  - you will know what to expect of their precision (and their frustration)
- Think of your expectations.
- Make a handout: name, office, phone number, email, office hours, general grading policy, suggestions to students. See the example handouts for some ideas.
- It may help to make a sample lab write-up (perhaps using the one you will write today!) of what you expect them to turn in.

9 The First Lab

- *This will be the hardest lab,* so know that they will get easier (and more fun).
- Be early!
- Prepare some information on the board before lab starts.
- During the first few minutes of your lab, introduce yourself (as you wish to),
- introduce the lab in general (what you/the department hopes they gain from being there)
- **Make sure the students know what you expect of them!** If they know what you're looking for in their lab books and general performance, everything becomes much easier for all involved ...
- Explain your basic method (*e.g.* "we'll start lab exactly on time ... i'll only give a five minute intro each week, so be on time ... my grading method is basically ... if you miss two labs you fail ... i'm leaving after 3 hours, so you must finish by then" ... etc.)
- explain the day's lab. explain what the goal is (*e.g.* to gain some experience in the physics of collisions). Tell them about anything finnicky or difficult that you noticed when you went through the lab yourself.
- **Enrollment issues can be a huge headache, and will occur if you are not careful.**
  - Before lab, you will receive a roster and a list of permission codes.

- *Labs can accommodate 22 students maximum, no exceptions!* Handing out too many permission codes, and having to tell a student who you said could add the class that they in fact cannot will create a very stressful situation for you both!
- Students who are not enrolled in the class, but want to add it will most likely show up early to ask for permission codes. Start a list on the board in the order that the students arrive, and ask them to stay until you have taken roll.
- Take roll at the end of your introduction (. . . be authoritative . . . don't let students talk over you).
- Students who are on your roster, but not present should be noted, and the roster will be returned to Julie in the physics office at the end of your section so that she can drop these students.
- At this point, if you have space, you can hand out permission codes.

- Let them go at it!

10 Resources

- **Matt Johnson – Head TA** headta@physics.ucsc.edu
  office: ISB 320 phone: 831.459.4762

  Feel free to contact Matt for any questions you have about lab, experimental setup, teaching, grading, balancing your work load, etc. (it doesn't have to be physics related). The head TA is meant to be a liaison between the TAs and the department

- **Charlie Crummer – Lab Manager** ccrummer@ucsc.edu
  office: 111D Thimann Labs . . . 831.459.4154 . . . (same hallway as the lower-div labs)
  Charlie is an excellent resource – he's the expert on the lab setups and knows the lab equipment *very* well.

- **The Instructing Professor** http://physics.ucsc.edu/about/directory.html
  Don't hesitate to talk to the professor in charge of the class about the physics. TAing can be a learning experience for you as well as the student. If something is confusing in the lab or in the textbook, the instructing professor (or any professor you feel comfortable with) can be an excellent resource.